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NUMERICAL SIMULATIONS OF GALAXIES WITH A CENTRAL MASSIVE BLACK-HOLE

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Merger of galaxies is an essential process in the widespread accepted hierarchical structure formation scenario. However, during the last decade there has been growing evidence that the galactic centers are housing supermassive Black Holes (BH, c.f., Kormendy & Richstone, 1995, ARA&A, 33, 581). It has been shown that the masses of these BHs correlate linearly with the central stellar velocity dispersion. The existence of such a relation implies that the formation and evolution of both the galaxy and its central BH are coupled. It may also conflict with some predictions of the hierarchical formation scenario of galaxies as well as with some restrictions deduced from the Fundamental Plane (Ciotti & van Albada, 2001, ApJ 552, L13). Numerical simulations involving massive BHs are known to need high computational performance. This is due to the requirement of high spatial resolution of the simulation and, as well, to the extreme dynamical range involved (M_{BH}/M_{star}~10^{6-7}!). We describe here simulations aimed to study the dynamical influence of central massive BH and the implementation using the code GADGET, a parallelized version of the well-known TREECODE, with the 16 Pentium nodes cluster built by the DAS/INPE under a FAPESP project. We compare simulations of a self-gravitating sphere (Hernquist mass model) with and without BH, showing quantitatively the increase of the computational effort due to the presence of the BH. We show how important is the fine-tuning of the TREECODE parameters, the softening ([epsilon]) and the time-step parameters, and give their optimal values for our problem. The general performance of the cluster, compared to mono-processor computers, will be discussed.

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DWARF GALAXIES IN COMPACT GROUPS OF GALAXIES

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This work presents the results of a study of low surface brightness dwarf galaxies in the compact groups HCG44, HCG68 and the NGC7582 Group. Dwarf galaxies are the most common type of galaxies in the local universe and due to their intrinsic low luminosities and sizes they are also the hardest galaxies to observe. Since they are so

common and due to their large dark matter content, these galaxies may give us important information necessary to better understand the formation process of structures and the distribution of mass and luminosity in the universe. Our data consist of CCD images collected at the 0.9m telescope at KPNO (Kitt Peak National Observatory) in filters B and R, for the compact groups HCG44 and HCG68. For the group NGC7582, we have CCD mosaic images obtained at the Warsov 1.3m Telescope at Las Campanas Observatory in Chile, and spectroscopic data obtained at the ESO 3.6m telescope using the MEFOS instrument. The images were processed with IRAF and detection and photometry of the objects was done with the program Source Extractor. The technique used in this work is similar to that used by Carrasco et al. (2001, AJ, 121, 148). Our sample consists of about 70 dwarf galaxies candidates, selected based on their sizes and magnitudes at the average limiting isophote of 26 mag/arcsec^2, adopting an exponential surface brightness profile. The average central surface brightness, sizes, and total magnitudes are similar to those found for the dwarf galaxies in other studies. Their colour distribution of peaks near B-R = 1.2, compatible with the colours of the dwarf galaxy population in other groups. We present the properties (spatial and color distributions, sizes and morphological classification) of the selected dwarf galaxies for each group, as well as some spectroscopic results for the group NGC7582.

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A SHOCKWAVE MODEL TO EXPLAIN QUASARS AND BL LACERTAE OBJECTS VARIABILITY

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This work intends to present both an analysis and application of a recent relativistic plasma jet shockwave model for AGN (active galactic nuclei) and BL Lacertae objects. Such model was applied to explain spectral and temporal variabilities due to synchrotron outbursts, observed during the last decades in quasars and BL Lacertae objects events. A theoretical treatment was accomplished based on observed properties of the bursts by decomposing light curves into a series of self-similar flaring events at different frequencies. An average evolution of the outbursts was deduced from well known physical aspects of the relativistic jets in AGN and was fitted to a couple of equations empirically proposed to describe some observed features of the studied sources. This fit was accomplished by an iterative numerical approach of normalized parameters in order to achieve a consistence between physical and observational aspects. Given the average outburst evolution, many bursts could be described by the model simply by modifying three jet parameters at the onset of the shock: K (electrons spectral energy distribution coefficient), B (magnetic field) and D (Doppler beaming factor). An optimal approximation of