HYDRODYNAMICAL NUMERICAL SIMULATIONS

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We write the standard hydrodynamical equations in comoving coordinates which are the most natural frame to describe the dynamical evolution of particles in an expanding universe model. We have used the SPH (Smoothed Particle Hydrodynamics; Monaghan 1985) technique to resolve the hydrodynamical equations for a particle representing a fluid element. We develop an algorithm of numerical integration to compute the forces of gaseous interaction implemented in the gravitational AP3M code developed by Couchman (1993). We simulate the accretion and secondary collapse of gas onto a spherical perturbation in an expanding universe model with critical density. Bertschinger (1985) found a semi-analytical solution for the dynamical behavior of the gas that initially expands with the Hubble velocity and collapse self-similarly. We compute the pressure gradient forces and an artificial pressure term that takes into account the forces due to molecular viscocity. This effect is important in scales much smaller than the resolution allowed by limitations in the number of particles used. The initial conditions correspond to a spherical perturbation with overdensity $\delta\rho/\rho = 5.5$. We use $32^3 = 32\,768$ particles initialy distributed on the nodes of a cubic grided volume, and with expanding Hubble velocities. We follow the dynamical evolution of the particles for an expansion factor $\simeq 5$. We calculate the velocity, pressure and density profiles as a function of the radial distance to the perturbation center. The results provide a satisfactory agreement with the theoretical solutions.

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α-ELEMENTS IN E/S0 GALAXY NUCLEI

André Milone [1] and Beatriz Barbuy [1]

Spectra containing TiO bands of γ System ($\lambda\lambda$6950–7550 Å) are calculated for evolved stellar populations ($\tau = 15 \times 10^9$ years) (ESPs) with $-1.0 \leq$ [Fe/H] $\leq +0.3$ dex, as described in Milone, Barbuy, & Bica (1995, A&AS 113, 547). A semi-empirical calibration for the equivalent width of these TiO bands at $\lambda\lambda$7050–7464 Å as a function of [Fe/H] and [α/Fe] has been derived.

Those synthetical spectra are used together to the line-indices Mg_2 ($\lambda\lambda$5156–5197 Å) calculated by Barbuy (1994, ApJ 430, 218) and $\langle Fe \rangle$ ($\equiv (W(Fe_{5270}) + W(Fe_{5335}))/2$) calculated through the parametric relation of Borges, Idiart, de Freitas Pacheco, & Thevenin (1995, AJ 110, 2408) for the same evolved stellar populations in order to derive the metal abundances of composite systems. The parametrical behavior of Mg_2 as a function of [Fe/H] and [α/Fe] has also been derived.

The results for a sample of normal early-type galaxy nuclei, observed in spectroscopy at $\lambda\lambda$6900–7600 Å in the "Laboratório Nacional de Astrofísica" (LNA)-CNPq-MCT (Itajubá, Brazil) are compared with the synthetic line-indices W(TiO) ($\lambda\lambda$7050–7464 Å), $\langle Fe \rangle$, Mg_2 of the ESPs models and the chemical evolution models of Arimoto & Yoshii (1987, A&A 173, 23), Bressan, Chiosi, & Fagotto (1994, ApJS 94, 63) and Bressan (1995, private communication).

The bright ellipticals and lenticulars present solar iron abundance and α-elements overabundances ([α/Fe] $\approx +0.28$ dex), pointing out that type II supernovae events were dominant in the chemical enrichment of these spheroidal systems. Moreover, [α/Fe] seems to anticorrelate to [Fe/H].

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A NEW METHOD FOR MODELING GRAVITATIONAL LENSES

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We present a new method for modeling gravitational lenses, which merges two different approaches to the problem: Kochanek's "Ring Cycle" algorithm (Kochanek et al. 1989), a useful modeling tool particularly advantageous in the case of extended sources, and the use of a mass distribution instead of the commonly used lens potential, which may sometimes lead to unphysical parameter values.

We use the method for the case of two gravitational lensing systems. In the first place, we model Q0142 – 100 (UM 673), which was originally thought to

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