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ABSTRACTS OF CONTRIBUTED PAPERS

TOPIC 1: SOLAR PHYSICS AND PLANETARY SYSTEMS

ASTROGEODYNAMIC STUDIES OF LATITUDE VARIATIONS DURING THE PERIOD: 1992-2002

E. Alonso,[1] A. Pacheco,[1] R. Podesta,[1] and E. Actis[1]

Astrogeodynamics is a growing activity in astronomical research. Observatorio Astronómico Félix Aguilar takes part of it by means of Photoelectric Astrolabe PA 2 observations from San Juan, Argentina.

Here we present a comparison between Instantaneous Latitude Variation and data published by IERS, for the period February 1992 to December 2002. The resulting curve has been obtained from observations of the Fundamental Stars Groups, computing weight values of Latitude Variation for each night, previously corrected for Pole Movement.

Finally we analyze the possibility of a relation between this curve and the occurrence of earthquakes of more than 5 magnitudes (Mercalli scale).

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SUBMILLIMETER OBSERVATIONS OF AN X1.2 SOLAR FLARE

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We analyze the October 30, 2004, X1.2/SF event that occurred in active region (AR) 10691 (N13 W13) at 11:38 UT. High-time resolution flux density observations at 212 GHz obtained by the Solar Submillimeter Telescope (SST) show an intense ($\sim$1600 s.f.u.) impulsive burst followed by a long-lasting thermal phase. Emission above background level was also detected at 405 GHz (the second observational frequency of SST). We complement the spectral radio analysis with data from the Radio Solar Telescope Network (RSTN) in the range of 0.265 to 15.4 GHz with 1 second time resolution. EUV images from the Extreme Ultraviolet Imaging Telescope (EIT) are used to identify the possible emitting sources. Assuming that the origin of the emission during the impulsive phase is gyrosynchrotron radiation from mildly relativistic electrons, we derive the parameters of the accelerated electrons and emitting source using the gyrosynchrotron codes developed by Ramaty et al. (ApJ 436, 941, 1994). A good fit to the flux data can be achieved taking B=160-200 G, 0.15 Mev $< E <$ 10 Mev, $\delta = 3.9$ and a source size of $25''$. This size agrees with the one observed in EIT images. The long-lasting phase is analyzed in terms of thermal emission and compared with the radio flux inferred from the temperature and emission measure derived from the Geostationary Operational Environmental Satellites (GOES) data. The flux data shape closely follows the radio flux predicted from the soft X-ray data. Although the observed absolute flux density exceeds the predicted one by a factor 5, we argue that both come from a common source, having electron populations with different temperatures.

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DETECTION OF EXTRASOLAR PLANETS WITH TRANSITS

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We obtained high-quality optical images with VIMOS at the ESO VLT, in order to get very precise lightcurves during the transits of 10 OGLE candidates. Our photometry is about 10 times more precise and 100 times more frequent than the OGLE photometry, and that is achieved accumulating more photons faster, using the large telescope. With about

100 points in the flat portion of the transit plus a similar number of points before and after, we could measure the eclipse amplitudes with a precision of 0.0001 mag and also accurate transit durations.

The candidates have been confirmed as faithful planets or brown dwarfs or pre-screened carefully as good candidates as done in our previous work using low dispersion spectroscopy and near-IR photometry.

The final products of our work are: 1) Determination of the mean transit times and of the times of ingress-egress. 2) Precise estimate of the transit geometry (impact parameter of the transit and the orbital inclination angle). 3) Accurate measurement of the amplitude of the transit, leading to a precise planetary radius measurement.

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OBSERVATIONS OF PROTOPLANETARY DISKS IN ORION OB1

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Using IRAC instrument aboard the SPITZER Space Telescope, we have obtained images in the 3.6, 4.5 5.8 and 8.0 μm bands in two regions of the sky of ~ 1 deg^2 each one, both located in the Orion OB1 Association: the Orion 1b (age $\sim 4 \cdot 10^6$ years) and Orion 1a (age $\sim 10 \cdot 10^6$ years) sub-associations. Based on first data of the CIDA Variability Survey of Orion OB1 (Briceño et al. 2005), we carried out aperture photometry to 19 objects in OB 1a and to 45 objects in OB 1b. We have constructed with this data two colors diagrams: [3.6]$-$[4.5] vs [5.8]$-$[8.0] and [3.6]$-$[4.5] vs [4.5]$-$[5.8]. We have found that a fraction of 2/19 stars in OB 1a and a fraction of 9/45 stars in OB 1b subassociations show evidences of circumstellar disks. We have detected 6 stars with IRAC colors which suggests that dust in the inner region of their disks had experimented an appreciable evolution, consistent with predictions of planetary formation models. The stars in these subassociations have shown in general an IRAC colors deficit with respect to the Taurus objects, which suggests that dissipation processes of fine dust could develope on time scales of $\sim$ 2-8 millions years.

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DYNAMICAL BEHAVIOUR OF CENTAURUS-TYPE OBJECTS

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We have analyzed the dynamical behavior of objects located in a position $22 < a < 26$ AU which corresponds to the mean motion resonances 3:2 and 2:3 with Neptune and Uranus respectively. Mostly of the studied objects migrant toward the external part of the Solar System. Some of them are ejected from the Solar System with a great e. Of the test particles studied less than 10 cases becoming Earth and Mars crossers. Many objects make numerous close approaches to Jupiter and Saturn. Other clones, a few, can reach the region a approx 500 AU, e approx 0.78, i approx 15° like Sedna. This behavior of some clones occur when Neptune has $a = 28$ AU.

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MULTI-WAVELENGTH ANALYSIS OF AN M6.7 FLARE FROM AR 10486

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The most intense flares of Solar Physics history were registered during October - November 2003. Here we analyze the M6.7 flare (12:27 UT) on October 27, 2003, that occurred in the complex active region (AR) 10486 (NOAA number). We use data in different wavelengths provided by instruments observing from the photosphere to the corona. Using the Michelson Doppler Imager (SoHO/MDI) magnetogram at 12:47:03 UT as boundary condition, we compute the coronal magnetic field under the linear force-free field assumption. We compare the computed magnetic field lines with the Extreme ultraviolet Imaging Telescope (SoHO/EIT) loops to determine the free parameters of our model. From the model we find that a magnetic null point is present in the corona. We propose that magnetic reconnection at this null point is responsible for the M6.7 flare.

Concerning radio wavelengths, we analyze the Solar Submillimeter Telescope (SST) data. At 12:31 UT, a short impulsive phase ($\sim$ 1 minute) is detected followed by a gradual ($\sim$ 1 hour) emission associated with Hα radiation observed by the H-Alpha Solar Telescope for Argentina (HASTA). The radio spectrum during the impulsive peak suggests the presence of energetic electrons radiating through the synchrotron process. During the extended phase the radio spectrum is flat up to very high frequencies, indicating that the emission is due to the thermal radiation of a cool and dense plasma. The radio analysis is complemented with patrol data from the Bern Polarimeters and Kosma and Bemrak observations.

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GLOBAL MAGNITUDES IN EXPANDING MAGNETIC CLOUDS

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Magnetic clouds (MCs) are the interplanetary counterpart of coronal mass ejections (CMEs). They transport the magnetic flux and helicity released in CMEs by the Sun. At 1 AU from the Sun, an MC is generally modeled as a static flux rope and its magnetic helicity content can be quantified (Dasso et al., JGR 108, 1362, 2003). However, an MC can be also modeled as an expanding structure when its velocity profile shows evidence of a significant expansion. Here we present a quantification of the global magnitudes for the expanding MC observed by the spacecraft Wind between August 09 (10:48UT) and August 10 (15:48UT), 1999. We use magnetic (Magnetic Field Instrument, MFI) and plasma (Solar Wind Experiment, SWE) data. We analyze here two cylindrical models: (1) a static model that considers the cloud magnetic structure as a linear force free field (i.e., the Lundquist's solution), and (2) a radial expanding selfsimilar model (Farrugia et al., JGR 98, 7621, 1993). In both cases, we derive expressions for magnetic fluxes, helicity, and energy. We apply the minimun variance method to find the cloud orientation and compute the cloud radius for the static model (R_s). For the dynamic model, we fit the initial radius for the expanding model (R_0) and the age of the cloud (T_0) from the observed velocity profile. We also fit the free parameters of each magnetic model using the magnetic observations, and find that the dynamical model better represents the data, since it fits the assymetry caused by the expansion in the cloud. Finally, for both models, we quantify the magnetic fluxes, helicity and energy, as done in Nakwacki et al. (Proc. Solar Wind 11 - SOHO 16, ESA SP-592, 629, 2005). We find a change in the computed helicity and fluxes of less than 30% (comparing static and dynamic models). Considering the range of time in which Wind observes the cloud, and the dynamic model, we find a magnetic energy decay of less than $\approx 12\%$ and a radial expansion of 17%.

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ORBITAL EVOLUTION OF THE JUPITER FAMILY COMETS CLOSE TO THE EARTH

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We studied the orbital evolution of the observed comets of the Jupiter family close to Earth (which means those that presents a perihelion distance $q <$ 1.3 AU) and its effect on the evolution of whole Jupiter family. The study of the evolution is taken in a period of time of ± 1000 years centered on the present. The obtained results of the dynamic evolution will be presented and discussed using non-gravitational forces of the model induced by Marsden et al. (1973,AJ 78,211) with purely gravitational results. It's shown how the non-gravitational forces wont have major effect on the evolution of these comets. Also it's presented the asymmetry past-future observed on the evolution of the average of the perihelion of the group of comets. This asymmetry might be caused by a particular point of phase-space, in which the comets meets or by a observational vias due to the instrumental limitation.

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THE POLARIZATION SIGNATURE OF EXTRASOLAR PLANETS TRANSITING COOL DWARFS

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We investigate the linear polarization in the light of extrasolar planetary systems that may arise as a result of an occultation of the star by a transiting planet. Such an occultation breaks any spherical symmetry over the projected stellar disk and thus results in a non-vanishing linear polarization. This polarization will furthermore vary as the occultation progresses. We present both analytical and numerical results for the occultation of G-K-M-T dwarf stars by planets with sizes ranging from the one of Earth to two times the size of Jupiter. We find that the occultation polarization may result in an observable signal and provide additional means to characterize various parameters of the system.

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A STUDY OF URANUS' IRREGULAR SATELLITES

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Very recently, rich systems of irregular satellites of the giant planets have been discovered. Their physical and dynamical properties provide a window on processes operating in the young Solar System. In particular for Uranus they may witness the mechanism leading to the peculiar tilt of its rotation axis, which is usually attributed to a giant tangential impact that suffered Uranus with another protoplanet at the end of its formation.

We have carried out the first time-dependent BVRI photometrical study of the three Uranian irregulars, Prospero, Stephano and Setebos and new observations of Sycorax at ESO using FORS2 at VLT-UT1 in two consecutive nights in July 2005 (Parisi et al. 2006 submitted to Icarus, Maris et al. 2006 submitted to ApJ Letters). We find very strong evidences of the extremely irregular structure of these objects in the variation of $\sim$ 1.5 mag of the R light curve. Considerable variations were found in all the bands. These results allow us to cast light on the formation (capture) mechanism of these objects, suggesting that these satellites should be fragments of one or more collisional interactions between planetesimals passing near the planet or between a planetesimal and a preexisting satellite, the so called "break-up" processes. These results imply not only a break-up origin for these objects but also that a large impact as the cause of Uranus obliquity cannot be ruled out.

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ASTROGEODYNAMIC STUDIES OF EARTH ROTATION

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From OAFA's Photoelectric Astrolabe Pa II systematic observations of stellar fundamental groups on period 1992 - 2002 we have determined (UT0-UTC) Time Variation Curve corresponding to Earth Rotation and its comparison with data (UT1-UTC) given by International Earth Rotation Service (IERS)

We have obtained values of the curve from the average of observations of each night with their respective weights, and have corrected them by Pole Movement.

We have also studied the possibility of relations between anomalies on Time Variation (UT0-UTC) and important earthquakes happened on the neighborhood of the Astrolabe.

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MILLI-MAGNITUDE IR TRANSIT DETECTION: OGLE-TR-113

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OGLE-TR-113-b is a giant exoplanet that was discovered independently by Bouchy et al. (2004, A&A, 421, L13), and by Konacki et al. (2004, ApJ, 609, L37). We present high quality near-IR and optical data during the transit of this planet in front of the star OGLE-TR-113 (V=14.42, α=10:52:24.4 and δ=-61:26:48.5). The K-band observations were obtained in May 2005 with SOFI+NTT, located at ESO La Silla (Chile), and the V-band observations were obtained in April 2005 with VIMOS+VLT, located at ESO Paranal (Chile). After the data reduction process and difference image photometry, it was possible to achieve millimagnitude precision for the transit light curves in both bands. The planetary transit is clearly seen for the first time in the K-band, with similar amplitudes $A = 0.03$ mag in both V, I, and K, confirming the planetary size of the OGLE-TR-113 companion. Our monitoring program for this and other OGLE transit candidates using accurate optical and near-IR photometry allows us to discard false positives (binaries, blends, giants, etc), and to refine the star/planet parameters.

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SOFTWARE FOR SUNSPOTS AUTOMATIC DETECTION, HELIOGRAPHIC LOCATION AND AREA MEASUREMENT FOR SOHO IMAGES

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Active regions (ARs) are the manifestation of the magnetic flux tubes because of the buoyancy action these emerge in the typical letter Greek Ω shape. The tracking and the respective study ARs permit us to study the global properties of the flow tubes (which form the active regions) and provide important information about the origin (formation and transports in the convective zone) and how the magnetic helicity is taken along the corona by photospheric movements. In order to initiate an study of these behaviors we are developing a programming algorithm using IDL as base, moreover taking routines developed in SOLARSOFT, will allow us to pursue of some interesting active region.

The program has obtained the year 2005 magnetograms data base provided by MDI-SOHO, in which we selected the ARs of interest to determine the location of the region in function of its heliographic coordinates. At the time of selecting this image, the level of intensity of the interest field is selected and the program calculates the position of different polarities and his geometric area (given in arcsec), these values are stored in a text file as well as a support image which shows the contour lines of magnetic field intensities chosen by the user.

As a test of the algorithm we have taken several images MDI-SOHO of the 10715 NOAA region from 01 to 03 of January of the present year; we have used up to 43 images. These results by are part of an study of active zones evolution for the purpose of determining the origin of the RA's formation.

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COMETARY MASSES DERIVED FROM NONGRAVITATIONAL FORCES

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We derive masses and densities for a number of short period comets with known sizes, including 1P/Halley, 2P/Encke, 6P/d'Arrest, 9P/Tempel 1, 10P/Tempel 2, 19P/Borrelly, 22P/Kopff, 45P/Honda-Mkros-Pajdusáková, 46P/Wirtanen, 67P/Churyumov-Gerasimenko and 81P/Wild 2. The method follows the one developed by Rickman et al. (1987) based on the asymmetry of the gas production curve, and the delay or advance in the time of the perihelion passage with respect to the one derived for a purely gravitational orbit. This delay or advance in the time of the perihelion passage is related to a change in the orbital period, which is due to the forces arising from the anisotropic outflow of gas, causing a jet acceleration on the nucleus. The gas production curve is derived from an empirical correlation with the visual light curve. Therefore, from the observed light curve and change in the orbital period, we can derive the perturbing force components and hence the mass. The computed densities are in all cases very low (less than about 0.8 g/cm^3) in agreement with previous results and models of the cometary nucleus depicting it as a very porous object.

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OBSERVATION OF EXTRASOLAR PLANETARY TRANSISTS FOR THE OBSERVATORIO UC

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What photometric precision is possible to achieve with a low budget instrument, from a place with moderate luminic contamination? Several nights of imaging stars with extrasolar planets discovered by radial velocities were acquired at the Observatorio UC for this work. We aim to compare different methods of reduction and differential photometry, in order to determine the highest photometric precision within reach of the Observatorio UC. We are looking for the optimal pipeline, as well as the limits for different possible targets. This will allow us to establish if the Observatory is capable of doing future observations of extrasolar planet transit candidates, as well as the magnitude, amplitude, and coordinate ranges of observable candidates.

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TOPIC 2: INTERSTELLAR MEDIUM AND STAR FORMATION

RADIOFREQUENCY MAPPING OF COMPACT HII REGIONS: THE RCW95 COMPLEX

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We present a $2'$-resolution, 43 GHz continuum map of the free-free radio emission of the complex RCW95 made with the 14-meter antennae of the Itapetinga radio observatory in Brazil. RCW95 is a small cloud ($10' \times 10'$) with coordinates $\alpha = 15^h44^m43^s$ and $\delta = -54^o05'54''$, associated with the radio source G326.7+0.6 and identified as an optical HII region by Rodgers et al. (1960). The region encloses three strong IRAS point sources (IRAS 15408-5356, 15411-5352 and 15412-5359) with colours of compact HII regions. This work was motivated by recent studies of the stellar population of the IRAS source 15408 (Roman-Lopes & Abraham 2004) that revealed that the source is a site of ongoing massive star formation. Previous mapping of the region were conducted by Goss & Shaver (1970) in 5 GHz with low resolution and detected strong continuum emission in this direction, but could not resolve the individual sources. In this mapping we were able to separate the emission of each HII region, identifying the radio counterparts to the IRAS sources and deriving fluxes of 7.3 ± 0.3 and 3.4 ± 0.5 Jy for IRAS 15408 and 15411, respectively, and an upper limit of 2.0 Jy for the flux of IRAS15412. We could also identify the radio continuum counterpart of the methanol maser detected by Ellingsen et al. (1996), firstly associated by its discoverers with IRAS15408. Finally, we report the results of an unpublished 22.2 GHz water maser survey that resulted on the identification of 7 different emission lines associated with all three IRAS sources in the region, closing the long debate on the nature of IRAS15411-5352 and supporting evidence for IRAS15412 being another star-formation site in the region.

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INTERSTELLAR BUBBLES AND PHOTODISSOCIATION REGIONS IN NGC 6357

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We investigate the distribution of the ionized, atomic neutral and molecular gas, and of the interstellar dust in the complex star forming region NGC 6357, with the aim of studying the interplay between the stars and the surrounding interstellar matter.

We based the study of the ionized gas on narrow-band optical images (Hα, [SII], [OIII]) obtained with the Curtis-Schmidt Camera at CTIO, Chile, and on radio continuum observations at 1465 MHz taken with the VLA, USA, with a synthesized beam of $40''$. The distribution of the neutral atomic gas is analyzed using HI 21cm line data from the Southern Galactic Plane Survey obtained with the ATCA and Parkes radiotelescopes (synthesized beam = $2\rlap{.}'3$). The distribution of the molecular gas was investigated using CO(1-0) data obtained with the Nanten radiotelescope (angular resolution = $2\rlap{.}'7$), in Chile. The interstellar dust distribution was studied using infrared data from the IRAS satellite (HIRES).

The images show neutral atomic and molecular gas with velocities in the range –12 to +1 km s^{-1} associated with the outer ionized nebula. A detailed analysis of the region reveals interstellar bubbles and photodissociation regions created by the massive stars in Pis 24 and by undiscovered ionizing sources.

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HI AND MOLECULAR GAS RELATED TO RCW 78

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We analyze the atomic neutral and molecular gas associated with the ring nebula RCW 78 around the Wolf-Rayet star HD 117688 (WN7). The CO(1-0) data were obtained with the SEST telescope of the ESO, located at La Silla, Chile, with an angular resolution of 45″. The neutral hydrogen data belong to the Southern Galactic Plane Survey with a synthesized beam of 2.′1.

The CO emission distribution reveals the presence of molecular gas with velocities in the range -66 to -32 km s^{-1} associated with the brightest part of the nebula.

The study of the HI gas emission distribution allowed the identification of a void and shell linked to the nebula, which was interpreted as the neutral gas counterpart of the optical ring nebula.

The analysis suggests that RCW 78 has probably developped at the surface of the molecular cloud, where the UV stellar photons have photodissociated and ionized the dense gas.

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NEW HIGH RESOLUTION VLA MOSAIC AT 1.4 GHZ OF THE SNR PUPPIS A

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We present new observations at 1.4 GHz of the supernova remnant (SNR) Puppis A made with the VLA in the hybrid DnC and CnB configurations (in 2003 and 2004, respectively). We observed this extended remnant (about 55′ diameter) applying a mosaicking technique to combine 39 different pointings. The data were reduced using the AIPS++ software package. The multiscale clean method was used to deconvolve the image. The interferometric image was combined with single dish data extracted from the Parkes Southern Galactic Plane Survey (McClure-Griffiths et al. 2001, AJ, 551, 394) following a feathering technique which involves Fourier transforming of both the single dish and interferometric data onto identical grids. The new image produced by uniformly weighted visibility data, has a final angular resolution of $34'' \times 16''$ and an rms noise level of 0.5 mJy beam^{-1}; the improvement represents a factor of two in angular resolution and almost ten times in sensitivity compared to the best previous image of Puppis A at 1515 MHz (Dubner et al. 1991, AJ, 101, 1466; HPBW $77'' \times 43''$, rms noise 3 mJy beam^{-1}). For the first time a highly structured border encircling a diffuse, almost featureless interior was revealed in Puppis A. In particular the northern half of Puppis A displays a wealth of structure along the periphery consisting of short arcs that appear to be oriented rather perpendicular to the shock front on the northeast quadrant, but tangential to it on the northweast side.

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RADIATIVE TRANSFER IN CIRCUMSTELLAR ENVELOPES OF PRE-MAIN SEQUENCE OBJECTS

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We developed a numerical code which evaluates the propagation, absorption and reemission of radiation in circumstellar envelopes with the aim of study the emergent flux from protostellar objects. The circumstellar medium was represented by an envelope model based on the kinetic theory of gases, and the opacity sources were attributed to a mixture of gas and dust. We have studied how the Spectral Energy Distribution (SED) is affected by the variation of model parameters. We found that the overall spectral energy distribution and color data of low mass

protostellar objects (Class 0 – Class III) can be reproduced by the present model.

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GIANT EXTRAGALACTIC HII REGIONS IN THE SOUTHERN SKY

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The present work aims to discover the presence of Giant H II Regions (GH IIR) in spiral galaxies of the southern hemisphere sky. We have obtained data of eight luminous H II regions in the galaxies NGC 7552, NGC 6070 and NGC 2997 using the Magellan Inamori Kyocera Echelle spectrograph (MIKE) at the Clay Magellan Telescope (LCO), covering the spectral range 3500-7500Å with a resolution R$\sim$60K. The high S/N ratio, together with the resolution of the echelle allowed us to solve the profile of emission lines and to calculate the velocity dispersion of the ionized gas. This analysis was done measuring the observed width of the recombination lines profile after correcting for the instrumental profile and the thermal contribution. We have discovered the giant nature of seven out of the eight candidate regions. These giant H II regions lie, within errors, on the already observed regression in the L-σ plane.

The extended wavelength coverage and proper flux calibration for our targets has been ideal to analyze the properties of the ionized gas and determine the nature and evolutionary state of its source of energy.

We have made use of photoionization models to derive abundances based on the use of strong optical emission lines. We can assure that the mechanism of excitation is due to photoionization by stars and that our GHIIRs present solar metallicities. On the other hand, the electron temperature can be determined from the ratio of the auroral line [OIII] λ4363 to a lower excitation line such as [OIII] λ5007. However, we could not measure reliable intensities for the weaker emission lines due to their relatively high metallicity, for these we could only derive an upper limit for their temperatures.

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CIRCUMSTELLAR ACTIVITY IN HERBIG AE/BE STARS

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We presented evidences of accretion of matter in a sample of Herbig Ae/Be stars and we determined whether these events originated in a remnant gaseous structure from the primordial cloud (rich in Hydrogen) or in a metal rich body (like comets in our Solar System). During such analysis we also determined precise stellar parameters for this sample of stars. The stars were observed using high resolution spectroscopy (R = 48,000). A synthetic photospheric spectrum was constructed and then subtracted from the observed one in order to obtain the circumstellar component. An iterative procedure was applied in order to find the stellar parameters that were used to build the synthetic photospheric spectrum. Evidences of accretion were found for three stars: HD100546, HD142666 and HD145718. A chemical analysis of the accretion episodes suggest that the material is Hydrogen rich, what excludes the possibility that the accretion events were created by comet-like bodies.

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PLANETARY NEBULAE LUMINOSITY FUNCTION IN NGC 6822

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We present preliminary results of CTIO 4-m MOSAIC 2 data in NGC 6822. At this time, in this galaxy there are about 17 Planetary Nebulae (PNe) reported. We obtained on-band off-band ([OII] 5007, Hα) data of the whole galaxy to search for more PNe. We measured [OIII] 5007 fluxes for the whole sample. We are studying if the PNe Luminosity Function

(PNLF) can be used as distance indicator in this galaxy because there are some problems involved: few PNe and an apparent anomalous distribution in the PNLF (Leisy et al. 2005). And our first results are:
- At this time we confirmed only 13 PNe candidates from the 17 reported previously.
- Our PNLF looks more like the standard PNLF than the previous one reported by Leisy et al. (2005).

The next step in this study will be to search more PNe in our data and complete the sample. In order to build a better PNLF. The spectroscopy with Gemini and Magallanes data are going to be clue to know if there are PNe or not. Finally we will get abundances of HII regions and PNe and then to find the chemical history of NGC 6822 with a chemical model.

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HIGH RESOLUTION H_2O MASER EMISSION FROM BRIGHT RIMMED CLOUDS

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Bright Rimmed Clouds (BRCs) are clouds that have been compressed by an external ionization-shock front which focuses the neutral gas into compact globules. The boundary layer between the neutral gas and the gas ionized by the incident photons is often called "bright rim" but the clumps are sometimes classified also as speck globules or cometary globules depending on their appearance. Small globules with bright rims have been considered to be potential sites of star formation and have been studied in several individual regions as in Orion and M17. Some systematic surveys of bright-rimmed clouds/globules associated with IRAS point sources have been made searching for new candidates of recent star formation. For some of the 44 objects in the northern sky, evidence has been found for the presence of small clusters of embedded sources of intermediate and high-far-infrared luminosity ($L_{FIR} > 10^2$ L$\odot$). We present the first high resolution VLA observations for the three detected sources, from the 20 BRCs observed during the months of February and March 2005: IRAS 21346+5714 (BRC36), IRAS 21388+5622 (BRC37) and IRAS 21445+5712 (BRC39). The low detection rate seems to support the idea that BRCs produce mostly low-luminosity objects, for which maser emission is weak and episodic, and that the embedded sources are in a more advanced evolutionary phase than class 0 objects.

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THE STELLAR CONTENT OF EMBEDDED OB STAR CLUSTER IRAS 10184-5748 THROUGH NEAR-IR IMAGING

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VLT-ISAAC K band imaging of G284.0-0.8 (IRAS 10184-5748), which we discovered during our extensive CS (2-1) survey of 1600 ultra-compact HII regions (Bronfman et al. 1996, A&AS 115,81), reveals G284 as a promising region with which to study mass segregation in the birth sites of massive stars.

G284.0-0.8 is a very small ultra-compact HII, of irregular shape in the classification scheme of Wood & Churchwell (1989, ApJS, 69, 831), and probably belongs to the carina arm witch has a minimum distance of 4.11 Kpc (Grabelsky 1988, ApJ, 331, 181). Its Ks image shows two clusters of ionizing stars embedded in extended emission, but the Js and H counterparts are weak. Seven ionizing stars are clustered within the ultra-compact HII region, which is itself surrounded by many faint stars lacking circumstellar nebulosity and J detections. Here we present Js, H, Ks, M and M imaging and photometry of G284.0-0.8.

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THE SPM KINEMATIC CATALOGUE OF PLANETARY NEBULAE

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We present a progress report on the San Pedro Mártir Kinematic Catalogue of Planetary Nebulae. Both, galactic PNe from the disk, bulge and halo populations, and PNe from galaxies in the local

group from a diverse range of metallicities have been observed.

Most of the observations have been made with the 2.1-m SPM telescope and the Manchester Echelle Spectrometer (Meaburn et al. 2003, RevMexAA, 39, 185). The data consists of spatially resoved long slit spectra at resolutions of $\sim$ 10 km s^{-1}. For most galactic targets more than one slit positions has been observed. The interpretation of the 3D structures and outflows derived from the kinematic data is being performed with the aid of SHAPE (see the contributions by Steffen, López, & Escalante, Steffen & López in this symposium). This unique database of high dispersion spectra will allow a firm characterisation of nebular shell properties in relation to progenitors from diverse stellar populations.

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CORE MASS FUNCTION OF MOLECULAR CLOUDS AND ITS DEPENDENCE ON TEMPERATURE

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We report observations of dust continuum emission towards the star forming regions NGC 6334 and NGC 6357 made with the SIMBA bolometer array at the SEST (La Silla). The observations cover an area $\sim 1^\circ \times 3^\circ$ with approximately uniform noise. On a preliminary analysis of the map using the clumpfind algorithm (*clfind2d*, Williams, de Geus, & Blitz, 1994) we find 347 clumps spanning almost three orders of magnitude in mass. Masses were estimated as being proportional to optically thin dust emission at 250 GHz. We derive an overall clump mass function of the form $dN/d\log M \propto M^{-0.6}$. In this poster we concentrate on the mass spectrum of NGC 6334 and on the possible effects of having a distribution of clump temperatures in this mass spectrum. MSX three color images were used to correlate dust clumps with infrared sources searching for embedded protostars. Also, the clumps considered to have embedded sources correlated well with ATCA free-free emission maps, verifying their higher temperatures. We find that having up to 10% of the clumps with hotter temperatures does not affect significantly the mass spectrum even though it tends to decrease significantly the higher clump masses.

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IR STUDY OF N11 IN THE LMC

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N11 is a large complex in the LMC with many regions of star formation at different evolution stages. It is characterized by a huge cavity (80×60pc) with a 5 Myr central cluster. It is surrounded by several ionized clouds where young where the youngest O star population is developing (Walborn & Parker 1992, ApJ, 399, 87; Barbá et al. 2003, AJ, 125, 1940). Current star formation is taking place in N11A and N11B. New millimeter data (CO and continuum) show that dust is associated "with the young stellar population, while the central cavity is relatively clean". In this work we present a morphological study of the gas in this region obtained with observation of the IR emission gas lines Br γ and Paschen β. These images are compared to H α and molecular gas images of N11. The main goal of this study will consist in a study of the extinction in this region using multiwavelength imaging of the gas and dust.

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HII SUPERGIANT SHELL IN THE LARGE MAGELLANIC CLOUD

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We present kinematical results obtained by using Fabry-Perot Interferometry about The SuperGiant Shell LMC9 in the LMC. That shell, composed by N204, N206, N200, N198, N205 molecular complexes, was analysed with the aim of establishing its characteristics and to test whether it belongs to a major kinematical structure. The obtained radial velocity field presents a main component with a well defined profile, and a minor component, which could reveal the presence of a high velocity stream. It could also be indicative of a layer of gas at a greater distance. In some regions the perturbation of the ISM is due to stellar winds arising from stars which lie inside the nebulosities; in other regions the observed

profile could correspond either to supernovae explosions or to very strong stellar winds coming from WR stars. In most of the complexes the bubbles rim seems well defined, with regular gaussian profiles, and could be represented by a single systemic radial velocity. In general the widths of the gaussians are quite variable for the distinct complexes, probably revealing different conditions in the medium in which the ionised gas is embedded. In particular we find small molecular clouds in the CO lines in agreement with the position of the complexes. We also observed a remarkable coincidence between the position of CO concentrations and the HII regions with narrower profiles. So it seems that dense molecular clouds would block the expansion of ionised hydrogen.

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A SHOCK WAVE MODEL FOR THE PROCESSING OF SILICATES IN CIRCUMSTELLAR DISKS

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Shock waves seems to be the mechanism able to explain the existence of crystalline silicates found in chondrites, long-period comets and disks around YSOs (Scott & Krot 2005, ApJ, 623, 571). We propose a new energy source of gas dynamics shocks based on gravitational perturbations excited by a companion object, i.e., a giant planet or a companion star. We carry out a parameterization of the wave dynamics and of the dust heating in the shock front that predicts the melting of silicates in a bound orbital range determined by the orbital semiaxis of the companion object. We obtain that the gravitational perturbations of the companion would generate shock waves able to process dust particles at $\sim$ 0.5-5 AU depending on the central star and disk physical parameters as well as on the companion orbital semiaxis. The recent detection of crystalline silicates in young binary systems (e.g. Meeus et al. 2003, A&A, 409, L25) might be understood within this scenario. For the Solar Nebula, we obtain that dust processing could have taken place by Jupiter-driven waves at a minimum distance of $\sim$ 1-2 AU. Our main result is that density waves excited by a companion object are an efficient mechanism to account for the *in situ* crystallization and melting of silicates at a large distance from the central star in contrast with the well known difficulty that the observed crystalline dust in YSOs appears to be much colder than the minimum temperature required for crystallization to take place.

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THE CALIBRATION OF PAGEL'S METHOD TO DERIVE THE O/H ABUNDANCES OF EXTRAGALACTIC H II REGIONS BASED ON O RECOMBINATION LINES

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The difficulty of measuring $I(4363)$ (or any other direct temperature indicator) led Pagel et al.(1979, MNRAS, 189, 95) to propose an empirical method based on the ratio of the nebular oxygen lines to $I(\mathrm{H}\beta)$, $R_{23} = [I(3727) + I(4959) + I(5007)]/I(\mathrm{H}\beta)$, to determine the O/H ratio in giant extragalactic H II regions. There are three different ways to calibrate Pagel's Method: a) by determining the oxygen abundance assuming uniform temperature and using $T_e(4363/5007)$; b) from photoionization models; and c) using the abundances derived from O II recombination lines. This third method uses abundances based on the much fainter recombination lines; these lines have become accessible with the new generation of 8m class telescopes.

We consider the option to calibrate Pagel's Method based on the O recombination lines to be superior to the one based on photoionization models, because even the best available models are not yet able to reproduce all the observed emission line ratios. The O recombination method is also better than the option based on the observationally determined $T_e(4363/5007)$, because the O/H values derived from the nebular lines and $T_e(4363/5007)$ are

very sensitive to the $t2$ value while the O/H values derived from recombination lines are independent from it.

The O recombination lines are only available to calibrate the upper branch of Pagel's method; from 14 objects the average increase with respect to the $T_e(4363/5007)$ method amounts to 0.21 dex. To calibrate the lower branch a different approach is needed, we propose the use of the $t2$ formalism defined by Peimbert (1967, ApJ, 150, 825); from 5 objects the average increase with respect to the $T_e(4363/5007)$ method amounts to 0.11 dex.

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CLUMPFIND IN PERSEUS MOLECULAR CLOUD

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The COordinated Molecular Probe Line Extinction Thermal Emission (COMPLETE) Survey of Star Forming Regions collaboration has finished mapping the Perseus molecular cloud in ^{12}CO and ^{13}CO 1→0, covering an area of $\approx 2° \times 7°$ with the Five College Radio Astronomy Observatory (FCRAO) (Ridge et al. 2006).

We applied the *Clumpfind* algorithm (Williams et al. 1994) to our ^{13}CO 1→0 transition data-cube with 4 different set of parameters. Using this molecular line as a density tracer we can estimate the mass for each clump found by *Clumpfind.* Assuming a distance of ~ 260 pc and an abundance of 2.18×10^{-6} with respect to H_2, we derived the Clump Mass Function (CMF) and the Virial Parameter (Betoldi & McKee, 1992).

The CMFs can be fitted with a broken power-law above 1 $M_\odot$, where all CMDs match. The exponents are 1.2 and 2.9, where the Salpeter slope is 2.35, with the turn over around 10 $M_\odot$. Below $\sim 1\ M_\odot$ a different plateau is reached for each set of parameters. The results show that the virial parameter is smaller for the most massive objects, but there is a lack of clumps with virial parameter less than unity. This could be due to depletion of ^{13}CO in the most massive objects or due to a sensitivity limit.

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THREE DIMENSIONAL ATOMIC AND MOLECULAR STUDY OF THE INTERSTELLAR MEDIUM TOWARDS RCW 103

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We present a study of the interstellar medium in an extended region towards the shell-type supernova remnant (SNR) RCW 103, based on HI $\lambda 21$ cm data obtained with the ATCA radiotelescope (Australia) and on observations of the rotational transition J = 1 − 0 of ^{12}CO and HCO$^+$ performed towards the south of the SNR using the Australian MOPRA radiotelescope. In order to visualize the atomic ambient medium where RCW 103 evolves we have developed a three dimensional display for the HI $\lambda 21$ cm data. This visualization has the great advantage of providing spatial and kinematical information simultaneously, a useful tool to get a 3-dimensional insight of the ambient gas. From the molecular lines study, we confirm on the basis of the observed changes in the intensity ratios that the SNR is physically interacting with a nearby cloud to the south.

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A 2MASS ANALYSIS OF THE STABILITY AND STAR FORMATION IN SOUTHERN BOK GLOBULES

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Bok globules are the simplest molecular clouds in which the study of low-mass star formation is not affected by disruptive phenomena that occur in other clouds that are actively forming low- and high-mass stars. The Two Micron All Sky Survey (2MASS) offer a great possibility to survey these clouds in the near-infrared distributed along the Galaxy. In this work we present extinction maps of Southern Bok globules from the catalog of Bourke, Hyland & Robinson (1995) constructed from extincted background stars in the 2MASS JHK_s bands. The radial distribution of column density obtained from these maps are then modeled with different solutions that

arise from several models of the gravitational collapse of molecular clouds cores. We adjust these profiles with Bonnor-Ebert spheres, negative-index polytropes and a simple power-law. This work will help constrain the early stages of the process of isolated star formation of low-mass stars.

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ON THE HYDRODYNAMICAL STRUCTURE OF SUPERWINDS

A. Rodríguez-González,[1] G. Tenorio-Tagle,[1] and S. Silich[1]

We present the hydrodynamical stucture of superwinds (SWs) driven by super star clusters (SSCs). We show the impact of the radiative cooling in the SW properties (Silich et al. 2003, ApJ, 590, 796; Silich et al. 2004, ApJ, 610, 226; Tenorio-Tagle et al. 2005, ApJ, 620, 217). The SSCs recently found by HST in a large variety of starburst galaxies present a typical radius and masses that range from to several times. These are now believed to be the unit of violent star formation in starburst galaxies. The mass and energy injected by stellar winds and SN explosions (in the SSC volume) is totally thermalized via random interactions. This generates the large central over pressure that continuously accelerates the ejected gas and eventually blows it out of the SSC volume. This outflow is called SW. An adiabatic steady wind solution was proposed by Chevalier & Clegg (1985, Nature, 317, 44). However, this solution is not applicable in the case of massive and concentrated cluster. The radiative cooling changes the temperature distribution, it makes that the temperature drops faster to in a very tiny radius than in the adiabatic case. For more energetic clusters, strong radiative cooling promotes the sudden leakage of thermal energy right within the star cluster volume itself, and for the cases in which the radiative losses exceed of stellar energy deposition rate, the cooling becomes catastrophic. For that case the stationary superwind solution is totally inhibited. We solved the hydrodynamics properties of the ejected gas driven by massive stars (via stellar winds and SN) in function of star formation lifetime, and found 3 important stages. And we show the observational signature for each super star cluster stages.

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THE HEATING MECHANISMS OF MOLECULAR CLOUDS IN THE GALACTIC CENTER REGION

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The molecular gas in the galactic center is exceptionally warm ($\sim$150 K), but without associated warm dust, since the dust temperature is not higher than 40 K. So the obvious question is: What process heat this gas? The two most likely mechanisms are: cloud-cloud collision and ion-slip heating. These processes can be related to observations, since cloud-cloud collision will destroy dust grains and set silicon free into the gas phase. The ion-slip heating mechanism is referred to the friction between ions and neutrals, where the ionics motions are controlled by magnetic fields while that of the neutrals by gravity. We can use different molecules to evaluate the effectiveness of these heating mechanisms. We have observations for the galactic center region in HCO^+ (J=1-0, 89.188518 GHz), SiO (J=2-1, 86.846998 GHz) and in the optically thin Formyl ion isotopomer $H^{13}CO^+$ (J=1-0, 86.754294 GHz) which falls within the SiO spectrometer range, using the NANTEN 4-m telescope from Nagoya University, operating at Las Campanas Observatory from 1999 until 2003. The area observed covered from l=354.25 to l=5.625 and from b=$-$0.6874 to b=1.3542. The presence of a large amount of SiO indicates prevalence of cloud-cloud collision, while that of the Formyl ion favors the ion-slip heating. The data are presented in latitude-longitude spatial map and L-V diagrams. In order to compare the species we present spatial plots of T(SiO)-T(HCO^+) and T(SiO)-T($H^{13}CO^+$) and L-V diagrams of SiO-HCO^+ and SiO-$H^{13}CO^+$, that allowed us to identify regions where the HCO^+ dominates and where SiO dominates, distinguishing between heating mechanisms of the galactic center molecular gas.

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SPECTROSCOPY STUDY OF THE PLANETARY NEBULAE H1-3

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We have carried out a spectroscopy study of the planetary nebulae H1-3 (PN G 342.7+00.7) with the spectrograph REOSC at the 2.15-m telescope at CASLEO, Argentina. The measured wavelength of the strong line Hα indicate a systematic velocity $V_{LSR} = 8 \pm 10$ km s^{-1}, the expansion velocity of the nebula is estimated in $V_{exp} = 25$ km s^{-1}. The emission lines identified in our spectra are: HI (Hα, Hβ), HeI 6678, 7065, [OIII]$\lambda\lambda$ 4959, 5007, [NII]$\lambda\lambda$ 6548, 6583, [SII]$\lambda\lambda$ 6716, 6731. The electron densities were derived from the [SII] 6716/6731 ratio this vary from 1.3×10^{-3} cm^{-3} in the central region to 0.6×10^{-3} cm^{-3} along the major axis. The ratio [OIII]/Hβ shows a high exitation degree: class VII. On the other hand the ratio 5007/Hβ allows estimate an abundance O/H of 10^{-4} cm^{-3}. Finally the low-excitation line [NII]6584 is strong compared to Hα, furthermore the ratio 6584/Hα increases towards the lobes.

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THE COMPLEX ISM TOWARDS THE HII REGION SH2-157

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We analyze the distribution of the gas and dust in the environs of the northern part of the HII region Sh2-157. We based our study on radio continuum and neutral hydrogen observations obtained using the Synthesis Telescope of the DRAO (Canada), CO data from the Five College Radio Astronomy Observatory (USA), and IRAS (HIRES) data. The northern part of the HII region, SG13, is a ring nebula related to WR157, belonging to the open cluster Ma 50, which is projected close to the center of SG 13. The nebula is clearly detected in the radio continuum at 1420 and 408 MHz showing a thermal spectrum. The CO emission distribution reveals two concentrics shells associated with SG13 of $\sim 25'$ and $50'$ in diameter, detected within the velocity interval -52 to -41 km s^{-1}. The HI line emision distribution shows a low emission region present within the velocity range -47 to -34 km s^{-1}, which correlates with the higher galactic latitude section of the outer CO shell.

Assuming circular galactic rotation models, the radial velocity of the ionized gas (-53 to -33 km s^{-1}, Lozinskaya et al. 1986, Ap&SS, 121, 357) and the CO gas (-47.6 km/s), indicate a kinematical distance $d_{kin} = 4.2 \pm 0.9$ kpc. This value coincides, within errors, with the spectrophotometric distance estimate of WR 157 and Ma 50, suggesting that the neutral structures detected in HI and CO are associated with this open cluster. We can explain the distribution of the interstellar material in the environs of WR 157 and Ma 50 by considering that SG 13 and its neutral gas and dust counterparts have been swept up by the stellar winds of the WR star. We believe that the outer CO shell and HI structure originated during previous evolutionary stages of the WR star.

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TOPIC 3: STELLAR EVOLUTION, STELLAR ACTIVITY, AND BINARIES

THE BEHAVIOUR OF THE CIRCUMSTELLAR ENVELOPE OF HR 5941

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We analize the behaviour of the extended envelope of the star HR 5941 from 1904 to 2005. The star shows cyclical radial velocities and spectral variations which cannot be explained by a pulsating model. Based on observations taken in CASLEO and ESO observatories, we describe the activity observed in the star during the last 15 years.

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BIDIMENSIONAL SPECTROSCOPY OF HR DEL SHELL WITH GMOS-IFU

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The slow and bright classical nova HR Del 1967 was observed in the optical using GEMINI-NORTH GMOS-IFU in 2002 with a spectral range from 0.4 μm to 1 μm, a resolution of ∼300 km/s, and spatial resolution of $\sim 0''.5$. Line intensity maps were obtained for Hα+[NII], [OIII] 5007, Hβ and helium lines. The shell showed a bipolar and clumped structure resembling the shell observed in 1998 (Harman and O'Brien 2003). The [OIII] 5007 map showed seven bright knots. Models of the central source, shell and knots spectra were performed using CLOUDY 94 (Ferland et al. 1998) and RA3D (Diaz 2001). Central source spectra were best fitted with a $T_{eff} = 60000$ K, $\log(g) = 6$ and $\log(L_*) = 36.6$ Rauch atmosphere model. Shell H-density law was modeled using a power law with α parameter -1.2 and mass = 4.1×10^{-4} M$_\odot$. The knots spectra were fitted as gaussian condensations with ∼50000 cm^{-3} peak H-density and ∼20000 cm^{-3} average H-density. HeII 4686 emission was found in the knots. The HeII origin is atributted to projected emission from diffuse matter in front of the knots, hypothesis corroborated by about the same HeII intensity observed outside the knots. Physical parameters of the condensations were obtained from our analysis and helium abundances were recalculated. A peak density contrast N/N$_S$ = 270 was found when compared to the medium outside the knots. Electron temperatures ∼9500 K, electron densities ∼20000 cm^{-3} and helium number abundance ∼0.2 were derived. Our results showed a constant helium abundance within a narrow radius range which is consistent with impulsive ejection (Kato and Hachisu 1994).

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ECLIPSE MAPPING EXPERIMENTS IN DWARF NOVAE OUTBURSTS

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In this work, we report the eclipse mapping analysis of CCD photometric data of two short period dwarf novae – V4140 Sgr (Borges & Baptista 2005) and HT Cas (Borges, Baptista & Catalán, in preparation) – during observed outburst events. The analysis of the observations of V4140 Sgr, done between 1991 and 2001, reveals that the object was in the decline from an outburst in 1992 and again in outburst in 2001.

A distance of $d = 170 \pm 30$ pc is obtained from a method similar to that used to constrain the distance to open clusters. From this distance, disc radial brightness temperature distributions are determined, and the disc temperatures remain below the critical effective temperature $T_{\rm crit}$ at all disc radii during the outburst. The distributions in quiescence and in outburst are significantly different from those of other dwarf novae of similar orbital period. These results cannot be explained within the framework of the disc instability model and the small amplitude outbursts of V4140 Sgr can be due bursts of enhanced mass transfer rate from the secondary star.

Our HT Cas data consist of V and R CCD photometric observations done in 2005 November with the 0.95-m James Gregory Telescope (JGT) and cover a outburst cycle. We used the entropy associated to the eclipse maps to obtain the semi-opening disc angle α evolution throught the outburst. The obtained angles are systematically lower than those obtained by Ioannou et al. (1999) and we can conclude that the outburst radial profiles must be flatter than the the $T \propto r^{-3/4}$ law of steady state dics, against the expectations of the disc instability model. Our intensity radial distributions presents the same "outside-in" outburst behavior as obtained by the referred author.

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DEBRIS DISK AND EXOPLANETS: THE METALLICITY PROBLEM

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Debris disks (DD) are the most visible signposts of other planetary systems, representing indirect evidence of planetary system formation. It has recently been shown that the metallicity distribution of the stars with planets peaks at a more positive value than for nearby stars. Our aim is to test whether the metallicity differentiates DD stars from stars with Doppler detected planetary mass objects. We compiled a list of 140 DD candidates stars from the literature. We obtained photometry data from the IRAS and Hipparcos databases. We used the catalog of Nordström et al. (2004) to obtain metallicity for F and G stars. With the data from the IRAS databases

we constructed the IRAS Color- Color diagram, the compiled sample shows clear color excesses. We find an anti-correlation between the age and the IR excess for the DD stars with resolved disk . It means more age, less IR excess. Finally, we compare the metallicity distributions of F and G DD candidate stars, Exoplanet host stars and field main sequence stars, and find that F-G DD objects have metallicities quite similar (although not identical) to field main sequence stars and significantly different from the Exoplanet host group. This result may suggest that giant planets of the type detected by radial velocity techniques are not as common in Vega-like objects as in Exoplanet Host Stars.

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1.5-MCTIOPI: A SOUTHERN SKY PARALLAX INVESTIGATION

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Trigonometric parallaxes, proper motions and $V_J(RI)_{KC}$ photometry were obtained for 69 stars studied by the Cerro Tololo Inter-American Observatory Parallax Investigation (CTIOPI), a widely scoped program aimed at discovering and characterizing nearby stars (see: `http://www.chara.gsu.edu/thenry/CTIOPI/`). The observations were carried out with the CTIO 1.5-m telescope, which targeted the fainter subset of the CTIOPI input list. We discovered 20 new nearby stars ($D \leq 25$ pc, the classical limit of the Catalogs of Nearby Stars), three of which lie at distances less than 10 pc: DEN 1048-3956, at 4 pc, DEN 0255-4700 at 4.97 pc, and LP 647-013 at 9.59 pc. Color-magnitude and color-color diagrams, in combination with theoretical isochrones from the literature, tangential velocities, M_R and M_J, aided to identify the general nature of our targets. We have in this way discovered several new subdwarfs and very low mass stars, a few of which could be brown dwarfs.

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NEW UBV, DDO AND WASHINGTON PHOTOMETRIC DATA FOR THE RED GIANTS IN THEN OPEN CLUSTER NGC 2447: MEMBERSHIP AND CHEMICAL COMPOSITION

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M. C. Parisi[1]

UBV, DDO and Washington photometry for 14 red giant candidates of the open cluster NGC 2447 is presented. Membership results emerging from the application of two photometric criteria are in excellent agreement with those derived from published Coravel radial velocities. A mean cluster reddening $E(B-V) = 0.05 \pm 0.04$ is derived. Both the ultraviolet excesses and cyanogen anomalies of the cluster giants imply $[Fe/H] \simeq -0.1$. Five Washington abundance indicators yield a mean cluster metallicity of $[Fe/H]_W = -0.09 \pm 0.06$.

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THE GLOBULAR CLUSTER M69: COLOR-MAGNITUDE DIAGRAM AND VARIABLE STARS

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J. D. Gregorsok,[4] D. L. Welch,[5] and
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We present BV photometry and the results of a search for stellar variability in the globular cluster M69 (NGC 6637). The images were collected over a one-week run at the Warsaw 1.3-m telescope in Las Campanas Observatory in April 2003. The photometry was performed using DAOPHOT II/ALLFRAME and the variable stars search was made with ISIS 2.2. Our color-magnitude diagram (CMD) shows a red horizontal branch (HB) typical of moderately, metal-rich clusters as M69, with significant contamination by field stars. We are unable to confirm or discard the possible blue HB extension suggested by other authors. In our search for variable stars we found 61 candidates, 53 of which are new discoveries. Among these 53 newly discovered variable stars we have 8 RR Lyrae, 4 SX Phe, 10 eclipsing variable and 15 LPV candidates. In the case of RR Lyrae stars, cluster membership is

still uncertain since the ALLFRAME magnitudes do not place these stars at the HB level, as would have been expected in the case they were bona-fide cluster members.

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PHYSICAL PARAMETERS OF THE PRE-WN CANDIDATE HD326823

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HD326823 is a massive and luminous star characterized mainly by the presence of very intense HeI emission lines. From qualitative spectroscopic studies it was proposed by Lopes et al. (1992, A&A, 261, 482) and Borges Fernándes et al. (2001, ApJS, 136, 747) that this interesting object is in a pre-WN stage of evolution. In the present work we reinforce this conclusion, thanks to the estimate of its physical parameters like mass loss rate and especially chemical abundances.

The data analysed by us were obtained at ESO 2.2-m telescope, with the spectrograph FEROS (R=48000) on April, 2005.

The method employed to obtain the parameters is the fitting of HI, HeI and NII emission lines. In order to do this we have used the CMFGEN code, developed by J. Hilliers and colaborators (see, for instance, Hiller & Miller 1998, ApJ, 496, 407). This code is adequate for the modelling of lines produced in an expanding atmosphere and it includes important effects like line-blanketting and clumping.

Preliminary results indicate a mass loss rate in the range and a clear overabundance of helium. As nitrogen abundance is concerned, it also indicates a tendency of increased abundance, but the result is not so firm in this case.

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DISK FORMATION IN Be AND B[e] STARS

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The inclusion of rotation in the hydrodynamic equations of radiation driven winds in a rapidly rotating star yields to a new solution (Curé, M., 2004, ApJ, 614, 929). Combining this new solution (slow solution) and the standard solution (fast solution) to describe the wind structure of a rotating star, a hybrid wind model is obtained. The polar wind is described by the fast solution while the equatorial flow, by the slow solution. We compute simultaneously the line-force parameters and the density contrast between polar and equatorial regions. In the equatorial region close to the star ($< 2\ R_*$) we obtain density values 1000 times greater than the ones obtained in the polar region. In external regions the density contrast is around 10. We propose these solutions to explain the disk wind formation in B[e] stars. In the case of Be stars, the computed density contrast is between 10 and 30.

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HUNTING MASSIVE STARS AROUND THE TARANTULA

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We have studied the N159A region which is located aproximately at $\alpha = 5^h 40^m 07^s$ and $\delta = -69^o 47' 47''$. This region belongs to a major complex called N159 located in the LMC at the southern edge of the 30 Dor Nebula. All the complex is $\sim 50pc$ diameter long and in its interior there are at least six HII regions (N159A, E, F, G, H, K). N159 is an extremely young complex and shows characteristic features of active stellar fomation. The interest in studying N159 is based in the fact that it is an extragalactic (though near) star forming region, in a low metallicity environment and located spatially close to an enormous complex of star formation like 30 Dor. These conditions make N159 an excellent place to study and learn about a subject as sequential star formation, IMF of stars at low metallicities, peculiar objects, etc. In the present work we made a spectrophotometric analysis of a large number of N159 objects. The images used for spectroscopy were taken with the 2.5-m telescope at Las Campanas Observatory (Chile) during the nights from 26th to 28th November 2003. The images, 25 arc minutes wide, were taken with the Wide Field Reimaging CCD Camera, using masks for multiobjet spectroscopy with medium spectral resolution.

In this study aproximately 150 stars were classificated as a result of the analysis of 5 masks. We have found 50 O-type stars, 70 early B type stars and 30 stars of spectral type later than A (which most probably are field stars) in a region where no spectral classification had been obtained before.

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BVRI PHOTOMETRIC MONITORING OF η CARINAE

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We present here the most recent results, obtained up to August, 2005, of our monitoring program of the Luminous Blue Variable η Carinæ. After the observing campaign to register the "eclipse-like" event, which ocurred in 2003.5 (Fernández Lajús et al. 2003, IBVS, 5477, 1), we have continued the monitoring of this amazing object, aiming to complete the orbital period of 5.5 years of the proposed binary. Our observations consist of CCD photometry in the Johnson-Cousins optical bands $BVRI$, using the 0.8-m Reflector telescope at La Plata Observatory, Argentina. The light curves in the four bands, show a similar behavior. Fluctuations were present in every band and their amplitudes were not greater than 0.1 mag. Two notorius minima were registered in February 2004 and December 2004, and one maximum during January 2005. η Car has slowly brightened reaching $V \sim 4.85$ during August 2005. All our data are permanently updated and can be seen in our web-page: `http://lilen.fcaglp.unlp.edu.ar/EtaCar`.

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ECLIPSING BINARY SYSTEMS AS CALIBRATION FOR STAR FORMATION MODELS

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Pre-main sequence stellar evolutionary models allow the understanding of star formation processes and early stellar evolution. A comparison of these evolutionary models and fundamental stellar parameters, directly determined through observations, provides useful data for testing the predictions of existing models and, what's more, provides them with an empirical mass calibration.

A thorough spectroscopic and photometric analysis of eclipsing binary systems yields highly accurate properties of the system and of its stellar components, in such a manner that they are determined independently of their distance and other theoretical assumptions.

The newly discovered system is an example of very young, low-mass eclipsing binary member of the Orion Nebula Cluster. Therefore, it has a likely age of only a few million years. The components of the newly discovered system are both brown dwarfs, with masses of 0.054 and 0.034 solar masses, respectively, making this system the first example of an eclipsing brown dwarf pair.

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NEW OB STARS IN THE FIELD OF THE HAVLEN-MOFFAT 1 GALACTIC OPEN CLUSTER

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Havlen-Moffat 1 (HM-1) is a poorly known, highly reddened open cluster situated in the inner part of our Galaxy. HM-1 was first studied by Havlen & Moffat (1977, AA, 58, 351), who identified 2 Wolf-Rayet (WR), 2 Of, and 2 O8 stars. Two additional Of stars were later classified by Massey et al. (2001, AJ, 121, 1050). When attempting to estimate the distance to HM-1, Havlen & Moffat (1977, AA, 58, 351) found 3.3 Kpc via main-sequence fitting and 2.5 Kpc via spectroscopic parallaxes; and Vázquez & Baume (2001, AA, 371, 908) obtained 3.3 Kpc from the ZAMS superposition. With the goal of learning more about the early-type population of HM-1, and to solve the uncertainty about its distance, we observed the spectra of all of its known probable members with the WFCCD spectrograph attached to the 2.5-m du Pont telescope at Las Campanas Observatory. Here we present for the first time the spectra of several probable members of HM-1, including 20 new OBtype stars, and use them to estimate a new spectroscopic distance.

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BINARY FREQUENCY IN THE OPEN CLUSTERS NGC 6025 AND BLANCO 1

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This work is part of an ongoing program aimed at determining the binary frequency and the properties of the binary star population in southern open clusters.The goal of the project is to provide statistical data essential for clarifying the role played by binaries and multiple stars in the evolution of open clusters.

We present here the results of a spectroscopic study of the open clusters NGC 6025 and Blanco 1. Repeated observations for 78 stars in these two clusters were obtained throughout 5 years with the 2.1-m telescope and the echelle spectrograph REOSC at the CASLEO. We measured radial velocities and determined kinematic memberships. We obtained for the mean velocities of the clusters NGC 6025 and Blanco 1 6.8±0.2 km/s and 11.1±0.3 km/s, respectively.

In the cluster NGC 6025 we detected 2 double lined spectroscopic binaries, one of which is not a cluster member according to its center-of-mass velocity. In addition, eight stars are radial velocity variables or show spectral lines with variable or asymmetrical profiles. These objects are candidates to be binaries with components of similar spectral types and high rotational velocity. Some of them, however, might be spotted rotating stars or pulsating stars. In Blanco 1 we detected eight single-lined binary stars and calculated the orbit for six of them. NGC 6025 presents a high binary frequency, probably over 40-50 percent, while in Blanco 1 the spectroscopic binary fraction is about 25 percent.

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HIGH SPATIAL RESOLUTION NEAR-INFRARED IMAGES OF PROTOSTARS IN TAURUS

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We present near-infrared K and L images of 15 embedded Class I objects belonging to the Taurus-Auriga molecular cloud. L-band images were obtained with the COB, at the KPNO 4-m telescope, used in the diffraction limited mode (DLIRIM) while K-band data were observed with both the COB and the STERLIMCam attached to the 1.2-m telescope of the Fred L. Whipple observatory in Arizona. In this analysis we use the radiative transfer code of Whitney et al. (2003, ApJ, 598, 1099) to model these images. We adopt a geometric configuration that consists of a central illuminating source surrounded by an accretion disk and infalling envelope. Perpendicular to the disk, a bipolar outflow excavates cavities along the rotational axis of the envelope. We constructed a grid of models for the centrifugal radius (R_c), accretion rate ($\dot{M}$), opening angle (θ) and inclination angle (i). In addition we tried two grain models in the envelopes, a model with r_V =4.3 and the ISM grains. We obtained physical and geometric parameters for each of the analyzed protostars. We compare our results derived from high and low resolution images with those obtained by other authors. We find that envelopes with grains corresponding to R_V =4.3 reproduce better the real images than envelopes with ISM grains.

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SPECTROSCOPIC STUDY OF THE BE STAR 88 HER

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Since its discovery as a variable star, 88 Her has undergone three photometric long-term variation cycles with transitions between Be-Shell and normal B phases. From the spectroscopic analysis of fifteen high resolution spectra obtained by the IUE satellite between 1981 and 1992, we were able to set parameters such as optical depths and location of line forming regions. We also found that the periodic radial velocity variations of UV Fe II lines agree with the orbital period (86.7 days). The residual intensity variations of Fe II lines have a cycle of 1560 days.An analysis of Mg II lines allowed us to measure for the first time the radial velocities of both stars of the binary system. Our aim is to ralate the properties of a circumstellar envelope to the variability phenomena observed in Be stars, in order to understand the mechanisms which cause them.

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SPECTRAL ENERGY DISTRIBUTIONS OF TAURUS CLASS I OBJECTS

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In this contribution we present the analysis of the SEDs corresponding to three of the Taurus protostars (IRAS 04248+2612, IRAS 04295+2251 and IRAS 04365+2535). We compile from the literature the Spectral Energy Distributions (SEDs) of these embedded Class I objects. We use the radiative transfer code of Whitney et al. (2003) to model the SEDs. This code computes models for combinations of several physical and geometrical parameters such as: the accretion rate ($\dot{M}$) and the centrifugal radius (R_c), in the first case, and the inclination angle (i) and cavity opening angle (θ), in the second. In our analysis we varied these parameters and fixed other parameters of the star + disk/envelope system. In this manner, we constructed a grid of models that were used to choose an initial set of parameters for each of the analyzed protostars. We then refined this initial solution by constructing a new grid around this set of values. We proceeded in this way until we obtained a synthetic SED that reproduced the observed data. In General our initial results for the three objects presented in this contribution agree the ones obtained by other authors. Our goal is to refine these initial solutions to achieve a better fit to the observed data and to perform a similar analysis for the rest of the Taurus Class I sources (12 in total). The results for the complete set of Taurus protostars should allow us to begin to investigate statistical tendencies among physical and geometric parameters and better characterize the properties of these extremely young objects.

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X-RAY AND GAMMA-RAY RADIATION OF COLD NEUTRON STARS DUE TO NEUTRAL INTERSTELLAR GAS ACCRETION

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Effects of neutral gas (hydrogen and helium) accretion onto a cold (surface temperature about 0.3×10^5 K) neutron star are studied. Capture of charged particles from interstellar medium is suppressed because of electro-magnetic wave of neutron star magneto-dipolar radiation and ejected plasma with freezing-in magnetic field pressure. But the wave has no effect on neutral gas. Neutral gas is captured by gravity into neutron star magnetosphere, then it is ionized by surface thermal emission and then accelerated by electro-magnetic field of neutron star magnetosphere. Energy of accelerated particles transforms into gamma-ray emission and thermal energy of polar caps radiating in X-ray. It was calculated that neutron star with magnetic field 10^{12} G and rotation period P=1 sec radiates most efficiently when it has surface temperature 0.3×10^5 K (accretion of hydrogen) and 0.45×10^4 K (accretion of helium). When concentration of interstellar gas is $1\,\mathrm{cm}^{-3}$, temperature of polar caps appears to be about 1.5×10^6 K and their X-ray radiation is about $2 \times 10^{29}\,\mathrm{ergs\,s^{-1}}$. Such high level of radiation cannot be provided by retuning positron flux. Gamma radiation of neutron star with these parameters due

to accretion is about $0.2 \times 10^{29}\,\mathrm{erg\,s^{-1}}$ that is small in compare with radiation of primary electron beam $4 \times 10^{29}\,\mathrm{erg\,s^{-1}}$. The example of such source can be radio and X-ray pulsar J0826+2637. This work was supported by RFBR (project code 04-02-17590).

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ON THE STABILITY OF THE LONG-TERM VARIABILITY OF THE DOUBLE PERIODIC VARIABLES

R. E. Mennickent,[1] P. Assmann,[1] and B. Sabogal[1]

We have analyzed times of maxima and minima in the long-term light curves of the recently discovered double periodic variables (DPVs, Mennickent et al. 2003, A&A, 399, L47) in order to enlighten the nature of their photometric variability. Whereas it seems well established that the short-term variability is strictly periodic and seems to be well explained as ellipsoidal variations in a close binary system, we find the long-term variability non strictly periodic, with an hitherto unexplained origin.

We have examined OGLE and MACHO light curves of DPVs spanning a time range of 11 years. We measured times for maxima and minima, using the centers of polynomial fits to the peaks. Poorly-resolved peaks were rejected from our analysis. The method was successful for all stars except for the eclipsing systems, where the crowding of the photometric points avoided to find accurate timings. In order to increase the statistical significance of our results, and using the observation that the long-term variability is well represented by a sinusoid (M03), we considered maxima and minima altogether in our analysis. We considered the nth observed peak HJDn and calculated the period P2, by fitting the data with the function HJDn = HJD0 + n(P2/2) . In order to test the stability of the period we constructed O-C diagrams. We find that the systems can be grouped in: G1-type, those systems with brief but significant excursions of timings around the predicted value (7 cases), G2-type, those with short-lived tendencies of increasing or decreasing period (9 cases), G3-type, those with a global pattern of decreasing or increasing period (7 cases) and G4-type, those with random distribution of timings around the predicted value (7 cases).

In a forthcoming paper we will provide an atlas for the long-term variability of double periodic variables.

MODELLING AND SIMULATION OF ASTRONOMICAL PHENOMENA WITH FEEDBACK USING SYSTEM DYNAMICS

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The hypothesis of implementing system dynamics as a methodological tool for the construction of mathematical models of astronomical phenomena that show feedback is proposed. These processes are described as dynamic systems because feedback loops are present in the influence relationships between the variables of the system. The feedback loops or feedback refers to the situation where variable X affects variable Y, and Y in turn affects X, producing a series of causes and effects. The interaction $X - Y$ cannot be studied independently, only the study of both interactions as a whole will lead us to the correct results. Modelling and simulation with system dynamics can be summarized as follows: Analyze the theory and/or observations of the problem, establish the influence relationships to find the feedback and verify the dynamic nature of the system, translate the influence relationships into mathematical relationships and obtain its numerical solution under different simulation conditions. The step from influence relationships to differential equations is facilitated through a series of representations based on the correlation: *state variable-rate*, where the state variable expresses the evolution of the system and the rate expresses the change of the state variable. Three cases where this methodology is used were shown; in the Proton Proton Chain case the model is completely developed and the results are in accordance with the theory and observations. In the cases of the CNO cycle and the galactic evolution the authors are developing these models to verify the hypothesis aforementioned.

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CHANGE OF PERIOD IN CYGNUS X-1

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Cygnus X-1 is an X-ray binary system composed by a supergiant star (O9.7 Iab) and a presumed black hole with mass of 18 and 10 $M_\odot$ respectively. A period P of 5.599847±0.000018 days has been reported by La Sala et al. (1998, MNRAS, 301, 285). We used our recent observations and previously published data to try to detect variations in the orbital period. Variations in the period are related with changes in the orbital angular momentum caused by the mass loss of the supergiant star. Using our results for the rate of change of period we found a preliminary independent estimate for the mass loss rate of the primary star. We compared our results with those found by Herrero et al. (1995, A&A, 297, 556) using stellar-atmospheres models.

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SPECTROSCOPY OF HOT HORIZONTAL BRANCH STARS IN GLOBULAR CLUSTERS

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We will present our latest results on spectroscopy of hot horizontal branch stars in globular clusters. This class of stars still presents many puzzling features, and many aspects of their formation and evolution are still unclear. Extreme Horizontal Branch (EHB) stars, also known as Subdwarf B (sdB) stars, are post-He flash stars with a He-burning core and high effective temperature ($T_{eff} \geq 20000$ K). They originate from stars of low initial mass that during their evolution have lost great part of their external envelope. Many channel for the formation of these stars have been studied in literature. The scenarios involving dynamical interactions inside close binary systems, deeply investigated by Han et al. (2003, MNRAS, 341, 669), have been recently preferred, since between field sdB stars many close binary systems have been detected. (Morales-Rueda et al. 2003, MNRAS, 338, 752). Maxted et al. (2001, MNRAS, 326, 1391) estimated that 69±9% of field sdB stars are close binary systems. Latest results indicates that also this scenario presents some problems (Lisker et al. 2005, A&A, 430, 223), and Napiwotzki et al. (2004) found a lower fraction of binaries among their sample (42%). Moni Bidin et al. (2005, A&A, submitted) recently showed that in globular cluster NGC6752 the binary fraction among EHB stars is sensibly lower than what observed among field sdBs, estimating an upper limit of 20%. This difference between field and cluster sdBs is quite surprising. We are performing further investigation of these stars extending our search for close binary systems to other two clusters with a rich population of EHB stars. This will allow us to tell if the results on NGC6752 indicate a pecular cluster or the lack of binaries is a common trend of EHB stars in globular clusters. Moreover, with a larger sample we will be able to better estimate the binary fraction, or an upper limit for it. With our contribution we are going to show our results on this investigation that at the moment is still a work in progress.

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GMOS-IFU SPECTROCOPY OF THE CBSS CAL83

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The Compact Binary Supersoft X-Ray Sources (CBSS) are X-ray binaries initially discovered in the Magellanic Clouds which are copious sources of supersoft X-rays. The basic model of this class includes a massive white dwarf that suffers stable nuclear burning on its surface due to high mass transfer rates. Here we present the preliminary results of our search for nebular emission in CAL83, a CBSS in the LMC, using GMOS-IFU data obtained at the Gemini South Telescope. We found that CAL83 shows the [FeX] 6375 Å coronal line in emission. This line had never been identified in a CBSS before. This same line was observed, for instance, as the most intense one in the spectrum of the classical nova GQ Mus four years after its outburst. As in that case, this nebular emission is probably associated to hydrostatic hydrogen burning on the surface of the white dwarf. We also found that H and HeII lines present absorption and emission components associated to bipolar jets, with velocities consistent with the escape velocity of a white dwarf. In this preliminary analysis we can not assert the presence of the [OIII], [SII] or [NII] nebular lines. We can identify an emission at the expected position of the [NII] 6548

Å line, but this emission may also be associated to a jet with velocity of −600 km/s with respect to Hα, which in fact is also observed with the same velocity near Hβ.

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ANGULAR MOMENTUM EVOLUTION IN YOUNG LOW MASS STARS

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During the last decades, the study of rotation in young low mass stars has been one of the more active areas in the field of stellar evolution. Many theoretical efforts have been made to understand the angular momentum evolution and our picture now, reveals the main role of the stellar magnetic field in all pre-main sequence stage (Ghosh & Lamb 1979, ApJ, 234, 296; Cameron & Campbell 1993, A&A, 274, 309; Cameron & Campbell 1995, A&A, 298, 133; Kúker, Henning, & Rúdiger 2003, ApJ, 589, 397; Matt & Pudritz 2005, MNRAS, 356, 167). The mean rotation of most of the cool low mass stars remains roughly constant during the T Tauri stage. This can be explained by the disc locking scenario. This paradigm suggest that star start out as CTTS with periods of 4-14 days, perhaps locked to their disc, and that this disc is eventually lost mainly by accretion. At the current time, it is not clear that this is true for all low mass stars. Some authors have questioned its validity for stars less massive than 0.5 solar masses. Although the reality may eventually turn out to be considerably more complex, a simple consideration of the effects of and limits on disc locking of young low mass stars seems necessary.We have investigated the exchange of angular momentum between a low mass star and an accretion disc during the Hayashi Track (Pinzón, Kúker, & de la Reza 2005, in preparation) and also along the first 100Myr of stellar evolution. The model incorporates changes in the star's moment of inertia, magnetic field strength (Elstner & Rúdiger 2000, A&A, 358, 612), angular momentum loss by a magnetic wind and an exponential decrease of the accretion rate. The lifetime of the accretion disc is a free parameter in our model. The resulting rotation rates are in agreement with observed vsin and photometric periods for young stars belonging to co-moving groups and open young clusters.

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STABILITY OF A TOROIDAL MAGNETIC FIELD UNDER HALL EFFECT

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In order to understand a possible decay modes of a neutron star magnetic field, we used electron-magnetohydrodynamics equations to calculate the evolution of a specific configuration in a solid sphere. Assuming a high conductivity, we found that the evolution of a purely toroidal field can be written in terms of the dissipationaless Burger equation, which has a family of stationary solutions. Introducing a small perturbation in the stationary toroidal field, we found that the poloidal component of the perturbation grows with time. Therefore, a toroidal magnetic field is unstable to poloidal perturbations under Hall effect. This instability under Hall effect was found numerically in the works of Urpin and Shalybkov and Reinhardt and Geppert.

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NO NEED FOR SPECTROSCOPY IN PMS STAR MASS DETERMINATIONS

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The problem of mass determinations of PMS stars requires the placement of each star on a temperature - luminosity diagram with evolutionary tracks. However, to determine the temperature one usually needs to know the spectral type obtained through spectroscopy, because the colors are affected by reddening from extinction and from the presence of a dusty circumstellar disk. We have found that the disk reddening can be represented by a vector, similar to the interstellar extinction one, and it is thus possible to de-redden both contributions from JHK photometry only. The method uses color-color and color-magnitude diagrams transformed to a space where extinction and disk reddening are the base of the diagrams. They are called reddening principal vectors RPV.

We have tested this method on T-Tauri low mass stars with masses known from dynamical methods. Of the 14 objects in the dynamical sample we were able to recover the mass ($< 3\sigma$) of 12 at the canonical age of $10^{6.3}$ yrs. If we relax the age assumption, we are able to find matching masses for all the objects, with ages that disperse from the canonical in acceptable amounts. We also tested the method on the individual components of the multiple sysytems in our dynamical sample with excellent results.

This new method to determine the mass of PMS stars from NIR photometry only, will greatly increase the amount of available data for initial mass function studies in the milky way and in other galaxies.

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A NEW CATACLYSMIC VARIABLE IN THE PERIOD GAP

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AD Men had been classified as a probable long–period dwarf nova, while recent spectroscopic data instead suggested a short–period system. We present time-resolved photometry and spectroscopy to determine the orbital period and thus clarify the nature of this object.

The light–curve of AD Men shows the flickering typical for cataclysmic variables, and a clear hump-like periodic modulation with an average amplitude of 0.3 mag. From this variability, we confirm that AD Men is a system at rather high inclination. However, due to the absence of eclipses, an inclination as high as 80° can be ruled out. We derive a photometric period of $P = 2.20(02)$ h. The radial velocity measurements of the Hα emission line confirm this value as the orbital period of the system. It places AD Men at the lower end, but clearly inside, the gap of the period distribution of cataclysmic variables.

AD Men increases the number of known dwarf novae in the period gap to eleven, being one of the six systems that have their orbital period measured directly, while for the remaining five, this parameter has only been deduced from the observed superhump period. So far, not much is known about the dwarf novae in the period gap, nor what makes them special, this being mainly due to the general difficulties in measuring the secondary star in cataclysmic variables. There is hope that with the growing number of systems in the gap, one or the other will qualify for a more thorough research.

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MOLECULAR GAS TOWARD THE PLANETARY NEBULA K 3-35

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K 3-35, is a very young PN particularly interesting because it is one of the two PNe that exhibits water maser emission which, in the case of K 3-35, is present in the central region as well as at the enormous distance of 5000 AU from the center. Water masers are not supposed to be found at such an enormous distance in an evolved star, where the physical conditions required to pump the water maser ($n_{H2} \approx 10^8$ cm^{-3}, $T_K \approx 500$ K) are not expected to exist. It has been proposed that the shocks driven by the bipolar jet could be creating the physical conditions necessary to pump the distant water-vapor masers. However, the presence and persistence of water molecules in these regions is still puzzling, probably related to some shielding mechanism due to the presence of high density molecular gas that protects water molecules against the ionizing radiation of the central star. A full understanding of this shielding mechanism requires first the characterization of the physical conditions of the molecular gas around the planetary nebula together with detailed modeling studies. All available data strongly suggest that K 3-35 is an extremely young planetary nebula in which we are observing the first stages of formation of collimated bipolar outflows. Then, any information about the chemistry and physical parameters of the gas in K 3-35 is very important to understand the characteristics of such a particular object. In this work, we present a search of molecular emission toward K 3-35 and the first detection of HCO^+ ($J = 1 - 0$) molecular emission from which we derived the value for the K 3-35 molecular mass: $M \approx 0.15 M_\odot$. This result suggests that this PN has a massive neutral envelope which could be responsible for the shielding mechanism that prevents water molecules from being destroyed by the central star ionizing radiation and also can provide the physical conditions to favor the maser emission at large distances. By comparing the molecular-to-ionized mass ratio with the relative abundance of HCO^+ to HCN, we have plotted the point which corresponds to K 3-35 in an evolutive sequence for young PNe showing that K 3-35 is in a very early stage of its evolution. We report new spectra of the water masers present in this PN as well as upper limits for the detection of the molecules SiO, $H^{13}CN$, $H^{13}CO$, HNC, HCN, HC_3OH, HC_5N, CS, HC_3N, ^{13}CO, CN and NH_3.

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LIGHT CURVES OF CANDIDATE PRE-CATACLYSMIC BINARIES

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We present an update on our project to provide new input on the period distribution of pre-CVs by taking photometric light curves of candidate pre-CVs to detect sinusoidal (due to reflection effect) or ellipsoidal (due to Roche deformation) variability, and to determine the orbital period in positive cases. Having analysed data for 18 objects we find 6 confirmed pre-CVs or very probable candidates, 7 discarded systems, and 5 with still insufficient data. With the exception of the previously reported system LTT 560 with an orbital period $P = 3.54$ h, all confirmed pre-CVs have periods > 8 h, that still have to be confirmed by further observations. Among these, the clearest case is that of EC 14329−1625 with possible values of either 8.42 h or 16.84 h, depending on the variation being of sinusoidal or ellipsoidal nature, respectively. This research was supported by Fondecyt grant 1051078.

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SPECTROSCOPIC STUDY OF HE PECULIAR STARS

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Spectroscopic observations of He peculiar stars were performed using the 2.15-m telescope at CASLEO, Argentina. We search for line profile variations with rotational phase originated by the presence of a inhomogeneous distribution of elements. We present radial velocity and equivalent width measurements of H, He and metallic lines. We find that HD 135038 and HD 202671 do not show variations in their spectral lines. HD 133518 shows variations in the line He I λ 4387 and HD 142301 shows line intensity and radial velocity variations with a timescale of $\sim$ 20 hours that might be due to non radial pulsations or corotating magnetic spots. We also derive mean values of the fundamental parameters: T_{eff}, $log\, g$, M_V, M_{Bol} and spectral type of 15 He peculiar objects by using the BCD spectrophotometric system.

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INTERFEROMETRIC OBSERVATIONS TOWARD S140 IRS REGION

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We have presented results of radio continuum and water maser emission observations made with the VLA toward the S140 IRS region. Our results indicate that IRS 1 is a thermal radio jet associated with a high-mass protostar and is the driving source of the bipolar outflow observed in the 20°/200° direction. In addition, we do not find evidence that IRS 1 is the driving source of the bipolar outflow observed in the 160°/340° direction, and another source, not yet detected, could be driving this outflow. On the other hand, we detected four water maser spots toward IRS 1, which could be associated with the bipolar outflow in the northeast-southwest direction.

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COMPARISON OF PHOTOMETRIC DATA REDUCTION METHODS

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We study stellar variability in open clusters. The observational data include thousands of CCD-frames in Strömgren and Johnson photometric bands. The main data reduction methods used in our study, are pure aperture photometry and combined

PSF/aperture photometry. In order to verify if the two approaches give consistent results, we reduced a selection of data separately with two methods and then compared the resulting differential light-curves. We found that for bright stars and optimal seeing conditions, the average systematic difference between the light-curves was less than 1.5 mmag with standard deviation of 1.3 mmag.

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SPECTROSCOPIC VARIATIONS INDUCED BY MAGNETIC FORCES

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We compute theoretical He I line profiles by means of LTE models for the photosphere of B stars. In these models we have taken into account the effect of the Lorentz force in the equation of hydrostatic equilibrium following the procedure of Valyavin *et al.* (2004). We analyze the influence of a magnetic field on the intensity and the shape of the line profiles and discuss the determination of abundances in magnetic stars. This mechanism could explain the observed variations in the line profiles and the continuum flux of some He-variable stars, and it could be used to estimate the magnetic field strength.

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A SPECTROSCOPIC-PHOTOMETRIC ANALYSIS OF THE BINARY SYSTEM HR 1300

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We present an observational analysis of the eclipsing double-lined spectroscopic binary HR 1300 = GW Eri. Fifteen spectra with resolution R=35000 were obtained with the 2.15-m telescope and the bench echelle spectrograph EBASIM of the CASLEO, while photometric observations in the V band were carried out with the 61-cm telescope at CASLEO. We measured radial velocities for both stellar components by cross-correlations using the IRAF task fxcor. We use as template an observed spectrum of a low rotation star (HR8641) taken from the ELODIE database, which has a similar spectral resolution. This template was previously convolved with an appropriate rotational profile.

From our light and radial velocity curves we derived orbital and physical parameters for the system using the Wilson & Devinney code. Assuming a temperature of 9000 K for the primary component, as estimated from the spectral type, we obtained for the secondary companion a temperature of 8680 ± 30 K. The resulting values for absolute masses and radii were 1.797 ± 0.006 $M_\odot$ and 1.811 ± 0.008 $R_\odot$ for the primary component, and 1.779 ± 0.011 $M_\odot$ and 1.786 ± 0.016 $R_\odot$ for the secondary. The comparison with theoretical stellar models of Girardi et al. (2000, A&AS 141, 371) for solar composition suggests an age of $10^{8.7}$ yr. However, despite the high precision of the calculated masses and radii, the great similarity of the two stellar components prevents us from using this system as a test for stellar models.

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TOPIC 4: GALACTIC STRUCTURE, LOCAL GROUP, AND STELLAR POPULATIONS

INTEGRATED SPECTRAL STUDY OF STAR CLUSTERS BELONGING TO THE MILKY WAY AND TO THE SMALL MAGELLANIC CLOUD

A. V. Ahumada,[1] J. J. Clariá,[1] and E. Bica[2]

A new base of template integrated spectra is presented, with a good temporal resolution, to be used for future determination of fundamental astrophysical parameters of Galactic and extra-Galactic stellar systems. New observational data of Galactic open clusters are provided, which allow to widen the current global knowledge of the Galactic open cluster system. The dissolution rate of these systems in selected regions of the Galaxy is examined. Reddenings and ages of 24 concentrated star clusters of the Small Magellanic Cloud (SMC) are also determined.

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THE STELLAR HOST IN BLUE COMPACT DWARF GALAXIES: ON THE NEED OF A 2D FIT

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In order to characterize the low surface brightness component in blue compact dwarf galaxies, we determine their structural parameters for eight objects by fitting a Sérsic law to the starburst-free regions of their deep B, V and R images using a two-dimensional fitting technique. We exclude the starburst emission by using color maps and Hα images. We use real data and ideal simulations to discuss the limitations of the technique and the uncertainties involved in fitting a Sérsic model, in particular, the limited portion of galaxy used in the fit and the sky-subtraction errors. We show that, by carefully masking out the starburst and performing a set of consistency checks, this 2D pixel-weighted fitting procedure is able to derive stable Sérsic parameters with small uncertainties, that could provide an important improvement in this kind of analysis. All galaxies in this sample show a red underlying component with low Sérsic indexes (n close to 1) and effective radii in agreement in the three bands, suggesting that they share similar structural properties.

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MAPPING THE OLD AND YOUNG STELLAR POPULATIONS OF BLUE COMPACT DWARF GALAXIES: THE CASE OF MRK 35

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We present a detailed spectrophotometric analysis of the blue compact dwarf galaxy Mrk 35 (NGC 3353, Haro 3), based on deep *BVRIJHK* broad-band and Hα narrow-band observations, and long-slit spectroscopy. The optical emission of the galaxy is dominated by a central young starburst, distributed in a bar-like shape, while an underlying component of older stars, with elliptical isophotes and red colors, extends more than 4 kpc from the central starburst. We used spatially resolved spectrophotometry to analyze the properties of the 8 strongest Hα emitters (young star-forming regions) of the galaxy, as well as of the optical nucleus, defined as the peak of emission in the broad-band frames. Using Hα and color maps we spatially discriminate the central starburst from the underlying populations of stars. We fit a 2D Sérsic model to derive the structural properties of the host galaxy. Finally, we apply evolutionary synthesis models to derive the properties of the young star-forming knots.

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ARE SOME INNER SPIRAL DISKS COUNTER-ROTATING OR ARE THEY WARPED?

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Simulation of encounters of disk galaxies (Barnes 2002, MNRAS, 333, 481) shows that the newly formed disks are often warped, many have rather complex kinematics, and roughly a quarter have counter-rotating or otherwise decoupled central components. Recent integral-field observations of the S0 galaxy NGC 7332 added to broad-band ground-based and Hubble Space Telescope (HST) photometry seem to indicate a double-disc structure in this galaxy. Furthermore, the SAURON two-dimensional stellar kinematic maps is interpreted as been produced by a cold counter-rotating stellar component within the central 250 pc of NGC 7332. The H β and [O III] emission line maps show that the ionized gas has a complex morphology and kinematics, including both a component counter-rotating with respect to the stars and a fainter corotating one (Falcon-Barroso et al. 2004, MNRAS, 350, 35). Other galaxies also show this type of counter-rotating inner disk at tens or hundredths parsecs scale, as the case of NGC 253 (Zhao et al. 2001, ASPCP, 240, 404). In this contribution we analyze the inner disk warp as an alternative explanation to counter-rotation to explain peculiar forms of the rotation curves ascribed to counter-rotation. In fact, inner disks warps with position angle of their line of nodes different from that of the large disks, both with a small inclination with respect to the plane of the sky, may be misunderstood as been produced by counter-rotation.

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NGC 2401: A TEMPLATE OF CYGNUS ARM YOUNG POPULATION OVER THE THIRD GALACTIC QUADRANT

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Based on a deep CCD (UBV(RI)$_C$) photometric survey and Two-Micron All-Sky-Survey (2MASS) photometry data we derived the main parameters of the open cluster NGC 2401. We found this cluster is located at 6.3 ± 0.5 kpc ($V_0 - M_V = 14.0 \pm 0.2$) from the Sun and is 25 Myr old. That allows us to identify NGC 2401 as a member of the young population belonging to the extension of the Norma - Cygnus spiral- arm over the Third Galactic Quadrant. We additionally constructed the cluster luminosity function down to V≈22 and also the cluster initial mass function for all stars with masses above M≈1-2 M_V in which case we found a slope x ≈ 1.8 ± 0.2. A spectroscopic study of the emission star LSS 440 that lies is the cluster area revealed it is a B0Ve star. Its parameters and probable connection with NGC 2401 are also discussed.

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MOLECULAR CLOUDS AND MASSIVE STAR FORMATION IN THE NORMA SPIRAL ARM

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The Norma spiral arm in the Southern Galaxy contains the most massive molecular clouds as well as the most FIR luminous regions of massive star formation in the Galactic disk. The tangent region of this arm, at a well defined distance of ≈ 4.5 kpc from the Sun, is ideal to study in detail the process of massive star formation in GMCs (Bronfman et al. 1988, ApJ, 324, 248). We present maps of the major GMCs in ^{12}CO and C^{18}O obtained with the Nanten 4-m telescope, at a resolution of 2.5 arcmin. We have obtained also CS (2-1) and CS(5-4) maps of several OB star formation regions embedded in these GMCs (Bronfman et al. 1996, A&AS, 115, 81). What is the contribution from embedded OB stars to the total FIR emission from these GMCs? What is the fraction of cloud molecular gas involved in massive star formation?

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FOLLOW-UP PHOTOMETRY AND SPECTROSCOPY OF SPACE INTERFEROMETRY MISSION PLANET QUEST GRID GIANT STAR CANDIDATES

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We show our results on followup photometry and spectroscopy of the Grid Giant Star Survey (GGSS) candidates we are establishing in our Space Interferometry Mission (SIM) Preparatory Science program. The GGSS has established thousands of metal-poor giants as SIM Astrometric Grid candidates, based on single-epoch photometric and low resolution spectroscopic observations. Metal-poor G-K giant stars are excellent Grid Candidates because, for a given apparent magnitude, they are very distant and thus show less astrometric "jitter" and they are also very numerous and well distributed. Our project is to obtain Followup, multi-epoch photometric and high resolution spectroscopic observations of half of the GGSS candidates (∼ 1000 objects in each hemisphere) in order to monitor photometric and velocity stability. Our RV sample of G-K giants is larger than any previous study. We find that about 2/3 of our stars are variable at these low velocity errors (50-100 m/s), independent of metallicity. The cause of this variation (binarity, planets, star spots, atmospheric jitter, etc.) is not clear. For 3132 stars observed photometrically in the North with ROTSE, we find only a small fraction of observed GGSS candidates are photometrically variable. A lack of correlation between the photometric and RV variability is seen. Thus, it is shown that photometric stability at the 0.025 mag level cannot be used for a pre-selection of RV-stable stars, and the most important tool remains high-resolution spectroscopy.

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THE OPEN CLUSTER G353.1+0.7 IN NGC6357

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The HII region NGC 6357 shows a very complex structure and it harbors the interesting open cluster Pismis 24 with several O-type stars. Another HII structure known as G353.1+0.7 is located to the eastern side of the nebula. This structure can be described like a Strömgren sphere surrounded by a dense dusty molecular shell with finger-like gaseous features pointing to the location of the O stars which demonstrates that these stars are the main ionizing source in the area. In this work we report new spectral types for the brightest stars projected in the cavity of G353.1+0.7. Among them, two are classified as early O-type stars: N49, O4 III((f*)) and N51, O3.5 V((f)), while two other cluster members belong to spectral types O9 V (N50) and B1 V-III (N70). We also discuss UBV photometry for stars in the area leading to the discovery of a young open cluster. From the spectroscopic parallax of the early-type stars and MS fitting, we derive a DM $\sim 11.9 \pm 0.25$ (2.4 kpc) in agreement with the value found by Massey et al. (2001), DM $\sim$ 12.0 for the Pismis 24 open cluster. This indicates that G353.1+0.7 and Pis 24 belong to the same HII complex. The star density in the core of the cluster (around N49) reaches 40 stars per arcmin^{-2} at V band and an inspection of the CM-D suggest the presence of a population of PMS stars.

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STRUCTURAL PARAMETERS FROM GROUND-BASED OBSERVATIONS OF NEWLY DISCOVERED GLOBULAR CLUSTERS IN NGC 5128

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We have investigated globular cluster candidates in the giant elliptical galaxy NGC 5128. We used the Magellan I telescope + MagIC camera under excellent seeing conditions ($0.3'' - 0.6''$) and obtained very high resolution images for a sample of 44 candidates. Our images allow us to study the light profiles of the likely clusters, all of which are well resolved. This is the first ground-based study of structural parameters for globular clusters outside the Local Group. We compare the psf-deconvolved profiles with King models and derive structural parameters and surface brightnesses. Our clusters extend to higher ellipticities and larger half-light radii than their Galactic counterparts, as do the HST sample in NGC 5128 observed by Harris et al. (2002). The combined sample fills in the gaps previously existing in $r_h - M_V$ parameter space and indicates that any substantial difference between presumed distinct cluster types is now removed and that clusters form a continuum in this diagram. Indeed, this continuum now extends to the realm of the Ultra Compact Dwarfs.

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MODELLING COLOUR-MAGNITUDE DIAGRAMS: TECHNIQUES, RESULTS AND PERSPECTIVES

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In the last decade the study of resolved stellar populations has improved significantly due to the high quality images obtained with HST, capable of generating deep colour-magnitude diagrams (CMD) even in dense stellar regions in neighboring galaxies. To take advantage of this increasing quality and quantify of data, sophisticated CMD analyzes, which combine two dimensional CMD modelling and statistical comparisons, have been employed to objectively extract the physical parameters of an stellar population. Using CMDs obtained with HST/WFPC2 and the aforementioned approach our group has been working in the following topics: 1) modelling the structure of the Galaxy, especially the thick disk and stellar halo; 2) constraints in the LMC Star Formation History (SFH); 3) determination of age, Z, $(m-M)_0$, $E(B-V)$ and positional dependence of the Present Day Mass Function (PDMF) slope in rich LMC clusters. Here we review our main results and stress the power, but also the limitations of the CMD modeling process. We also discuss the perspectives opened by Gemini and SOAR telescopes.

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NEW OPTICALLY IDENTIFIED SNR CANDIDATES IN THE LM FROM THE MCELS

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We present the optical identification of several new supernova remnants (SNRs) in the Large Magellanic Cloud. These SNRs have been identified by the ratios shown in optical emission-line images from the Magellanic Cloud Emission-line Survey. For several of these candidates, we have obtained long slit resolution spectroscopy to confirm the high [S II]/Hα ratios. We present the list of candidates, discuss the characteristics of these new objects, and also include some preliminary measurements of expansion velocities, electron and ambient densities based on the optical data we have obtained.

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ELEMENTAL ABUNDANCE STUDIES OF CP STARS THE HGMN GROUP

Z. López-García,[1] R. Tapia-Vega,[2] E. P. González,[2] S. Maris Malaroda,[1] and F. Leone[3]

An analysis of the abundances of the normal late-B star HD 196426 and of the HgMn CP star HD 144206 is presented using ATLAS9 model atmospheres and observational material taken with the SARG spectrograph attached to the Telescopio Nazionale Galileo, Roque de los Muchachos, La Palma, Spain. The isotopic and hyperfine structure of several lines of MnII, GaII, PtII, HgI and HgII in HD 144206 is investigated and also, the possible existence of weak emission lines from CrII and TiII in the red part of the spectrum.

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ELEMENTAL ABUNDANCE STUDIES OF CP STARS THE SILICON GROUP

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An analysis of the silicon CP star HD 168733 is presented using ATLAS9 model atmospheres and observational material taken with the EBASIM spectrograph attached to the Jorge Sahade 2.15-m telescope at CASLEO. The light elements are deficient except silicon which is overabundant. The iron peak and the heavy elements are all overabundant by large factors.

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THE EXOTIC CHEMISTRY OF THE SAGITTARIUS DSPH

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We presented detailed abundances for a sample of giant stars in the Sagittarius Dwarf Spheroidal Galaxy (Sgr dSph), based on VLT-UVES spectra. The closest known satellite of the Milky Way (MW), Sgr dSph is undergoing tidal disruption while moving along its short period orbit in the Halo and consituting the most prominent case of substructure accretion by the MW. The sampled population appears to be metal rich ([Fe/H] between -0.9 and 0), and shows highly peculiar abundance ratios, with underabundant α elements, deficient Na, Ni, Cu and Zn, and overabundant La, Ce and Nd among others. These abundances hint of a slower star formation rate inside Sgr dSph compared to the one characteristic of the MW disk, with a significant contribution from Sn Ia and AGB yelds. At the same time, they show that Sgr dSph is polluting the Halo with stars which composition is significantly different from the ones encountered in the MW populations. This rules out Sgr dSph as a major Halo building block, but allows to trace populations originally formed inside Sgr dSph and then accreted by the MW.

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THE OVERALL PROPERTIES OF OPEN CLUSTERS LOCATED TOWARDS THE GALACTIC ANTICENTER DIRECTION: WASHINGTON PHOTOMETRY OF NGC 1817 AND NGC 2251

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We present Washington photometry for red giant candidates in the open clusters NGC 1817 and NGC 2251. Coravel radial velocities are used to separate field stars from cluster giants. Effective temperatures and metallicities are derived for each giant star. From new UBV and DDO data, we also derive reddening and metal content for NGC 2251. We find [Fe/H] $= -0.33 \pm 0.08$ and -0.20 ± 0.05 for NGC 1817 and NGC 2251, respectively. We reexamine the overall properties of a sample of 30 clusters in the Galactic anticenter direction with distances, ages and metallicities available. No evidence for an age-metallicity relation is found. However, a radial abundance gradient of -0.093 dex kpc^{-1} is derived over a Galactocentric distance of 14 kpc. This value practically does not change when all clusters with basic parameters known up to this date are considered.

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THE ABSOLUTE PROPER MOTION OF THE SMALL MAGELLANIC CLOUD A PROGRESS REPORT

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We present a progress report on a project aimed at determining the absolute proper motion of the Small Magellanic Cloud (SMC), with respect to background Quasi Stellar Objects (QSOs) that can be used as fiducial reference points (Anguita et al. 2000, Pedreros et al. 2002, Pedreros et al. 2005). The motions thus derived, when combined with existing radial velocities, will allow us to determine the space velocity vectors of the satellite of our galaxy, which in turn will place important constraints on its orbit. This knowledge is crucial to determine if the SMC is gravitationally bound to the Galaxy, and to our understanding of the evolution and origin of the Magellanic System.

In general, the proper motions of the satellites of our Galaxy are necessary to understand: a) the origin of the Milky Way (MW) satellite system and its relationship with the formation of the galactic halo, b) the nature and origin of the streams that seem to align different subgroups of these galaxies, and c) the role of tidal interactions in the evolution and star formation history of low mass galaxies.

Using the Las Campanas Observatory (LCO) du Pont 2.5-m telescope and a CCD we expect to achieve, on a time-base of five years, and with six epochs of observations (of which four epochs have already been successfully secured, and a fifth has been granted for late 2005), a proper motion precision of 0.8 mas/year (1 mas = 1 milli-arc-sec) per QSO, for the SMC, on 10 QSO fields. This precision is sufficient to address the specific problem of reconstructing the past and predicting the future orbit of the SMC.

A comprehensive study of the MC-MW system can lead to a greater understanding of galaxy evolution and the physical processes governing star formation in galaxies, and provide us with insights into the role of galaxy interactions in stimulating star formation. In addition, the MCs may also hold important clues to understand the formation of the MW halo.

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THE CIRCUMGALACTIC SYSTEM OF HIGH-VELOCITY CLOUDS: A METHOD FOR DERIVING THEIR DISTANCES

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According to Olano (2004, A&A, 423, 895), the Galaxy is surrounded by a large cloud of high-velocity clouds (HVCs) centered on the Magellanic Clouds, i.e. on the Galactic position $(l_c, b_c) = (280^\circ\!.5, -33^\circ\!.9)$ at a distance from the Sun $d_c = 50.1$ kpc. This metacloud is translating as a whole with a barycenter velocity V_f similar to the spatial velocity of the Magellanic Clouds, since the HVCs were launched from this moving platform, and expanding from this center due to the original velocities with which the HVCs were ejected from the Clouds. The age T of the metacloud is ≈ 570 Myr. By means of a simplified model of the kinematics of the system of HVCs, we have derived

an analytic formula relating the LSR radial velocity ρ of an HVC to its distance d from the Sun: $\rho = -V_s \sin l \cos b - V_f \cos(l - l_0) \cos(b - b_0) + kd - kd_c(\cos b \cos b_c \cos(l-l_c) + \sin b \sin b_c) - V_{fall}$, where $V_s = 220$ km s^{-1} is the velocity of the LSR, l and b are the Galactic coordinates of the HVC, $Vf = 282$ km s^{-1} and $(l_0, b_0) = (78°, 2°)$ are the stream velocity of the HVCs with respect to the Galactic center and the direction from which the stream of HVCs comes (i.e., the radiant point), $k = (1/T) = (1/570)$ km s^{-1} pc^{-1} and $V_{fall} = 133$ km s^{-1} is the fall velocity of the HVCs towards the Galactic center. The above equation allows us to determine *kinematic* distances to the HVCs. We can also apply this equation to evaluate statistically the radius R_m of the metacloud. Equating the theoretical $\overline{\rho}$ of the HVCs within the total volume of the metacloud to the observed $\overline{\rho}$, we obtained $R_m \approx 140$ kpc. The uncertainties of the distances derived from this equation and its ranges of applicability will be discussed in connection with the $\rho - d$ relations of the HVCs obtained from a dynamical model (Olano 2006, in preparation).

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EVOLUTION OF THE MASS FUNCTION OF GLOBULAR CLUSTERS IN A HIERARCHICAL MODEL OF GALAXY FORMATION

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We study the dynamical evolution of globular clusters in a hierarchical model of formation of a Milky Way- type galaxy. The time-dependent potential of dark matter is taken from a cosmological N-body simulation, and each massive dark halo is supplemented by an analytic baryonic disk. Globular clusters are assumed to form within the disks of massive progenitor halos ($M_h > 10^9$ solar masses) at high redshifts ($z \sim 4$), which later merge into the common halo of the galaxy. This scenario is motivated by the results of gas dynamics simulations of Kravtsov & Gnedin (2005), who found that giant molecular clouds in those high-redshift disks may produce star clusters with masses and sizes of observed globular clusters. The initial mass function of these clusters is a power law $dN/dM \propto M^{-2}$, similar to that of young star clusters in interacting galaxies. We set model clusters on circular orbits within their host galaxies and follow their orbits through the hierarchical merging until the present, obtaining the final spatial distribution, which we compare with the observed distribution of old globular clusters in the Galaxy. The masses of globular clusters decrease with time as a result of several dynamical processes, among the most important: stellar evolution, two-body relaxation, and tidal shocks. We model all these processes, including the information of the orbits to calculate tidal heating and the effect of tidal shocks, and we compare the mass function of model clusters with the observed mass function of the Milky Way clusters.

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THE SAGITTARIUS DSPH GLOBULAR CLUSTER SYSTEM: VARIABLE STARS

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We have applied the image subtraction technique to images of four globular clusters which have been suggested to be associated with the Sagittarius dSph galaxy: Arp 2, NGC 5634, Palomar 12 and Terzan 8. As a result we have a found a sizeable population of variable stars incluiding RR Lyrae and SX Phoenicis stars in the globular clusters Arp 2, NGC 5634 and Terzan 8. We do not confirm the presence of variable stars that has been previously claimed in Palomar 12. In NGC 5634 we have found 19 RR Lyrae stars (six previously known), and 1 SX Phe star. Although the real amplitudes of all the variables are not completely determined, the Bailey diagram for the RRab stars, together with the mean of its periods $\langle P_{\rm ab}\rangle = 0.639$ d, confirm the Oosterhoff II classification for this cluster. In Arp 2 we have found 9 RRL stars (four previously known) and 3 SXPhe stars. If we only consider the mean period of the RRab stars, $\langle P_{\rm ab}\rangle = 0.593$ d, we can classify this cluster as Oosterhoff-intermediate. However, the Bailey diagram does not support this classification, because only one out of eight RRab stars are located in the intermediate region. The RRL specific frequency for this cluster is $S_{\rm RR} = 68.8$, the highest of all Sagittarius-related globulars, which could be a hint that some of the studied RRL are not Arp 2 members but rather Sagittarius field stars.

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SEMI-EMPIRICAL DETERMINATION OF THE MASS DISTRIBUTION OF HORIZONTAL BRANCH STARS IN M3

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We determine, by means of a semi-empirical study, the masses of horizontal branch stars in the globular cluster M3 (NGC 5272). We used the most recent and reliable observational datasets (broadband BVI photometry) available for the cluster, both for variable and nonvariable stars, to infer the most likely masses of individual horizontal branch stars by comparison against theoretical evolutionary tracks, suitably transformed to the observational planes. We found a mass distribution that is adequately described by a Gaussian, with $\langle M \rangle = 0.64\,M_{\odot}$ and $\sigma = 0.020\,M_{\odot}$, thus supporting the Gaussian shape previously obtained by Rood & Crocker (1989, in The Use of Pulsating Stars in Fundamental Problems of Astronomy, 218) without taking evolutionary effects into account. A recent suggestion of strong mass bimodality in M3 (Castellani et al. 2005, A&A, 437, 1017) is not supported by our analysis.

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KINEMATICS OF STARS IN THE LINE OF SIGHT TO THE OPEN CLUSTER COLLINDER 121

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We present a radial velocity study and revised spectral classification for 41 stars in the line of sight to the open cluster Collinder 121, whose existence has been often questionned, as well as its relation to a young stellar association containing the WR star HD 50896 (WR6). From our spectroscopic data and photometry available in the literature we are able to identify a real clustering at a distance of 1.1 ± 0.2 kpc from the Sun (derived through the spectroscopic parallax of its members) and sharing an average heliocentric radial velocity of 33.9 ± 2.5 km s^{-1}. This group is coincident in distance with that found by Kaltcheva (2000) based on Strömgren and Hβ photometry. From HIPPARCOS proper motions, available for 19 stars among the cluster probable members included in our study, we also confirm a common spatial kinematics for the group. The radial velocity determined for Collinder 121 is in agreement with that obtained for the ring nebula S 308 (associated to WR 6) and its surrounding HI structure, thus a physical vinculation with the cluster is inferred.

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THE GALACTIC BULGE VELOCITY DISPERSION AS MEASURED BY PROPER MOTIONS IN PLAUTS WINDOW

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Low extinction windows towards the Galactic bulge provide a good opportunity to use stellar proper motions to probe its kinematics and study the gravitational potential and mass distribution at this location. In particular, Plaut's window ($A_V \sim 0.8$ mag) located at (l, b) = (0, −8), offers the opportunity to study the transition zone between the bulge and the Galactic disk. With this is mind, we performed an astrometric reduction on a set of 43 scanned photographic visual and blue plates, taken at this target with five different telescopes: the 20″Double Astrograph at the Yale Southern Observatory (Argentina), the 84″at KPNO (USA), the 100″du Pont at Las Campanas (Chile), the 4-m at CTIO (Chile), and the 200″Hale at Palomar (USA). These plates cover $\sim 30' \times 30'$ on the sky, with seeing from 1″to 3″and $V_{lim} \sim 22$ so they reach below the bulge main-sequence turn off. These plates span over a 21-year baseline, adequate for a proper motion study, but the distortion introduced by each telescope and the crowded fields represent a challenge in the astrometric reduction. Centroids of the stars were initially computed by SExtractor and then refined with a Yale centering routine. A reduction scheme was adopted to maximize the "free-of-distortion" area on the plate, and to give more weight to the better quality plates. High order terms were required to model the distortion of the plates in most cases.

Photometric calibration was done on $\sim$ 60,000 stars, based on 29 photoelectric standards in the field, and was used to include a color term in the astrometric reduction, when necessary. Typical photometric errors are $\sim$ 0.2 mag in each band. The magnitude equation was also corrected. The final catalogue covers $20' \times 20'$ and has 21660 stars, all of them with calibrated V and B-V, proper motions (μ_l, μ_b) and errors (eμ_l, eμ_b) in μas/yr (galactic coordinates). Proper motion errors are mostly around 1.0 mas and systematic errors are all below 0.2 mas/yr. With the purpose of selecting bulge red giant stars, we cross-referenced our catalogue with the 2MASS Catalogue and used the infrared photometry to cleanly identify these stars. From the color-magnitude diagram, K vs. J-K, we get a final sample of 537 stars. This sample shows the following dispersion in p.m.: ($\sigma\mu$l, $\sigma\mu$b) = (3.36, 2.80) $\pm$ (0.11, 0.10) mas/yr. Assuming that the Sun-bulge distance is 8.541 kpc, then these values translate to a (σvl, σvb) = (135.37, 112.81) $\pm$ (4.43, 4.03) km/s. Compared to previous studies, our results agree very well.

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TOPIC 5: GALAXIES, LARGE SCALE STRUCTURE, AND COSMOLOGY

NIR MASS TO LIGHT RADIAL PROFILES IN SPIRAL GALAXIES

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We present the preliminary results of our study of the mass-to-light distribution in spiral galaxies. We show here the detailed near infrared (NIR) mass-to-light (M/L) ratios for M 83 and NGC 253, two nearby spiral galaxies with starburst nuclear activity.

We used the light profiles determined from 2MASS JHK band archival data. We selected these bands because they are much less affected by the dust distribution and the giant young star complexes of the spiral arms.

In order to derive de mass distribution, we have constructed the most complete rotation curve for M 83 from 2D kinematic data of different gaseous components (HII, CO, HI). The high spatial resolution of our Gemini data allows us to determine central region velocities in a few parsecs scale, while a wide field mosaic of HI data extends the kinematic information beyond five times the optical disk of M 83. The high resolution Paβ velocity field shows a nuclear disk decoupling whereas the outer part of the Rotation Curve implies the presence of a dark matter halo 20 times more massive than optical disk. NGC 253 Rotation Curve yields to a larger M/L ratio than M 83 and other 4 normal spiral galaxies studied by other authors.

We intend to construct a database on very detailed NIR M/L distributions and compare them with the previous optical determinations, in order to study the presence and importance of different structural components in the mass distribution of galaxies and their impact on the Tully-Fisher Law.

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DYNAMICS AND ELLIPTICITIES OF BRIGHTEST CLUSTER GALAXIES

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We inspected DSS images of 1083 Abell clusters likely to have a dominant galaxy, and derived accurate positions for BCM candidates, as well as ellipticities using IRAF's `ellipse`. We retrieved the BCM's basic parameters from NED, and extracted cluster mean redshifts, z_{cl}, and velocity dispersions, σ_{cl}, from the compilation maintained by two of us (Andernach et al. 2005, ASPCS 329, 283). We include only clusters with at least 10 measured redshifts, yielding a sample of 385 BCMs in 326 Abell clusters. For these we derived the relative velocity offset, $v_{off}/\sigma_{cl} = (v_{BCM} - cz_{cl})/(1 + z_{cl})/\sigma_{cl}$, where v_{BCM} is the BCM radial velocity. Half of the BCMs in our sample move at peculiar velocities above $0.37\,\sigma_{cl}$, with a trend for a smaller v_{off}/σ_{cl} in richer clusters which is expected if the latter are dynamically more evolved. For a sample of 980 BCMs the median ellipticity of the BCM's outer envelopes $\langle\epsilon\rangle$ rises with Abell richness R, such that $\langle\epsilon\rangle$=0.19 for the 559 R=0 clusters, $\langle\epsilon\rangle$=0.22 for 276 R=1 clusters, and $\langle\epsilon\rangle$=0.26 for 145 R$\geq$ 2 clusters. A Kolmogorov-Smirnov test for the ellipticity distributions yields probabilities of p=0.016 for the R=0 and R=1 samples, and p$<$ 0.0005 for the R=0 and R$\geq$ 2 samples to be drawn from the same population. This may suggest that BCMs in richer clusters grow more likely by anisotropic mergers. Our findings support Merritt's model (1985, ApJ 289, 18) in which most BCMs form during the collapse and virialization of poor clusters or compact groups with low velocity dispersions. We show that this model seems to apply to all BCMs, not only to cD galaxies. This supports the view that most galaxies formed in groups (and not in rich clusters) with a common dark halo and/or individual halo of each galaxy which form(s) a local potential minimum for BCM.

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GALAXY-GALAXY INTERACTIONS IN DIFFERENT ENVIRONMENTS

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We analyse the star formation rates derived from photometric and spectroscopic data of galaxies in pairs in different environments selected from the 2dF Galaxy Redshift Survey (2dFGRS) and the Sloan Digital Sky Survey (SDSS). The two samples comprise several thousand pairs, suitable to explore in detail the dependence of star formation activity on orbital parameters and global environment.

In order to characterise environment, we computed the projected local density estimator, Σ, from the distance to the 5^{th} nearest neighbour of galaxy pairs, brighter than $M_r = -20.5$ and $M_b = -19.3$ for the SDSS and 2dFGRS, respectively, and within a fixed velocity interval of 1000 km s^{-1}. Star formation activity is derived through the η parameter in 2dFGRS, and the star formation rate normalised to the total mass in stars, SFR/M^* in SDSS (Brinchmann et al. 2004).

Our analysis of SDSS pairs confirms previous results found with the 2dFGRS regarding the projected distance r_p = 100 kpc h^{-1} and a relative velocity ΔV = 350 km s^{-1} thresholds for interactions to induce significant star formation activity. We found an increase of star formation activity in galaxies in pairs for smaller projected separations and relative velocities in all environments. However, in high density regions, galaxies have to be closer to statistically show enhanced star formation activity with respect to galaxies without a close companion (see Alonso et al. 2006 for details).

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LARGE ASTROPHYSICAL STRUCTURES IN THE NEWTON-HOOK SPACETIME

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From a detailed analysis of the virial equation, we study the equilibrium and stability of cosmological and astrophysical structures in presence of an expanding universe ruled by a vacuum energy density in the so called Newton-Hook spacetime. It is shown that the effects of a positive cosmological constant has a close relation with the geometry and the density of the configurations. The equilibrium state of systems far from spherical geometry are more affected by the presence of. We generalize the procedure by taking into account other models such as Dark Energy, Chaplygin gas and Quintessence.

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KINEMATICS OF II ZWICKY 40: A HII GALAXY

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The origin of the supersonic velocity dispersion of the ionized gas in giant HII regions (GHIIRs) and HII galaxies (HIIGs) is one of the complex topics in the study of theses objects. We observed with Gemini telescope, using GMOS-N/IFU, the central region of II Zw 40 ($D \sim 12$ Mpc), a powerful HIIG. The aim is to understand the physical mechanisms which dominate the gas kinematics and the general dynamics, extending the spatially resolved study of the near star forming regions to HIIGs. We build from six frames over the brightest region of the galaxy, the Hα monochromatic, radial velocity and velocity dispersion maps. The radial velocity map shows a turbulent field, very similar with those found in Local Group's GHIIRs. From the velocity dispersion map we identified clumps well defined with high σ (up to 65 km s^{-1}), which are associated with a very weak Hα emission. Despite of the presence of the high dispersion regions, probably due to fast expanding shells and hot plasma interactions, these regions are poorly represented kinematically in the integrated optical nebular lines. A quantitative way to present these map results is through the σ vs. intensity plot, where some kinematics features of GHIIRs are identified. This method is used to show that the central starburst in II Zw 40, a single super star cluster (SSC), is one of the most powerful known, leading the gas to a smooth turbulent velocity dispersion of ~ 33 km s^{-1}.

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ENVIRONMENTAL EFFECTS IN CLUSTER GALAXIES FROM Z=0.02 TO Z=0.23

H. Bravo-Alfaro[1] and J. M. Islas[1]

Understanding the importance of environmental effects on galaxy evolution is a key step in the scenario of hierarchical structure in the Universe. In this context we present the first results of multifrequency surveys in the nearby clusters, A 1367 (z=0.02) and A 85 (z=0.05), and a preliminary analysis of *HST* images of two galaxies showing striking morphology disruption in the more distant (z=0.2) clusters, A 1689 and A 2667. Goals: (1) Study the effects of environment as a function of cluster properties and as a function of z. (2) Get an independent method to trace cluster substructure. (3) Spread the variety of physical properties of clusters imaged in HI, and push these studies to higher z. This enable to discriminate between cosmic evolution (*Nature*) and physical diversity from cluster to cluster (*Nurture*), to better understand the density-morphology relation and the Butcher-Oemler effect in clusters.

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SUPERMASSIVE BLACK HOLE MASSES AND GLOBAL PROPERTIES OF DISK GALAXIES

Y. S. Castillo,[1] J. G. Funes,[2] and R. J. Díaz[3]

Different scaling laws are known for the mass of supermassive black holes (M_{BH}): M_{BH}-σ; M_{BH}-M_{Bulge}; M_{BH}-M_{DM}. We have reviewed these correlations for 17 disk galaxies and tried to find any correlation between M_{BH} and other disk properties (HI and H_2 masses, far infrared luminosity, star formation rate, etc.). The sample was taken from Marconi and Hunt (2003). For these galaxies we have done a search in the literature for the following properties: A) in the nucleus: star formation rates, and luminosities in $H\alpha$; B) in the bulge: luminosity in B-band; C) in the disk: HI and H_2 total masses, total luminosities in X-ray, B band and far infrared, and total star formation rate. In this work we present the compiled data from the literature and the plots of M_{BH} against galaxy HI total mass, M_{BH} against galaxy H_2 total mass, and M_{BH} against disk blue luminosity. We did not find any evident correlation between the M_{BH} and the properties of the disk.

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STATISTICAL PROPERTIES OF VOIDS

L. Ceccarelli,[1] N. D. Padilla,[2] C. Valotto,[1] and D. G. Lambas [1]

We perform a statistical study of the distribution and dynamical properties of voids and galaxies around voids in mock galaxy catalogs and in the 2dFGRS. We analyze the galaxy density profiles as a function of distance to the void center and compare these with the profiles obtained for the mass around voids in numerical simulations. We detect a redshift space distortion in the void-galaxy cross correlation function consistent with an outflow motion of void shells and we are able to measure this outflow using peculiar velocities in the mock catalogues. We also compare outflow velocities to the non-linear theory model for the velocities surrounding an underdense region and find that our measurements are consistent with these predictions. We note that statistics of outflow velocities obtained using peculiar velocity data are strongly and systematically affected by distance measurement errors. We also measure the velocity dispersion of galaxies in void shells and find that galaxies move faster in the direction parallel to the void walls. Also, these results are in agreement with direct measurements from full 3D numerical simulations.

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STUDY OF INTERGALACTIC DIFFUSE LIGHT WITHIN THE FORNAX CLUSTER

A. N. Cifuentes Cárdenas,[1] S. A. Cellone,[1] and J. C. Forte[1]

The goal of this work is to quantify and to assess the detectability of the intercluster light (ICL) due to the contribution from the outermost zones of each galaxy in Fornax, and also to quantify the surface density of globular clusters (GC's) belonging to the whole cluster of galaxies. In this way we wish to estimate the amount of GC's that may be associated with the cluster of galaxies potential.

We simulated an astronomical image of the Fornax cluster from the catalogue of Ferguson (1989, AJ, 98, 367) and the observation conditions were taken from CTIO, photometric techniques (with IRAF) were used to analyze this image.

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STELLAR AND IONIZED GAS KINEMATICS OF PECULIAR VIRGO CLUSTER GALAXIES

J. R. Cortés,[1] J. D. P. Kenney,[2] and E. Hardy[3]

We present the results of the stellar and ionized gas kinematics of 13 bright peculiar Virgo cluster galaxies. The stellar velocity fields are mostly consistent with a rotation pattern, but some of them shows interesting features such as; S-shaped stellar isovelocity contours in NGC 4064, and signatures of kinematical distinct components in NGC 4429, and NGC 4698. This latter galaxy and NGC 4424 exhibit extremely low $(V/\sigma)^*$ values suggesting that these galaxies are the result of mergers. The ionized gas velocity fields are more disturbed than the stellar velocity fields, displaying non-circular motions. Most galaxies in the sample reveals kinematical signatures that can be associated to gravitational interactions such as; mergers or tidal interactions, being specially clear in the "truncated/compact" galaxies. Moreover, most of the sample galaxies show evidence for both gravitational interactions, and ICM-ISM stripping. Thus the evolution of a significant fraction of cluster galaxies is likely strongly impacted by both effects.

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OPTICAL PROPERTIES OF GALAXIES IN FOUR LOW X-RAY LUMINOSITY CLUSTERS AT INTERMEDIATE REDSHIFT

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We present an analysis of the cluster properties and investigate the galaxy population in four X-ray low luminosity poor galaxy clusters at intermediate redshifts (two at and two at). The clusters were selected from the 160 Square Degree ROSAT Cluster Survey (Vikhlinin et al. 1998, ApJ, 502, 558). The analysis is based on deep imaging and spectroscopic observations obtained at Gemini telescopes (North and South) with the Gemini Multiobject Spectrograph (GMOS).

We have started a program to obtain images and spectra of galaxies in an X-ray selected sample of poor clusters in the redshift range of. Four poor clusters with X-ray luminosity were observed with the Gemini Multiobject spectrograph at Gemini South and North during 2003. The data were used to construct a catalogue of member galaxies in order to analyze the cluster properties and investigate the galaxy population.

In this work we present our results obtained for cluster [VMF98] 97, [VMF98] 102, [VMF98] 124 and [VMF98] 22 at redshift, and respectively. We analyze the cluster dynamics, galaxy distribution, color-magnitude relation and the galaxy morphology in order to determine the global properties of the clusters.

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COMPACT GROUPS IN THE SDSS

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We identify compact groups in the Sloan Digital Sky Survey (SDSS) using an algorithm similar to that developed by Lee et al. (2003, astro-ph 0312553). Given that some authors claim compact groups to be chance alignments of galaxies or diffuse galaxy groups cores (Zandivarez et al. 2003, MNRAS, 340, 1400), our intention is to make a statistical study of the amount of compact groups that are real entities.

To do so, we construct mock catalogues of the SDSS from cosmological numerical N-body simulations and identify compact groups with the previous algorithm.

Next we compare them with groups identified with a tree-dimensional algorithm similar to the friend of-friends algorithm developed by Huchra & Geller (1982, ApJ, 257, 423).

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SUPERCLUSTERS AS FUTURE "ISLAND UNIVERSES" - THE CASE OF SHAPLEY

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We propose a physically motivated definition of superclusters as the largest structures that will remain gravitationally bound as they separate at an exponentially increasing rate in the dark-energy-dominated future of the Universe. Using the spherical collapse model, we were able to analytically determine the condition by which a spherical shell will eventually stop its expansion, becoming the outer limit of a gravitationally bound structure. In particular for the present universe, this criterion states that only shells containing a mean density of 2.36 times the critical density (ρ_c), will eventually stop growing. We tested our criterion using N-body simulations, showing that it gives a good estimate of the external limit of bound structure, and accordingly overestimating its bound mass. The model also showed to give a good estimation of radial velocities up to deep inside the core of the structure. Using this information, we generated a method to estimate the critical shell of structures as seen in redshift space. This method relies in great amount on its calibration using numerical simulations. We applied our method to a large redshift catalog of the Shapley Supercluster, the largest such structure in the nearby Universe ($z \leq 0.13$), in order to estimate its size and mass. We found that its critical radius is nearly $15h^{-1}$Mpc and its mass nearly $7 \times 10^{15} h^{-1}$M$_{\rm sun}$, in good agreement with other studies of the area.

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THE LOW-Z CARNEGIE SUPERNOVA PROJECT (CSP)

G. Folatelli[1] on behalf of the CSP

We present the results from the first year of the low-redshift part of the Carnegie Supernova Project (CSP). The low-z CSP is carried out mainly at the Las Campanas Observatory and consists of a five-year follow-up program of optical/near-infrared photometry, and optical spectroscopy observations of supernovae (SNe) of all types with redshift $z < 0.07$ (see Hamuy et al. 2006, PASP, 118, 2) The goal of the project is to provide an extensive, homogeneous set of high-quality data which would serve to improve our understanding of SNe and refine their use as distance indicators. Each year, a nine-month observing campaign is carried out from September to May. The first campaign (2004-2005) yielded optical ($u'g'r'i'BV$) light curves for a total of 39 SNe (17 Ia, 13 II, 9 Ibc), and near-infrared ($YJHK_s$) light curves for 25 of them. Definitive light curves will be obtained next year, once images of the host galaxies are available for subtraction. Nonetheless, in cases with low host-galaxy contamination, the scatter in the light curves is typically as good as 0.01-0.02 mag. In addition to the photometry, over 200 spectra were collected which cover SNe of all types at different evolution phases. Such a large data set contains precious information and some startling surprises! (See Folatelli et al. 2006, ApJ, 641, 1039).

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KINEMATIC ANALYSIS OF ELLIPTICAL GALAXIES PAIRS

J. Fuentes[1] A. C. Ramírez[1] and A. Zenteno[2]

We studied a sample of nearby elliptical galaxies pairs to correlate their kinematical properties in different environments and hosts systems. A sample of 150 pairs in the southern hemisphere were selected. The structural, kinematical and environmental properties of this population were classified. The statistical analysis allows us to conclude that elliptical galaxies pairs tend to be brighter and are more

tightly bound than the mean system members when are located in high density systems.

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PHOTOMETRIC CLASSIFICATION OF GALAXY GROUPS

E. P. González,[1] J. Alacoria,[1] R. Tapia Vega,[1] M. S. Alonso,[1,2] and D. G. Lambas[3]

We present a photometric classification of galaxy groups obtained by Merchan & Zandivarez (2005) from the Third Data Release of the Sloan Digital Sky Survey (SDSS-DR3). We divide the groups into Equal (E), Binary (B) and Central Dominant (cD) systems, by comparing $r-band$ member galaxy magnitudes. cD groups contain one galaxy in the center with higher luminosity than the rest of the members, B groups have two central luminosity galaxies while in E groups all galaxies have a comparable luminosities. The number of members in the groups have a range between 6 and 10 members. We classified the galaxy groups according to their luminosity distribution using the χ parameter:

$$\chi = \frac{(N-1)M_1}{\sum_{i=2}^{N} M_i}$$

Where M and N are the luminosity and the number of member in the group respectively. This effectively quantifies the difference between the most luminous galaxy and the rest of the members. The values of χ adopted to classified different groups are: $\chi \leq 1.025$ (E groups), $1.025 > \chi \geq 1.080$ (B groups) and $\chi > 1.080$ (cD groups).

We find that in cD groups all members are classified as bulges (compacticy parameter $C > 2.5$) while E groups shows both bulges and disk galaxies. We also analyze star formation rates of members using the $eClass'$ spectral parameter where $eClass' > 0$ indicates strong star formation activity. The distribution of the $eClass'$ parameter for bulge galaxies es similar for members of either cD, B or E groups. On the contrary, for disk galaxies this distrution shows a peak around -0.1, for cD groups while in B and E groups the $eClass'$ parameter is distributed homogenously over the range -0.15 and 0.15, indicating that star formation of disk is strongly modified by environment and that our classification correlates to galaxy properties.

SPECTROSCOPIC PROPERTIES OF M 51 TYPE GALAXIES

G. I. Günthardt,[1,2] R. J. Díaz,[1,3,4] and E. L. Agüero[1]

We present a partial sample of M 51 type galaxies, some of them, in an advanced degree of the interaction, like the systems VV 410 and AM 0459-340, with a long tidal tail extending from the main galaxy to the satellite galaxy. In some of the systems, for example VV 410 and AM 0459-340, is observed an enhancement of the star-formation activity in both galaxies. In VV 410, the starburst is placed mainy at the ends of the main galaxy bar, and in AM 0459-340 we observe peaks in the Hα emission in the nuclear region and in the notorious emission region of the southern arm, being the star-formation activity from moderate to intense in their satellite galaxies. In NGC 341 the starburst is seen only in the satellite galaxy. We determined oxygen abundances distributions along the bar of the main galaxies, being this distribution flatter than those obtained from barred isolated starburst galaxies. In some cases the abundances from the external parts of the main galaxies are similar to those which were found for the satellite galaxies, so we do not discard the possibility of material circulation. The radial velocity distributions through the major axis of the main and satellite galaxies are disturbed in some systems, like in AM 0459-340 and VV 410, while in others these distributions do not show clear assymetries or perturbations, like in AM 2256-304 and AM 0639-582. Two interesting systems, have extreme velocity differences between both galaxies, of about 1200 km/s for NGC 151 and 1400 km/s for AM 2256-304.

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THE BARYONIC TULLY-FISHER (TF) RELATION AND M/L CONSIDERATIONS

S. Gurovich[1,2] and K. C. Freeman[1]

In this poster we investigate the Tully-Fisher (TF) and Baryonic TF (BTF) relations for gas-rich disk galaxies. While the classical TF formulation relates the luminosity of the stars in the galaxy to the disk rotational velocity, the BTF formulation relates the total baryon mass of gas (mostly neutral hydrogen) plus the stellar mass to the rotational velocity. Some authors have found larger dispersions at the faint (dwarf) end of the TF relation eg: Willick (1999), Giovanelli et al. (1995). The larger dispersion at the faint end may hint at a break in the TF and BTF relations, (Gurovich et al. 2004). In this work on the BTF relation, we use the Bruzual & Charlot (2003) GALAXEV code to obtain accurate stellar M/L values in order to estimate the stellar baryon mass of our faint HI-selected field galaxies. This will allow us to delineate the structure of the TF & BTF relations more precisely.

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HI GALAXIES BEHIND THE MILKY WAY

J. M. Islas,[1] R. C. Kraan-Korteweg,[1,2] J. Donley,[3,4] and B. Koribalski[4]

We present results of the northern extension of the HI Parkes Zone of Avoidance Survey, a blind HI survey using the multibeam receiver mounted on the Parkes 64 m telescope. The survey has a median rms noise of 6.0 mJy beam^{-1} and is complete to a mean flux density of 22 mJy. This northern extension is divided in two regions, $l = 36° - 52°$ and $l = 196° - 212°$, $|b| \leq 5°$. We have detected 77 HI galaxies, 20 of which have been previously detected in HI, 35 with possible counterparts in optical, NIR and/or FIR. The detection of these 77 galaxies allows a closer inspection of the large-scale structures behind the Milky Way. The objects we found complement the limits of several known voids like Microscopium, Cygnus and Delphinus. We found some objects which fall on the Orion Void region ($l = 206°$, $b = -2°$, $V = 1500\,\mathrm{kms}^{-1}$), concluding this is not a real void. We can trace a new filament structure which intersects the Puppis filament ($l \approx 240° - 200°$, $|b| \leq 5°$).

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NARROW-BAND IMAGES OF STAR FORMING KNOTS IN HII GALAXIES

P. Lagos,[1] E. Telles,[1] J. Melnick[2]

HII galaxies are low-luminosity, metal poor and compact objects with intense star formation activity. Initially it was hypothesized that HII galaxies are young galaxies, forming their first generation of stars. However, Optical-NIR photometry have revealed the existence of an evolved underlying population of old stars, suggesting an intermittent star formation history with short intense star-forming episodes followed by long quiescent phases.

HII galaxies in general are simple systems compared to other galaxies, more massive galaxies, and many of them have more than one starburst component, turning these objects in excellent laboratories to study the star-formation mechanism, supernova winds and chemical evolution. Due to their intense emission lines, HII galaxies have been common targets of spectroscopic works. These have biased the results to the location of the brightest regions where slits have been positioned.

Using narrowband Hβ and true continuum images obtained with the NTT telescope on La Silla, we have studied a selected HII galaxies, producing continuum free H***** emission lines images. The images revealed a myriad of blobby structures due to the presence of multiple star forming knots, filaments or possible expanding shells, probably superbubbles.

From these we could map the distribution of luminosity and EW over the whole extension of the galaxies. Our integrated Hβ flux, over similar apertures, is in good agreement with the slit spectroscopy. However, the EW (Hβ) distribution is non-uniform and varies significantly over the different star forming knots. Thus, integrated values appear only as an average of the star forming regions, hampering the fine determination of indivudual star cluster ages.

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RECYCLING OF THE INTERESTELAR MEDIUM IN HII GALAXIES

P. Lagos,[1] E. Telles,[1] E. R. Carrasco,[2] and F. Cuisinier[3]

In this work, we investigate the recycling properties of the interestellar medium in HII galaxies from the analysis of the spatial variation of Oxygen abundance. The spatial variation of the abundance of this element should reflect the physical mechanisms involved in their recycling processes. We present the preliminary results for the galaxy UM 408, observed at the Gemini south observatory using GMOS-IFU spectroscopy. UM 408 is a compact and low metallicity galaxy without WR signature in their spectra. Maps of emission lines, continuum, EW(Hβ), Log [OIII]/Hβ and T_e are derived and compared with the spatial distribution of 12+Log(O/H). We do not observe a significant gradient in the oxygen abundance, suggesting that the new metals formed in the current star formation episode are possibly not observed and reside in a hot gas phase, whereas the metals from previous events are well mixed and homogeneously distributed through the whole extent of the galaxy. Under this supposition an underlying old stellar population would be expected.

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HST OBSERVATIONS OF CEPHEIDS IN NGC 4258

L. Macri[1]

NGC 4258 is a key galaxy for the absolute calibration of the Extragalactic Distance Scale, given the extremely precise (3%) distance that has been obtained through observations of water masers orbiting the central black hole. I will present the results of a survey for Cepheids in this galaxy, carried out using ACS and NICMOS on HST, and will discuss its implications for cosmology and the distance to the Large Magellanic Cloud.

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OBTAINING THE OPACITY CONTENT OF SPIRAL GALAXIES FROM THEIR INCLINATION LUMINOSITY FUNCTION

P. Leroy[1] and M. Portilla[2]

Assuming an inclination function f(i) for transparent galaxies, we obtain the modified distribution f(i) by the presence of opaque matter in the disk. This makes possible new development of the statistical test for the opacity of the spiral galaxies (Huizinga & Van Albada 1992, MNRAS, 254, 677) based on the distribution of inclinations.

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STELLAR KINEMATICS OF SPIRAL GALAXIES. NGC 2613, NGC 3521, M83

D. Mast[1] and R. J. Díaz[2]

We present the preliminary kinematics results for the galaxies NGC 2613, NGC 3521 y M83. These galaxies are part of a sample of spiral galaxies observed from CASLEO with the aim of studying the kinematics of the stellar component and its relation with the observed peculiarities in the gas kinematics. We present the spatial distribution and dispersion of the stellar radial velocities, obtained from long slit spectra in the Calcium Triplet (CaT) absorption lines. In the M83 and NGC 2613 cases, we compared these distributions with the gaseous kinematics. The main new result obtained for M83, is that the gaseous component is co-rotating with the stellar component in the circumnuclear region, despite the strong departures from axisymmetry in the central region of the galaxy (Mast et al. 2006, AJ, 131, 1394). For NGC 2613 the enclosed mass within $2\farcs5$ radius is 1.8×10^9 M$_\odot$. The gaseous phase velocity gradient for the inner $14''$ is 24 km sec^{-1}arcsec^{-1} against 8 km sec^{-1}arcsec^{-1} for the stars in the same radius. In order to estimate the enclosed mass inside r = 10 kpc, we adjust a two component Miyamoto-Nagai potential (bulge + disk), obtaining for the global disk component a mass of 2.4×10^{11} M$_\odot$, while for the bulge component we obtained 2×10^9 M$_\odot$, in accordance with the central radial dispersion velocity determination.

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THE FAINT-END OF THE GALAXY LUMINOSITY FUNCTION IN GALAXY SYSTEMS

M. Lares[1,2] and D. G. Lambas[1,2]

We studied the galaxy luminosity function in low mass systems of hosts with satellites galaxies. In order to do that, we have used the main spectroscopic galaxy sample from the fourth data release of the Sloan Digital Sky Survey (SDSS) to identify satellite galaxies around bright hosts. We used a statistical background subtraction method to compute the galaxy LF, following usually adopted techniques. We find that the faint-end slope of the galaxy LF is as step as $\alpha \sim -1.8$, and depends only slightly on the size of the system over a wide range in the number of members. We find also an upturn signature approximately at $M_r \sim -18 + 5\log(h)$ depending on the host properties and the photometric band.

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THE TRANSITION BETWEEN UCDs AND GCs IN FORNAX

S. Mieske[1]

We discuss the separation between UCDs and globular clusters (GCs) in the Fornax cluster. Ultracompact dwarf galaxies (UCDs) have been proposed as a new class of galaxies, populating the central regions of the Fornax, Virgo and Abell 1689 clusters (Hilker et al. 1999, A&AS, 134, 75; Drinkwater et al. 2000, PASA, 17, 227; Hasegan et al. 2005, ApJ, 627, 203; Jones et al. 2006, AJ, 131, 312; Mieske et al. 2005, A&A, 430L, 25). UCDs are placed between the sequence of globular clusters and dwarf elliptical galaxies in the fundamental plane (Drinkwater et al. 2003, Nature, 423, 519), having absolute magnitudes $M_V > -13.5$ mag. Two UCD formation channels are discussed: 1) "Super star clusters" formed in galaxy mergers (Fellhauer & Kroupa 2002, MNRAS, 330, 642). 2) Remnant nuclei of dE,Ns stripped in the potential well of their host cluster (Bekki et al. 2003, MNRAS, 344, 399). In order to discuss those scenarios properly, one first needs to cleanly separate UCDs from the morphologically similar globular clusters (GCs). Regarding this issue, in Mieske et al. (2006, AJ in press, astro-ph/0512474) we find two distinctive breaks in the properties of Fornax compact objects, i.e. within a joint sample of UCDs plus GCs. Both breaks occur at $M_V \simeq -11$ mag ($3 * 10^6 M_\odot$): 1. In the metallicity-luminosity plane, objects with $M_V < -11$ mag have a narrow metallicity distribution centred around [Fe/H]=-0.6 dex. Objects with $M_V > -11$ mag have a broader metallicity distribution centred around -1.2 dex. 2. In the size-luminosity plane, objects with $M_V < -11$ mag have half-light radii that positively correlate with luminosity. Objects with $M_V > -11$ mag have luminosity independent half-light radii around 2-5 pc, typical for GCs. We therefore conclude that in Fornax the separation between GCs and UCDs occurs at $\approx 3 * 10^6 M_\odot$ ($M_V = -11$ mag).

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STELLAR POPULATION IN BULGES OF SPIRAL GALAXIES

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Even if great progress has been done in tracing and modeling the galaxy spheroids formation and evolution, this topic still defied a general accepted explanation. Currently, the favorite models to explain the formation and evolution for galaxies are hierarchical merging and monolithic collapse. A way to discriminate between the above scenarios is to observe very deep in our nearby universe, to understand what kind of signature the stellar population has inherited from the galaxy formation mechanism. In order to investigate this aspect we presented an extensive project aimed at studying the stellar population of bulges in spiral galaxies to understand their chemical properties and whether these properties differ from those of elliptical galaxies. To achieve these goals, we observed a sample of disk galaxies in field and in cluster. We measured the main Lick indices (H_β, Mg_2, $< Fe >$, MgFe) and the principal kinematical parameters (velocity, velocity dispersion h_3 and h_4) as function of the galactocentric radius, in order to determine the age, metallicity and alpha-enhancement for all the sample galaxies. We do not find clear

gradient in the α/Fe profiles. The constant and supersolar (α/Fe = 0.3) values of the α-enhancement ratio along radius suggests that the formation of the bulk of the stars in spiral bulges occurred with the same short (less than 1 Gyr) timescale as found in elliptical and S0 galaxies. Therefore the α/Fe radial profiles, disfavor strong inside-out or outside-in scenarios and are in conflict with the pure monolithic collapse, where a positive gradient in the α-enhancement is expected. On the other hand the globally α/Fe enhanced stellar population is not expected in the hierarchical merging scenario where the star formation is triggered by the merger event and could give higher central values of α/Fe which decrease outwards.

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THE LOW X-RAY LUMINOSITY CLUSTER [VMF98] 22: GALAXY MORPHOLOGY AND CLUSTER DYNAMIC

J. L. Nilo,[1] H. Cuevas L.,[1] and E. R. Carrasco[2]

Cluster of galaxies are one of the best cosmological laboratories to study the different physical mechanism that regulate the galaxy evolution. Many galaxy properties like the star formation rates, the gas content and the galaxy morphology are regulated locally and also by the large-scale environment. In particular, the galaxy morphology is one of the fundamental parameter that defines the characteristic of the galaxies. Although the galaxy properties are well established for massive clusters (locally and at higher redshifts), the galaxy population in intermediate mass system, those between loose groups and rich clusters, have received comparatively little attention. In this poster we investigate the galaxy population and analyze the properties of the poor cluster of galaxy [VMF98] 22 at redshifts. This cluster was selected from the 160 Square Degree ROSAT Cluster Survey (Vikhlinin et al. 1998, ApJ, 502, 558). The analysis is based on deep imaging and spectroscopic observations obtained at Gemini North with the Gemini Multiobject Spectrograph (GMOS-N).

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GALAXIES AT IN THE FIELDS OF GALAXY CLUSTERS

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The amplification by lensing effect of massive galaxy clusters enables us to study faint background galaxies in the fields. We have carried out a search for z-band dropout sources in the cluster fields in which HST/ACS optical images. The J-band images were obtained with Magellan and VLT. Because of lensing effect of foreground clusters, our candidates are brighter than those found in the GOODS and UDF (J-band AB magnitude of). We used VLT/ISAAC to obtain spectra of ten z-band-dropout candidates to search for emission lines. Our ultimate goal is to use the emission-line properties in galaxies to probe the epoch of reionzation of the intergalactic medium.

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SHAPES OF CLUSTERS AND GROUPS OF GALAXIES: COMPARISON OF OBSERVATION TO MODEL PREDICTIONS

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We analyze the 3-DIM dark matter shapes of groups and clusters in a high resolution cosmological simulation to investigate into detail the dependence of the ellipticity distribution of groups on characteristics such as mass and number of members. We find that the triaxial nature of groups, derived from our analysis of the principal axes, is a strong function of the number of members.

Groups tend to be prolate when they contain more particles. We find that this effect is mainly due to an artifact of the low number statistics. That means that the general triaxial shape of halos resolved with less particles have a systematic bias toward the oblate limit. This issue is particularly important in observed systems which have a low number of detected members, and low resolution simulations. Despite this resolution effect, we find a significant correlation between the mass and the halo

shape. Masive systems are still more prolate than the smaller ones.

We have also studied the distribution of ellipticities of groups of galaxies selected from the 2PIGG (Eke et al. 2004, MNRAS, 348, 866), and SDSSDR3GG (Merchan & Zandivarez 2005, ApJ, in press, astro-ph/0412257). The distribution of observed ellipticities are found to be a strong function of number of members, so that poor groups are more elongated than rich ones. However, this is again an artifact caused by poor statistics and not an intrinsic property of the groups as it has been suggested previously (Plionis et al. 2004, MNRAS, 352, 132). In order to confront the observational data with numerical models, we construct a mock 2PIGG catalgue from our numerical simulation box, populated by galaxies with properties obtained using a semianalytic model (Cole et al. 2000, MNRAS, 319, 168).

By comparing the properties of the ellipticity distributions of the mock and real catalogues, we find that the mock catalogue remarkably reproduces the characteristics of the real data, in excellent agreement with the observations. We do not find any significant correlation, in real catalogues, between the shape of the observed groups, and properties of the member galaxies like color or spectral index.

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SHAPES AND DUST EXTINCTION IN SDSS-DR3 GALAXIES

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By means of analyzing the distribution of galaxy axial ratios we determine the shapes of spiral and elliptical galaxies in the Sloan Digital Sky Survey Data Release 3, taking into account the effects of dust extinction and reddening. In order to do this we assume the underlying shapes of spirals and ellipticals to be well approximated by ellipsoids parametrized by two axial ratios. We find that the distribution of projected axial ratios of elliptical galaxies are well fitted by oblate spheroids, which become closer to spherical for brighter ellipticals. Our analysis shows that ellipticals are consistent with a negligible dust optical depth, since there is no dependence of shape on galaxy color or size. Variations in the axial ratio distributions of spiral galaxies indicate a strong presence of dust in the galactic disks, consistent with an edge-on extinction of $E_0 = 1.2$ magnitudes. The intrinsic shapes of spiral galaxies are consistent with flat disks (with a thickness of 25% the diameter of the disk). We find that the dust optical depth in spiral galaxies is larger for faint galaxies (absolute $r > -19$), with $E_0 = 1.7$, than for bright galaxies (absolute $r < -22.5$) for which $E_0 = 0.2$.

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CALIBRATING THE HUBBLE CONSTANT USING PLANETARY NEBULA LUMINOSITY FUNCTION. DISTANCES TO TYPE 1A SUPERNOVAE

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We report the results of an [O III] survey for planetary nebulae (PN) in five galaxies that were hosts of well-observed Type Ia supernovae (SN Ia): NGC 524, NGC 1316, NGC 1380, NGC 1448 and NGC 4526.

The goals of this survey are to better quantify the zero-point of the maximum magnitude versus decline rate relation for SN Ia and to validate the insensitivity of SN Ia luminosity to host galaxy Hubble type. We detected a total of 45 planetary nebulae candidates in NGC 1316, 44 candidates in NGC 1380, and 94 candidates in NGC 4526. From these data, and the empirical planetary nebula luminosity function (PNLF), we derive distances. Our derived distance to NGC 4526 has a lower precision due to the likely presence of Virgo intracluster planetary nebulae in the foreground of this galaxy. In NGC 524 and NGC 1448 we detected no planetary nebulae candidates down to the limiting magnitudes of our observations. We present a formalism for setting realistic distance limits in these two cases, and derive robust lower limits of 20.9 Mpc and 15.8 Mpc, respectively. Combining these results with optical and near-IR Hubble diagrams for SN Ia gives H, which agrees to within with the best estimate of H derived from Cepheid distances of the host galaxies of well-observed SN Ia.

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THE ESSENCE SURVEY: SEARCHING FOR SYSTEMATICS

G. Pignata,[1] A. Clocchiati,[1] and the ESSENCE collaboration

The ESSENCE project plans to discover and follow-up 200 Type Ia SNe over a redshift range 0.15-0.75 using the Mosaic Imager on the CTIO Blanco 4-m telescope. The goal of the experiment is to find out whether the dark energy of the universe is consistent with a cosmological constant by measuring the w parameter of the Equation of State of the Universe to within a precision of 10%. Assuming that the new 200 SNe discovered by ESSENCE will decrease the statistical noise by the poisson contribution the systematic uncertainties will likely become the limit of the experiment. For this reason, the ESSENCE team is devoting a great effort to identify the various sources of systematics. This work investigates the possible sources of systematic errors associated with the data reduction and light curve analysis.

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SPECTROSCOPIC AND PHOTOMETRIC PROPERTIES OF THE HIGH-REDSHIFT GALAXY CLUSTER LCDS0001

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New photometric and spectroscopic observations of galaxies in the direction of the galaxy cluster LCDCS0001 are presented. The observations were carried out with the Gemini Multi-Object Spectrograph attached to the Gemini South telescope. The main goal of this work is to study the photometric properties and the stellar population of cluster galaxies at the redshift 0.7.

The i' and r' images centered on the cluster coordinates have a field of 5×5. Using the SExtractor program (Bertin & Arnouts 1996, AAS, 117, 393) we have identified in this field around 900 objects with nonstellar brightness profiles. GIM2D (Simard et al. 2002, ApJS, 16, 1) was used to determine the integrated i' magnitudes and to fit a two-dimensional bulge+disc model to the surface brightness distribution of the objects. We found that 54 of these objects are disc-like galaxies.

The projected number density of galaxies is described by a King law up to a radius of 70, which corresponds to a physical scale of 380. Spectra were obtained using two slit masks for 40 objects distributed throughout the field. We obtain redshifts for 24 galaxies spanning the range 0.19< z <0.79. The radial velocity distribution of these galaxies is strongly concentrated at z = 0.7, thus confirming the photometric redshift estimated for this cluster.

12 objects are confirmed as cluster members, since their velocity offset to the mean cluster redshift is kmsec. The stellar population ages and metallicities of the cluster members were estimated by a population synthesis method using as basis the Bruzual & Chariot (2003, MNRAS, 344, 1000) spectrophotometric models.

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THE ROLE OF ROTATION ON THE $MG_2 - \sigma$ RELATION OF EARLY-TYPE GALAXIES AND BULGES OF SPIRALS

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R. L. C. Ogando,[1,2] and M. A. G. Maia[2]

There are strong evidences that early-type galaxies contain stellar populations younger than their dominant old populations indicating that galaxies with this morphology weren't completely formed at the same time in a remote past. This process continues until a more recent epoch which would give support to the hierarchical scenario for galaxy formation. We analyzed a different alternative involving the role of rotational support in the collapse scenario, keeping the idea that the bulk of galaxies formation may occur in a more remote past, but including the rotation as an agent that hinders the complete transformation of primordial gas into stars by forming a disk, which later, secularly, carries material into the bulges. On the other hand, objects with non rotational support converted essentially all of its primordial gas into stars.

We have compared $Mg_2 - \sigma$ relations for about 1000 E and S0 galaxies, discriminating sub-samples in these morphologies and relative importance of rotation ($V_{rot}/\sigma < 0.4$ and $V_{rot}/\sigma > 0.4$ for 300 galaxies) and found differences, basically associated to the rotational support. Objects with negligible rotation compared to velocity dispersion define a flatter $Mg_2 - \sigma$ relation with homogeneous scatter, which we considered as a standard to represent the non rotational support case. For galaxies with important rotation, the relation scatter presents an excess of negative residuals relative to the standard mention above and shows an apparent correlation with the rotational support V_{rot}/σ.

The scenario extends adequately to 160 bulges of spirals as a natural extension to objects with increasing importance of rotation.

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NGC 1399 AND MOND

T. Richtler,[1] Y. Schuberth,[1,2] and A. Romanowsky,[1]

Modified Newtonian Dynamics (MOND), having its sucesses in the phenomenology of rotation curves of disk galaxies, is known to not remove the need for dark matter in galaxy clusters. Does this also apply to central elliptical galaxies? Our sample of globular cluster velocities in NGC 1399, the central galaxy of the Fornax cluster, now comprises 625 objects out to a galactocentric distance of 100 kpc, extending the sample of Richtler et al. (2004). In NGC 1399, the deep MOND regime is realized only at radial distances larger than 100 kpc and one has to apply partly physically unmotivated interpolations between the Newtonian and the MONDian regime. For any of the proposed interpolation schemes, MOND is not able to explain the circular velocity indicated by the globular cluster analysis, so dark matter is still needed. Bekenstein's (2004) interpolation, if applied over the full radial range, might be considered as being consistent with no dark matter. However, preliminary analyses suggest that Bekenstein's interpolations fails to remove the need for dark matter in other central galaxies like NGC 3311 or NGC 6166, so the case of NGC 1399 probably cannot be generalized. Moreover, it predicts too high circular velocities for NGC 4636.

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DYNAMICS IN GALAXY HALOS

A. J. Romanowsky[1]

The outskirts of galaxies offer crucial clues about their formation history. There are clear predictions in the ΛCDM paradigm for the distribution of mass, angular momentum, and orbit types in galaxy halos. I present work from several interrelated programs to study the dynamics of nearby galaxy halos—including a systematic survey of ordinary elliptical galaxies. The observational probes include X-ray emission and the kinematics of stars, planetary nebulae, and globular clusters. Initial results imply dark matter halos in L^* galaxies with concentrations too low for ΛCDM, while in brighter galaxies, there appears to be *too much* dark matter for the MOND gravitational theory.

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THE DETERMINATION OF PRIMORDIAL HELIUM ABUNDANCE USING SDSS

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The determination of the mass fraction of primordial helium represents a relevant topic in modern astronomy due to its important cosmological implications in the early universe. The classic method for the determination of (Peimbert & Torres-Peimbert, 1974, ApJ, 193, 327) is based on the abundance analysis of extra-galactic H II regions through their emission lines and the extrapolation to zero metallicity. In this work we carried out a new determination of based on measurements of 12 galaxies with HII regions of low metallicity selectedfrom the Sloan Digital Sky Survey catalog among nearly 500 candidate objects.

Through the extrapolation of the relations Y vs. O/H and N/H, we obtain a primordial helium abundance mass fraction = 0.243 ± 0.004 for the N/H relation. The determination through the relation Y vs. O/H was not successful due to the presence of peculiar oxygen deficient objects with high helium abundance. However, the importance of these objects is such that if the abundances are confirmed to be of

true primary origin and are included in the catalog of H II regions found in the literature, then a correspondence between the observational and WMAP values derived for is possible envisaged.

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THE DARK HALO OF NGC 1399

Y. Schuberth,[1,2] T. Richtler,[2] and M. Hilker[1]

NGC 1399 is the central giant elliptical of the nearby Fornax cluster of galaxies. Our sample now consists of 625 GCs with projected galactocentric distances between 6 and 100 kpc, thus increasing by almost a factor of two the radial range in comparison to the study presented by Richtler et al. (2004). We determine the line–of–sight velocity dispersion as a function of radius and compare it to spherical Jeans–models. We find that a massive dark halo is required in order to explain the dynamics of the metal–poor (red) GCs. At 60 kpc, the dark matter fraction is 60%. In accordance with their shallower radial distribution, the metal–rich (blue) GCs show a higher line–of–sight velocity dispersion. Yet, there is reason to believe that the blue cluster population of NGC 1399 is contaminated by intra–cluster GCs which perhaps have been stripped off neighboring early–type galaxies. The center of the Fornax cluster is a complex environment, and a more detailed analysis of our data will allow us to better understand the GC systems of central giant ellipticals and their connection to the galaxy clusters in which they reside.

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SPECTRAL SYNTHESIS OF SDSS GALAXIES

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We investigate the power of spectral synthesis as a mean to estimate physical properties of galaxies. Spectral synthesis is nothing more than the decomposition of an observed spectrum in terms of a superposition of a base of simple stellar populations of various ages and metallicities (here from Bruzual & Charlot 2003), producing as output the star-formation and chemical histories of a galaxy, its extinction and velocity dispersion. We discuss the reliability of this approach and apply it to a volume limited sample of 50362 galaxies from the SDSS Data Release 2, producing a catalog of stellar population properties (Cid Fernandes et al. 2005). Emission lines are also studied, their measurement being performed after subtracting the computed starlight spectrum from the observed one. A comparison with recent estimates of both observed and physical properties of these galaxies obtained by other groups shows good qualitative and quantitative agreement, despite substantial differences in the method of analysis. The confidence in the method is further strengthened by several empirical and astrophysically reasonable correlations between synthesis results and independent quantities. For instance, we report the existence of strong correlations between stellar and nebular metallicites, stellar and nebular extinctions, mean stellar age and equivalent width of Hα and 4000 Å break, and between stellar mass and velocity dispersion. We also present preliminary results of an analysis of a magnitude-limited sample which clearly reveals that the bimodality of galaxy populations is present in the parameters computed in the synthesis. Our results are also consistent with the "down-sizing" scenario of galaxy formation and evolution. Finally, we point out one of the major problems facing spectral synthesis of early-type systems: the spectral base adopted here is based on solar-scaled evolutionary tracks whose abundance pattern may not be appropriate for this type of galaxy.

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THE GALAXY POPULATION OF THE POOR CLUSTER RXJ 1252.0-2920 ([VMF98] 124) AT $Z \sim 0.2$

S. Torres,[1] H. Cuevas L.,[1] and E. R. Carrasco[2]

The majority of the galaxies in the Universe are concentrated in low-density environments. For intermediate redshift, $z \sim 0.2 - 0.5$, while rich clusters of galaxies have been widely studied, the intermediate-mass systems, those between loose groups and rich

clusters of galaxies have received comparatively little attention, either in the X-rays or in the optical. In the optical, many works have focused on the study of the galaxy population at intermediate redshifts, but mostly in rich cluster of galaxies.

In this work, we investigate the galaxy population in the poor cluster of galaxy RXJ 1252.0-2920 ([VMF98]124, Vikhlinin et al. 1998, ApJ, 502, 558). The analysis is based on deep imaging and spectroscopic observations obtained at Gemini South with the Gemini Multiobject Spectrograph. Located at $z = 0.1853$, the cluster has a low X-ray luminosity ($L_X = 3.2 \times 10^{43}$ erg s^{-1}) and a moderate velocity dispersion (578 km s^{-1}). We performed a galaxy classification by using the B/T ratio obtained with the GIM2D software (Simard et al. 2002, ApJS, 142, 1) and the break at 4000 Å and the equivalent width of Hδ "Balmer" spectral indices, in order to study the morphological segregation in a low density environment. The results given by the Balogh's diagram (4000Å ($\Delta - W_0$(Hδ) plane, Balogh et al. 1999, ApJ, 527, 54) show that the majority of the galaxies in this cluster are passive (no significant star formation is found). Also, there exist a correlation between the 4000 Å break and the B/T ratio that is in a good agreement with classification given by the Balogh's diagram (all galaxies with a reliable B/T measurement are passives). The morphological-radius relation shows a week correlation: the fraction of passive galaxies decrease at larger radius, as expected for this population of galaxies in clusters.

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CORRELATION OF OPTICAL AND RADIO PROPERTIES OF GALAXIES

F. Stasyszin[1] and C. Valotto[1]

We present a statistical analysis of the spatial distribution of the optical and radio sources from the SDSS and FIRST catalogs. We compute the auto and cross two-point correlation function of these galaxies, and link other parameters like the color index, magnitude, spectral index, etc. We analyze the dependence with galaxy physical properties, as star formation, AGN, velocity dispersion, mass. In order to analyze dynamical properties we also compute the redshift-space distortion of the correlation function in the direction parallel and perpendicular to the line of sight.

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THE ENVIRONMENT OF YOUNG MASSIVE CLUSTERS

L. Vanzi[1] and M. Sauvage[2]

We observed a sample of Blue Dwarf Galaxies in the Ks (2.2 μm) and LÕ (3.7 μm) IR bands at the ESO VLT with ISAAC. The purpose of the observations was to study the population of young massive clusters and the conditions under which they are formed. The sample galaxies included: Tol 1924-416, Tol 35, Pox 36, UM 462, He 2-10, II Zw 40, Tol 3, NGC 1705, NGC 5408, IC 4662, NGC 5253. They were selected to have evidence for star formation and firm detection by IRAS. All galaxies observed turned to be very rich of young massive clusters in Ks. Only few clusters, about 8 %, showed counterparts in LÕ. Most L' sources can be associated to radio thermal sources, with the only exception of the NGC 1705's one. For two galaxies, NGC 5408 and IC 4662, we derived the cluster luminosity functions finding them consistent with a power law of index about −2. We compared the numbers and luminosities of the clusters with the star formation rate of the host galaxy and could not find any evidence of a relation.

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SPECTRAL SYNTHESIS AND LINE STRENGTH INDICES

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Large samples of galaxy spectra of intermediate spectral resolution and high signal-to-noise ratio are now available (e.g. SDSS). Several libraries of empirical spectra of stars covering wide ranges of values of the atmospheric parameters T, log g, [Fe/H], and spectral type, have been compiled in the last few years and incorporated into population synthesis models (e.g. Bruzual & Charlot 2003, MNRAS, 344, 1000). These two facts have made possible the detailed study of galaxy spectra by means of population synthesis models to an unprecedented degree of detail. Several authors have extracted information about the star formation history in these galaxies by fitting the continuum model spectral energy distributions to the observations (e.g. Heavens et al. 2004, Nature, 428, 625; Cid-Fernandes et al. 2005, MNRAs, 358, 363; Mateu et al. 2005, in preparation). In general, these studies do not consider in detail the degree up to which the synthesis models can reproduce or not the intensity of the most conspicuous absorption lines in galaxy spectra. In this paper I explore in a systematic manner which spectral lines are well understood in terms of current population synthesis models. I use the line strength indices defined in the Lick system, complemented with our own definition of new indices (Stock et al. 2005, in preparation), to select the absorption lines which contain most information about the history of star formation in a given galaxy.

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GALAXY POPULATIONS IN THE INFALL REGIONS OF Z∼0.25 CLUSTERS

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We investigate 6 clusters of galaxies at intermediate redshift ($0.18 < z < 0.3$), in particular the star formation activity of galaxies. Our Calar Alto MOSCA spectra cover large fields of view reaching out to 2–4 virial radii. This outer region is often called the infall region since here newly arriving galaxies from the surrounding field encounter the special environment of clusters for the first time. We selected 3 fields containing 2 clusters each from the X-ray Dark Cluster Survey (XDC, Gilbank et al. 2004 MNRAS, 348, 551, G04) Each 40'×40' field was observed with 7-8 slit-masks yielding 553 low-resolution galaxy spectra ($R \sim 500$). The results for the first field (R285), were already published by Gerken et al. (2004, A&A, 421, 59). We select [OII]λ3717 and Hα equivalent widths as indicators of star formation activity.

In the analysis, we "averaged" 4 clusters: VMF73 (z=0.254) and VMF74 (z=0.18) in XDCS field R285 and VMF131 (z=0.295) and VMF132 (z=0.246) in field R265 and we found an increase of the star forming activity towards larger cluster-centric distances as well as towards shallower projected galaxy densities. Galaxies in the third field R220 exhibit a complex redshift structure which makes membership determination difficulty and were excluded of the overall analysis. However, we clearly identified the cluster VMF194 (z=0.211) and confirm another cluster at z=0.261 detected by G04. In addition, a group of galaxies with similar coordinates to VMF194 at z=0.243 is significant. We also detected a population of red star-forming galaxies, belonging to the red-sequence of the clusters and even redder. Those galaxies show a moderate star-forming activity and do not show any other spectral peculiarities. We do not detect any post-starburst galaxy nor AGN in our cluster sample.

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CAN THE LOCAL SUPERCLUSTER EXPLAIN THE LOW CMB MULTIPOLES?

C. A. Wuensche,[1] L. R. Abramo,[2] and L. Sodré Jr.[3]

We show that the thermal Sunyaev-Zeldovich effect caused by hot electrons in the Local Supercluster (LSC) can explain the abnormal quadrupole and octopole of the cosmic microwave background (CMB) that were measured by WMAP and COBE. The distortion needed to account for the low observed quadrupole is a spot in the direction of the LSC with a temperature decrease of order for GHz photons. The temperature and density of the hot gas which can generate such an effect are consistent with observations of the X-ray background. If this hypothetic foreground is subtracted from the WMAP data, we find that the amplitude of the quadrupole ($l = 2$) is substantially increased, and that the "planarity" of both the quadrupole and the octopole ($l = 3$) are weakened. For smaller scales the effect decays and, at least in our simplified model, it does not affect the angular power spectrum at $l > 10$. Moreover, since the Sunyaev-Zeldovich effect increases the temperature of photons with frequencies above 218 GHz, observations sensitive in that range (such as PLANCK's HFI) will be able to confirm whether the LSC indeed affects the CMB.

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TOPIC 6: COMPACT OBJECTS, AGNS, AND HIGH ENERGY/COSMIC RAY ASTROPHYSICS

A STUDY OF THE PHYSICAL CONDITIONS OF HEI LINES EMITTING REGION IN A SAMPLE OF SEYFERT 2 GALAXIES

B. Calvo-Mozo[1] and A. Rodríguez-Ardila[2]

In present work we examine a sample of Seyfert 2 galaxies in the near-IR, 0.8-2.4 μm, looking for HI and HeI recombination lines in order to study the physical properties of the region emitting HeI lines. For the HeIλ10830 it is important to consider collisional effects as a correction to the recombination cascade. For these purposes we apply the Benjamin et al. (1999, ApJ, 514, 307) model and take into account radiative transfer effects (Benjamin et al. 2002, ApJ, 569, 288).

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PRODUCTION AND COLLIMATION OF ASTROPHYSICAL JETS OR ACCRETION: M87 AND SN 1987A SCENARIOS

C. G. Bernal[1] and D. Page[1]

Jets and outflows of various degrees of collimation and energetics are an ubiquitous phenomenon in astrophysics. They are present at all length scales, ranging from those found in young stellar objects (YSOs, Reipurth & Bally1991) and the galactic microquasars (Mirabel & Rodriguez 1994, Fender & Belloni 2004), to kpc–scale relativistic jets in AGNs. In many cases these appear to be symmetrical, with two oppositely directed lines of flow, and almost always they seem to be directly connected with accretion onto a central object at the base of the collimated outflow. The energy in the outflow itself ultimately comes from the gravitational potential well created by the central object. The structure and evolution of jet-like structures under a variety of physical conditions is a problem that generally requires numerical modelling. However, in certain cases valuable insight can be gained from purely hydrodynamical analytical solutions which exhibit outflows (or accretion) of varying characteristics. We show here several solutions of this type, applicable to various accretion scenarios.

Assuming that our solutions are Jets, we applied the model to M87 scenario and to SN1987A scenario, assuming that our solutions are like accretion.

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THE PECULIAR SNR G0.9+0.1 WITH AN X-RAY PULSAR WIND NEBULA

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Radio composite supernova remnants (SNRs) consist of a shell and a spectrally distinct inner nebula, presumably a pulsar wind nebula (PWN), powered by the wind of relativistic electron/positron pairs from a central pulsar. The SNR G0.9+0.1 is a composite SNR characterized by a bright, centrally condensed synchrotron nebula and a weak surrounding radio shell. The central core was detected in X-rays using BeppoSAX (Mereghetti et al. 1998, AA, 331, L77) and later studied with the Chandra (Gaensler et al. 2001, ApJ, 556, L107) and XMM-Newton telescopes (Porquet et al. 2003, AA, 401, 197).

The Chandra observations revealed the presence of the point-like source CXOU J174722.8-280915, candidate to be the central powering pulsar. This SNR has also been detected with the HESS instrument at energies greater than 100 GeV (Aharonian et al. 2005, AA, 432, L25). The very high energy gamma-rays appear to originate in the PWN.

In this work we present new high-resolution radio data of the SNR G0.9+0.1 showing for the first time a detailed multiwavelength comparison of the central nebula and a spectral study of the complete SNR.

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THE CENTRAL BLACK HOLE AND NUCLEAR STAR CLUSTER IN THE MILKY WAY

R. Genzel[1]

Evidence has been accumulating for several decades that quasars, the most luminous objects in the Universe, are powered by accretion of matter onto massive black holes. I will discuss recent observations, employing adaptive optics imaging and spectroscopy on large ground-based telescopes that prove the existence of such a massive black hole in the center of our Milky Way, beyond any reasonable doubt. These observations also indicate that the Galactic Center black hole may be rotating rapidly. The central black hole is surrounded by a cluster of young massive stars, partly arranged in two thin, rotating disks. I discuss possible explanations for this 'paradox of youth'. I will also briefly discuss the cosmological evolution of massive black holes.

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SPECTROSCOPY AND PHOTOMETRIC FLUX CORRELATIONS FOR A SAMPLE OF AGNS IN THE RANGE OF 4×10^3–25×10^4Å

M. A. Higuera G.,[1] A. Rodríguez-Ardila[2] and J. M. Tejeiro[1]

The Active Galactic Nuclei (AGN) unified theory says that the primary role of a dusty torus around a central AGN is to hide the central engine. Nowdays based on near-infrared spectroscopy *L*-band spectroscopy and data collected from ground and space-based observatories is possible to explore the occurrence of starbursts in the dusty torus (Imanishi et al. 2004). Because the torus is rich in dust and molecular gas, it is a natural place to the ocurrence of starburts activity. The detection of PAH emission from the inner tens of parsecs in several Seyfert sources (Imanishi 2003; Rodríguez-Ardila et al. 2004; Peeters et al. 2004), suggest that the PAH detected emission can be directly associated to star formation episodes in the torus structure. The main goal of this work is to test the above hypothesis by means of flux correlations between the PAHs emission lines and the optical-infrared continuum using the data available in the literature. For a subset of galaxies from the CfA sample we choose continuum flux measurements at the wavelengths 0.6μm, 1.6μm, 2.1μm, 3.5μm (Alonso-Herrero et al. 2003), and 12μm, 25μm (Imanishi 2003, 2004). For our analysis, we selected the ratios F1.6/F3.3, F2.1/F3.3, F12/F3.3 and F25/F3.3 as a function of FOpt/F3.3, and F3.5/F3.3. We found a good correlation between F1.6/F.3.3 vs. FOpt/F3.3 and F2.1/F3.3 vs F3.5/F3.3, however in the other cases the correlations are not so good. The values observed show the presence of dust emission and reddening. In order to refine our study, new relationships need to be established, for example, between the 3.3μm and the other PAH emission lines with: radio emission (1.49 Ghz); emission from molecular hydrogen H_2 (2.121 μm), Brγ (2.165 μm) and emissions in the range of soft and hard X-rays.

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GRAVITOCHEMICAL HEATING IN NEUTRON STARS: CONSTRAINING POSSIBLE VARIATIONS OF THE GRAVITATIONAL CONSTANT

P. Jofré[1] and A. Reisenegger[1]

We report a study of the thermal evolution of a neutron star subject to a time-variation of the gravitational constant, G, analyzing the reactions that occur in the star's core when its density changes, namely direct ($n \to p + e + \bar{\nu}$) and inverse ($p + e \to n + \nu$) beta decays. The star is in chemical equilibrium if the rates of direct and inverse beta decays are the same, so the composition of the matter does not change. For a hypothetical time-variation of G, the resulting density change forces the chemical composition to adjust to a new equilibrium. The particles produced in these non-equilibrium reactions heat the star with their kinetic energy (*gravitochemical heating*). Eventually, the cooling effect due to neutrino and photon emission has the same magnitude as that of the gravitochemical heating, so the temperature remains constant. Time-evolution models for the temperature have been made for neutron stars with different masses, equations of state, and values of $\dot{G}$. The surface temperatures obtained in the stationary state have been compared with the observation of PSR J0437-4715, obtaining an upper bound for $|\dot{G}|$ comparable to those from other methods.

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MID-INFRARED STUDIES OF AGN GALAXIES

F. Marín[1,2] and P. Lira[1]

We present mid-infrared spectra of several Seyfert 1 and 2 galaxies. Combined with photometric data (Videla & Lira) we can determine the contribution of the nuclear and stellar components of the center of these galaxies, and in the effect of the dusty torus in the emission of the AGN. This has been done by

comparing the spectroscopic data (and photometric data also where available) to theoretical models of radiation transfer of a dusty torus around a central engine, by Nenkova et al. These studies help to constrain the geometrical and physical properties of the torus and also of the stellar components of the nuclear emission.

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RADIATIVELY INEFFICIENT ACCRETION FLOW IN THE NUCLEUS OF NGC 1097

R. S. Nemmen,[1] T. Storchi-Bergmann,[1] F. Yuan,[2] M. Eracleous,[3] Y. Terashima,[4] and A. S. Wilson[5]

We present a model for the accretion flow around the supermassive black hole inthe LINER nucleus of NGC 1097 which fits the optical to X-ray spectral energy distribution (SED). The X-ray segment of the SED is based on observations with the *Chandra X-Ray Observatory*, which are reported here for the first time. The inner part of the flow is modeled as a radiatively inefficient accretion flow (RIAF) and the outer part as a standard thin disk. The value of the transition radius ($r_{tr} \approx 225\,R_S$, where $R_S = 2GM/c^2$) between the RIAF and outer thin disk was obtained from our previous fitting of the double-peaked Balmer emission line profile, which originates in the thin disk. The black hole mass was inferred from measurements of the stellar velocity dispersion in the host galaxy. When these parameters are used in the accretion flow model, the SED can be successfully reproduced, which shows that the line profile model and the accretion flow model are consistent with each other. A small remaining excess in the near-UV is accounted by the contribution of an obscured starburst located within 9 pc from the nucleus, as we reported in an earlier paper. The radio flux is consistent with synchrotron emission of a relativistic jet modeled by means of the internal shock scenario. In an appendix we also analyze the *Chandra* X-ray observations of the ~ 1 kpc circumnuclear star-forming ring and of an ultraluminous compact X-ray source located outside the ring.

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ESO OPTICAL/NIR OBSERVATIONS OF IGR J162834838

L. J. Pellizza[1] and S. Chaty[1,2]

One of the most interesting discoveries of the INTEGRAL observatory (launched in 2003) is that of a set of transient X-ray sources with highly absorbed spectra in the Norma Arm of the Galaxy (e.g. Smith et al. 2004, AAS-HEAD8, 25.02; Walter 2004, AAS-HEAD8, 33.01). Multiwavelength studies of some of them have identified their optical/NIR counterparts and have shown that these systems are most probably high-mass X-ray binaries containing neutron stars or black holes, and with highly reddened early-type supergiant secondaries (e.g. Negueruela et al. 2005, ATel, 429; Pellizza et al. 2005, in preparation, Smith 2004, ATel, 338). IGR J162834838 is a recently discovered source which shares the X-ray characteristics of this group. In this work we present new ESO optical/NIR photometric and spectroscopic observations of the counterpart candidates of IGR J162834838, and discuss the nature of this source.

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ISAAC DATA REDUCTION, IMAGING AND PHOTOMETRY OF LINERS IN THE HEAVILY INTERACTING VIRGO GALAXY NGC 4438

S. R. Pérez,[1] S. Casassus,[1] and J. Kenney[2]

The aim of the present study is to contribute to the understanding of physical processes involved in the nuclear region of active galactic nuclei.

NGC 4438 is a peculiar spiral galaxy in the center of the Virgo Cluster [∼16 Mpc], which exhibits the most environmental damage in that cluster. NGC4438 shows evidence of interaction with the intracluster medium (ICM) and with NGC4435.

On the other hand, the nuclear region (classified as a LINER) has an unusual and complex morphology in radio continuum. Images that were taken with HST revealed asymmetric structures ('bubbles') interacting with the ISM. The nucleus lies at the root of these expanding bubbles. The bubbles have a LINER-type spectra, and may be responsible for the LINER qualification in low resolution imaging.

But, which excitation mechanism explains the 10^{53} erg of energy that feeds these bubbles? Does these mechanism correspond to an AGN or to a Starburst? We present ISAAC's observations in the near–infrared (NIR) (JHK & NB filters), that will allow us, along with the spectroscopy, to examine the presence of PAHs in the nucleus, and will help in elucidating the AGN/Starburst dichotomy in LINERS.

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LACUNARITY AND FRACTAL DIMENSION: AN APPROACH TO THE EVOLUTIONARY CHARACTERIZATION OF AGNS

V. J. Peña,[1] J. A. Hernández,[1] and A. Plata[1]

The Active Galaxy Nuclei AGN are systems whose behavior shows high complexity and multidependency of evolutionary parameters. With this consideration, it is proposed the fractal characterization of an AGN using the analysis of Lacunarity and fractal dimension as a methodology to quantify dynamic space patterns. In general, the fractal set of complex dynamic systems only show invariance at big scales. In order to study the processes that define the morphologic characteristics of a set, it is necessary to establish parameters that show the distribution of dimension and scales. This measurement can be obtained by considering the variations of both, multyfractal spectrum and Lacunarity of the same set. For an AGN, the filling factor is a distribution measurement of the densely grouped electrons in the Broad Line Region BLR. This region plays an important role in the object morphology. we in this paper carry out the analogy between the filling factor and Lacunarity, with this, we give a new approach for both the dynamic and morphologic study of the AGN.

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THE FIRST DEEP, NEAR IR, CHAMP OBSERVATIONS OF RED QUASARS - A STATUS REPORT

L. M. Perez,[1] M. G. Smith,[2] D. J. Norman,[3] B. J. Wilkes,[4] P. J. Green,[4] A. Mossman,[4] M. Kim,[4] W. A. Barkhouse,[5] J. D. Silverman,[6] and B. T. Januzzi[3]

Hard-X-ray observations are an efficient way to discover accreting sources at high redshift. A preliminary status report is given of near-IR observations of three, ∼100-square-arcminute fields centered on ChaMP fields MS2053.7-0449, CLJ0152.7-1357 and LP944-20. The deepest observations, centered on MS2053.7-0449, reached J=22.5mag, Ks=20.3mag, using a 1.5σ detection threshold. A catalog of the infrared sources detected in both filters in each field has been prepared and is being combined with CHANDRA/ChaMP observations to produce an initial matched catalog of IR and X-ray sources. The near-IR data were taken with the ISPI near-IR imager on the Blanco 4-m telescope on Cerro Tololo.

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NEAR-INFRARED CORONAL LINES IN SEYFERT GALAXIES

J. G. Portilla,[1] J. M. Tejeiro,[1] and A. Rodríguez-Ardila[2]

Seyfert galaxies show in their spectra coronal lines (CLs). Researchers have proposed a physical region responsible of the emission of CLs named Coronal Line Region (CLR). Some authors have suggested that CLR is well extended to the NLR; others propose its location between the BLR and NLR while others suggest that CLR is situated in the inner face of the obscuring torus. The goal of this work is contribute to the discussion about the location of the CLR. Our hypothesis is that they are emitted in the inner walls of the torus. Spectral analysis of a sample of Seyfert 1 (Sy1) and Seyfert 2 (Sy2) galaxies

can give insights about the location of the CLR. We took NIR spectra of the five Sy1 and five Sy2 galaxies. Those spectra were taken in at the NASA 3-m IRTF using the SpeX spectrometer. CLs are observed in all the objects of the sample. [Si VI] λ1.963 μm, is present in all of them; [S VIII] λ0.991 μm, is also present (except in H1143-182 and Mrk 1066); it is frequent to observe too [S IX] λ1.252 μm, and [Si X] λ1.430 μm. [Si VI] λ1.963 μm is observed in both types of galaxies. Values for FWHM, assuming Gaussian profiles, for the [Si VI] λ1.963 μm range from 250 to 530 km/s whilst those for S [IX] λ1.252 μm and [Si X] λ1.43 μm tend to be higher: 300 to 1150 and 260 to 1320 km/s, respectively. This seems to suggest that, for CL, those species with higher ionization potential present higher bulk velocity of the emitting clouds and therefore are situated nearer to the central mass concentration. The apparent fact that CL from species of higher ionization potential (χ) are preferentially observed in Sy1 rather than Sy2 seems to be coherent with the existence of a obscuring torus required by unified models for an active galactic nucleus (AGN): the Sy1 type shows internal regions of the AGN, including the BLR and internal parts of the torus. It is feasible then, that some of the high-χ coronal emission (i.e. [Si X]) are produced in the inner wall of the torus.

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GNIRS INTEGRAL FIELD SPECTROSCOPY OF THE SEYFERT GALAXY ESO 428-G 14

R. A. Riffel,[1] T. Storchi-Bergmann,[1] and C. Winge[2]

We present GNIRS IFU spatially resolved spectra of the central region of the Seyfert 2 galaxy ESO 428-G 14 in the J and K bands of the near-IR. Intensity, line-ratio, kinematic and velocity dispersion maps were constructed for the [Fe II]λ1.257μm, Pa$\beta\lambda$1.282μm, $H_2\lambda$2.122μm and Br$\gamma\lambda$2.166μm emission lines. All emission lines are extended along the PA $\sim$ 129°, presenting a double structure to both sides of the nucleus aligned with the radio jet. The H_2 emission map, besides presenting a double structure at the highest intensity levels, present also, at lower levels a more uniform distribution, suggesting a disk origin for its emission. Along the radio jet the ratio H_2/Brγ is approximately constant, with value 0.8$\pm$0.11 indicating that the main excitation mechanism is due thermal processes, which include shocks and X-ray excitation. The ratio [Fe II]/Paβ is 0.9$\pm$0.25 for the nucleus which is a typical value for AGNs, but smaller than the more extreme ratios presented by some AGNs, where shocks are the main excitation mechanism for [Fe II] emission. A rotation pattern is present in the four kinematic maps although it can be observed that in all cases there are other important kinematic components, as there are large deviations from simple rotation. The H_2 velocity field is the most similar to the classical spider diagram and its velocity dispersion values are lower than those of [Fe II] and H I lines, indicating that the neutral and ionized gas are more perturbed than the molecular gas in agreement with the idea that the H_2 is emitted by the galactic disk.

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THE PHYSICAL PROPERTIES AND EXCITATION MECHANISMS OF H_2 AND [Fe II] EMISSION IN AGN

R. Riffel,[1] M. G. Pastoriza,[1] and A. Rodríguez-Ardila[2]

One of the fundamental problems in AGN and SB galaxies is to determine the dominant excitation mechanisms of the narrow line emitting gas, whether it is due to non-stellar processes or to stellar processes. This ambiguity is most evident when interpreting the spectra of low-ionization lines such as [Fe II] and H_2 lines. Using NIR spectroscopy we study the kinematics and excitation mechanisms of H_2 and [Fe II] lines in a sample of 25 Sy 1, 17 Sy 2 and 2 SB galaxies, taken on IRTF, using SpeX spectrometer. The spectral coverage allows simultaneous observation of the JHK bands. The H_2 lines are sistematically narrower than the NLR lines, suggesting that the H_2 does not originate from the same parcel of gas that forms the NLR. Emission line ratios between H_2 lines favor thermal excitation mechanisms for the molecular gas in AGN. The mass of hot H_2 ranges from 10^2M$_\odot$ to 10^3M$_\odot$, with nearly half of objects showing values of < 500M$_\odot$. It shows that the fraction of molecular mass present in the nuclear region and emitting in the NIR is a very small fraction of the warm molecular mass present in the centre. A diagnostic diagram composed of the line ratios H_2/Brγ and [Fe II]/Paβ probes to be a uselful

tool in the NIR for separating emission line objects by their degree of nuclear activity. We found that AGNs are characterized by H_2 2.121μm/Brγ and [Fe II] 1.257μm/Paβ flux ratios between 0.6 and 2. Starburst/H II galaxies display line ratios <0.6 while LINERS are characterized by values larger than 2 in either ratio.

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MODELLING THE NEAR-INFRARED Fe II EMISSION IN ACTIVE GALACTIC NUCLEI

A. Rodríguez-Ardila,[1] A. Garcia-Rissmann,[1] A. Sigut,[2] and A. Pradhan[3]

All the complexity of the Fe II spectrum is reflected in active galactic nuclei (AGN), where the emission of several multiplets form a pseudo-continuum that extends from the UV to the near-infrared (NIR) regions (Wills, Netzer & Wills 1985, Vestergaard & Wilkes 2001, Rodríguez-Ardila et al. 2002). Tackled phenomenologically since the 70's, these lines can now be investigated in order to get information about the physical conditions of the broad line region (BLR) in AGNs using the most recent theoretical templates by Sigut & Pradhan (2004). These models include details of the Fe II ion microphysics and cover a wide range of ionization parameter (log U= −3.0–1.3) and density (log N_H= 9.6-12.6 cm^{-3}). With the aid of such templates and spectral synthesis approach, we study the Fe II emission in I Zw 1 and other narrow-line Seyfert 1 galaxies. The primary goal is to determine the relative contributions of collisional excitation and Lyα fluorescence. These two excitation mechanisms have been pointed out as the most important ones responsible for the formation of the observed Fe II spectrum. We also investigate the excitation channels that lead to populate the upper energy levels responsible for most of optical Fe II emission. Our results show that Lyα fluorescence is a key process to understand the Fe II spectrum both in the NIR and optical regions of AGN. This is further supported by the strong correlation found between optical and NIR Fe II line intensities. Clues for the most likely location of the iron emitting gas is obtained from the analysis of the BLR line profiles.

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A NIR ATLAS OF ACTIVE GALACTIC NUCLEI

A. Rodríguez-Ardila,[1] R. Riffel,[2] and M. G. Pastoriza[2]

We present the most comprehensive atlas of near-infrared (NIR) mid-resolution (R=1000) spectra of active galactic nuclei (AGN) made to date in the interval 0.8-2.4 μm. The aim of this work is to provide a homogeneous database suitable to study the nuclear NIR properties of AGN in a region poorly studied spectroscopically but that keeps useful constraints to model the AGN physics. The sample is composed of 49 objects, 39 of them with z <0.05, distributed between 7 quasars, 25 Seyfert 1 (classical and narrow-line Seyfert 1) and 17 Seyfert 2 galaxies. A few LINERS and Starburst galaxies are also included for comparative purposes. The spectra are dominated by strong emission lines of H I, He I, He II, [S III] and conspicuous forbidden lines of low and high ionization species, including coronal lines. In addition, rotationl/vibrational lines of H_2 are detected in most objects. Overall, the continuum of quasars and Seyfert 1s are rather similar, being essentially flat or slightly steep in the H and K bands. In J, the shape of the continuum is different from object to object, varying from that displaying a steep rise in flux towards shorter wavelengths, from 1.1 μm bluewards, to that remaining flat. In Seyfert 2s, the continuum smoothly decreases in flux with wavelength, from 1.2 μm redwards. Bluewards, the continuum flux steeply rises in some sources while in others it decreases towards shorter wavelengths, suggesting reddening. Independently of the AGN type, stellar absorption features of CO, Si I and Mg I are present in the H and K bands. They are found to be particularly strong in Seyfert 2s. Line identification and remarks on the most important characteristics observed in the sample are given.

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NUCLEAR INFRARED SPECTRAL ENERGY DISTRIBUTION OF TYPE 2 SEYFERT GALAXIES

L. Videla[1] and P. Lira[1]

It is currently well established that the physical process responsible for the emission from the active nucleus of a galaxy is matter accretion into a supermassive black hole. In order to explain the differences observed in galaxies with active nuclei, Antonucci (1993) proposed the existence of a dusty torus beyond the accretion disk that absorbs a considerable fraction of the radiation emitted at wavelengths shorter than 1 μm (Unified Scheme). If we observe the torus face-on (i.e. the symmetry axis parallel to the line of sight) we will be observing the accretion disk and the broad line region (BLR), and the galaxy will be classified as type 1. On the other hand, if we observe the torus edge-on (i.e. the symmetry axis perpendicular to the line of sight), the central region will be hidden from our direct view and the galaxy will be classified as type 2. The dust in the vicinity of the active nucleus typically reaches temperatures of a few hundred degrees and therefore its emission peaks somewhere in the mid-infrared. It is therefore in this regime where the torus can be detected allowing us to determine its physical and geometrical properties. We want to unveil the properties of the dusty torus, and to do that we have obtained images of 50 Seyfert 2 (Sy 2) galaxies in 6 IR bands (J, H, K, L, M and N). We will separate the contribution of the host galaxy from the contribution of the nucleus (due to the torus) and compare its emission with theoretical models (Nenkova, Ivezić, & Elitzur 2002).

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TOPIC 7: SCIENCE WITH ALMA AND ASTRONOMICAL INSTRUMENTATION

GTC PHOTOMETRIC CALIBRATION

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We are currently developing the calibration programme for GTC using techniques similar to the ones use for the space telescope calibration (Hammersley et al. 1998, A&AS, 128, 207; Cohen et al. 1999, AJ, 117, 1864).

We are planning to produce a catalogue with calibration stars which are suitable for a 10-m telescope. These sources will be not variable, non binary and do not have infrared excesses if they are to be used in the infrared.

The GTC science instruments require photometric calibration between 0.35 and 2.5 microns. The instruments are: OSIRIS (Optical System for Imaging low Resolution Integrated Spectroscopy), ELMER and EMIR (*Espectrógrafo Multiobjeto Infrarrojo*) and the Acquisition and Guiding boxes (Di Césare, Hammersley, & Rodriguez Espinosa 2005, RevMexAA Ser. Conf., 24, 231).

The catalogue will consist of 30 star fields distributed in all of North Hemisphere. We will use fields containing sources over the range 12 to 22 magnitude, and spanning a wide range of spectral types (A to M) for the visible and near infrared.

In the poster we will show the method used for selecting these fields and we will present the analysis of the data on the first calibration fields observed.

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ESOPO CONCEPTUAL DESIGN

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IAUNAM is building an optical, high efficiency, intermediate-low dispersion spectrograph ($R \sim 5000 - 500$) for general astronomical purposes, for use at the cassegrain $f/7.5$ focus of the 2.1-m telescope after-guider. The instrument should cover simultaneously a spectral range of $3500 - 9000$ Å, with a long slit with spatial field of view no less than 8 arc minutes. To achieve large spectral coverage and resolution simultaneously, ESOPO has two arms divided through a dichroic mirror. A blue arm optimized for 3500-7000 Å, and a red arm optimized for 4500-9000 Å, with significative overlap. They can be used separately, or combined. Optimal resolution is achieved by selecting the appropriate gratings. Acquisition and reduction of data have to be pipe-line like. The TOP Level Requirements are: Minimum System Efficiency: For the entire instrument without telescope, 15% at 3,500Å, 35% at 4,500Å, 36% at 5,500Å, 40% at 7,500Å, 15% at 9,000Å. Overall objective (excluding telescope, grating, dichroic mirror and CCD) 80% at 3,500-9,000Å. Resolution: $R \sim 2000$ or higher. Sky limited, pixel noise due to sky photons higher than detector noise (readout and dark current). Maximum real spectral resolution: $R \sim 5000$ ($FWHM$) with nominal slit of $0.8''$via density gratings not greater than 1200 $\|$ /mm and maximum dimensions of 154×206 mm. It must not vary more than 10% along slit (goal 5%). Field (length of slit): More than $8'$ with goal of $10'$. Full field of view should be visible. Detector noise: $< 8\,e^-$. Linear response at least up to S/N$\tilde{2}$50. Linear well $> 62,500\,e^-$. Width of slit: Minimum: $\leq$ diffraction limit of spectrograph. Maximum: $>9''$(goal $>10''$).

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ASTROMETRY WITH OPTIC AT WIYN

K. Vieira,[1] T. Girard,[1] and W. van Altena[1]

The astrometric precision of Orthogonal Transfer CCDs (OTCCDs) is investigated, using the OPTIC camera at WIYN 3.5-m telescope. The precision of the positions, determined with the Yale image-centering code, was used to establish astrometric design requirements for the anticipated WIYN One Degree Imager camera that will use similar technology.

OTCCDs are able to electronically compensate for real-time image motion, providing tip/tilt corrections without additional optics or moving parts (Tonry et al. 1997, PASP, 109, 1154). The Orthogonal Parallel Transfer Imaging Camera (OPTIC) consists of two 2K by 4K OTCCDs arranged in a single dewar mounted adjacent to each other with a small gap between the chips. Each chip is electronically divided into two regions, and each of these is further subdivided into two parts: a guide region and a science region. When mounted on WIYN, the camera has a scale of 0.14 arcsec/pixel, and a 10×10 arcmin field of view. OPTIC has a read noise of < 4 electrons when read at 160 kpix/sec and a nominal gain of 1.45 e^-/ADU.

To test the astrometric performance of OPTIC, we imaged the open cluster NGC 188, during 7 nights in october 2003, using Johnson-V and Gunn-i filters ranged from 0.6 arcsec to 3 arcsec, but only frames with < 2 arsec were considered for this study. After a careful internal astrometric reduction, we estimate that OPTIC achieves a precision of 2 milliarseconds over the dynamical range of the CCDs. This precision is obviously affected by the stability of the atmosphere, so these results demonstrate that the unique charge tranfer donde by OPTIC, which tracks the motion of a guide star, is able to stabilize the field within the atmospheric isokinetic region to the level of a few milli-arcseconds.

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LIST OF ABSTRACTS

TOPIC 1: SOLAR PHYSICS AND PLANETARY SYSTEMS

TOPIC 5: GALAXIES, LARGE SCALE STRUCTURE, AND COSMOLOGY

TOPIC 6: COMPACT OBJECTS, AGNS, AND HIGH ENERGY/COSMIC RAY ASTROPHYSICS

TOPIC 7: SCIENCE WITH ALMA AND ASTRONOMICAL INSTRUMENTATION