star infrared color box. In the present form we search for optical objects within the boundaries defined by Weintraub (1990, ApJS, 74, 575). There are about 3 500 of such sources in both hemispheres, 20% having possible optical counterparts brighter than 14.5 mag, as a result of the correlation with the Guide Star Catalogue (GSC).

We have taken coudé spectra with CCD in the 6 500 A region, and we defined as a T Tauri star (TTS) an object having both the Li absorption line and Hα emission line. We found 45 sources associated with new TTS, 7 being optical pairs and for 28 we suspect they are TTS. We also suspect the Herbig Ae/Be nature for 76 objects. In two cases the object may be a Fuori-like star. We found 6 new late type Li-rich giant stars. Some of the new found YSO are high latitude objects. The survey is now 80% complete south of +30°.

MOLECULAR GAS IN CENTAURUS A. THE ^{12}CO J = 2–1 MAP

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We mapped the ^{12}CO J = 2–1 line in Centaurus A using the 15-m Swedish-ESO Submillimetre Telescope (SEST) on La Silla, Chile. Centaurus A (NGC 5128) is a nearby (3 Mpc) elliptical galaxy with a prominent dust lane, extensive radio lobes and a compact radio continuum source. Due to its proximity and peculiar morphology, it has been observed over a large part of the electromagnetic spectrum. The detailed study of the molecular interstellar medium, however, has begun only recently with the availability of a large millimeter telescope in the southern hemisphere.

We present a map of the ^{12}CO J = 2–1 emission along the dust lane of Centaurus A. In several observing runs between December 1990 and May 1992 we measured a total of 240 positions extending over an area of 200″ × 70″. The angular resolution of SEST at the frequency of the ^{12}CO J = 2–1 transition (230.5 GHz) is 22″. The grid spacing was typically 8″ in the inner parts of the dust lane and 16″ in the outer parts. Integration times per position varied between 4 and 30 minutes.

Strong emission in the ^{12}CO J = 2–1 line (up to a level of T_{mb} = 0.6 K) is seen over a large part of the dust lane. The emission is generally symmetrical about the nucleus but, as in the case of the J = 1–0 and 50 micron maps, it is not centrally peaked. The striking similarity in the morphologies of the ^{12}CO J = 2–1, J = 1–0 and 50 micron maps suggests that the gas and warm dust are probably well coupled. The good spatial sampling of our map has allowed us to investigate into the kinematics of the molecular gas (Rydbeck et al. 1993, in preparation). The excitation conditions in the disk can be probed using the ^{12}CO J = 2–1/1–0 ratio, when the J = 2–1 map has been convolved to the resolution of the 1–0 map. This results in a ratio of close to unity at the position of the nucleus, a value which is also typical of the gas throughout the whole extent of the disk. Such a high J = 2–0/1–0 ratio implies that the bulk of the gas in the dust lane is warm (T > 15 K), dense (n(H_2) 2×10^4 β cm^{-3}, the critical density required to thermalise the J = 2–1 level, where β is the escape probability), and, probably partially, optically thick. This conclusion is supported by a ^{13}CO J = 2–1/1–0 ratio of 0.9 at one position in the disk.

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BLUE STRAGGLERS IN OPEN CLUSTERS

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A statistical study of the observational characteristics of blue stragglers in open clusters is presented. It is based on the visual inspection of color-magnitude diagrams of the clusters with photometry published before December 1991. According to membership probability and quality of the observations, the blue stragglers have been classified into three categories. Some interesting relations as: number of blue stragglers against cluster ages, number of blue stragglers versus number of ordinary stars per cluster, and degree of concentration of the blue stragglers in each cluster are shown.

OPTICAL IDENTIFICATION OF ROSAT X-RAY SOURCES AT THE GUILLERMO HARO OBSERVATORY

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First results of an optical identification program of X-ray sources newly discovered during the *ROSAT* All-Sky Survey are presented. The sample comprises about 1 300 sources which are contained in six "study areas" of about 150 square degrees each. Selection criteria for these areas were: *(i)* avoidance of the galactic plane (| b^{II} |> 25°), *(ii)* restrictions to fields of medium/high X-ray sensitivity (2–4×10^{-13} erg cm^{-2} s^{-1}), and *(iii)* distribution in R.A. allowing year-round follow-up observations.

The project is a collaboration between the Instituto Nacional de Astrofísica, Optica y Electrónica (INAOE), Puebla, México, the Landessternwarte Heidelberg (LSW), and the Max-Planck-Institut für Extraterrestrische Physik (MPE), Garching. For the purpose of this programme the LSW has constructed an efficient faint object spectrograph (LFOSC) which allows to carry out direct CCD imaging, filter photometry, and multiple-object spectroscopy. Two grisms giving 13 and 21 A spectral resolution are available. The observations are being carried out at the 2.1-m telescope of the Guillermo Haro Observatory which is operated by INAOE and located near Cananea, Sonora, México.

By now about 40% of the optical observing programme has been completed. Among the identified sources are stellar X-ray emitters, normal and active galaxies, and clusters of galaxies. About one quarter of the identified sources are AGN or QSOs, mainly at low to medium redshifts, although a few QSOs in our sample have z > 2.

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CALIBRATIONS OF M_V, [Fe/H] AND LOG *G* FOR YELLOW SUPERGIANT STARS

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Photoelectric observations of the OI7774 feature and *uvby*-β photometry of luminous A-G type stars has been used to derive functional formulae to estimate M_V, log g and [Fe/H]. These calibrations are found to predict gravities and iron abundances with uncertainties not much higher than good spectroscopic determinations. When the calibrations are applied to a group of A-G stars of high galactic latitude classified as supergiants, it is found that they are in the galactic plane or are misclassified as supergiants. BL Telescopii is found however to be luminous, slightly iron deficient and far from the galactic plane. These results are consistent with the idea that BL Telescopii is a massive and young object placed out of the galactic plane.

EVOLUTION OF HELIUM STARS IN MASSIVE CLOSE BINARY SYSTEMS[1]

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The evolution of the 2.0, 2.2, 2.5, 2.9, 3.5, 4.0 and 6.0 $M_\odot$ helium stars (X = 0.0, Y = 0.97) to the carbon ignition was calculated. With the help of a simple procedure for the determination of the helium convective core-boundary the influence of overshooting at the edge of it was accounted. Results of the evolution of these stars are presented. If the helium stars formed in massive close binary systems have masses from 6.0 to 2.0 $M_\odot$, and if the orbital separations between the components are less than ~2–10 $R_\odot$ respectively (the second components are assumed to be compact objects), then the helium stars are able to reach their Roche lobes before the carbon ignition in the core. Therefore a mass loss phase (non-conservative) arises. Such a phase is numerically investigated. The remnant masses, time scales and other characteristics of this phase were obtained. We deduced an approximate formula for the remnant stellar mass:

$$M_r \approx (0.89\, M_{He}^{0.96} - 0.40)\, (R_R/0.6)^{0.2},$$

where M_{He} is the mass of the initial helium star and R_R the Roche-lobe radius. The helium stars more massive than 2.2 $M_\odot$ undergo a SN explosion and form neutron stars (after the mass loss phase). If the system does not disintegrate after the explosion, then it might be the progenitor of a binary radiopulsar. The initial helium-star mass and the orbital separation of such a binary radiopulsar are estimated. For instance, we estimated that the progenitor of the well-known PSR 1913+16 was a binary system with a 4.03 $M_\odot$ helium star and an orbital separation of 1.66 $R_\odot$. A 4.02 $M_\odot$ helium star originates from a 13 $M_\odot$ ms-star, and such a small orbital separation results after a common-envelope phase.

The calculations were carried out at the Institute of Astronomy of the Russian Academy of Sciences, and in the Department of Astronomy of St. Petersburg University.