A new family of analytical potential–density pairs for galaxy models with thin disks and spheroidal halos

Y.F. Santos[1], O.M. Pimentel[1], G.A. González[1]

[1] *Universidad Industrial de Santander UIS, Escuela de Física, Bucaramanga, Colombia*

In this work a new family of galaxy models is constructed, which are characterized by having two components, a thin disk of matter and a large halo. The models were obtained considering the total gravitational potential. The gravitational potential generated by the spheroidal halo of matter is constructed considering a multipolar expansion, expressed in cylindrical coordinates. As this potential is a solution of the Laplace equation, a change of variables is done so that the Laplacian is nonzero over the z axis. So the new potential satisfies the Poisson equation and represents the potential distribution of three-dimensional material. From the gravitational potential we raised analytical expressions for the surface density of the disk, halo density of matter and the corresponding expressions for the curves of rotation. We found that the surface density of the disk presents a maximum at the center, vanishing at infinity. Also, we found that the halo density is maximum at the disk surface, also vanishing at infinity. The rotation curves obtained, for some values of the parameters, present a flat region for large values of the radial coordinate .

Keywords / galaxies: kinematics and dynamics

Contact / santosfabiany@gmail.com

The VISCACHA survey - structure of outer MC star clusters

J.F.C. Santos Jr.[1,2], F. Maia[3], B. Dias[4], L. Kerber[5], A. Piatti[6], E. Bica[7], the VISCACHA team

[1] *Departamento de Física, ICEx - UFMG, Belo Horizonte, Brazil*
[2] *Departamento de Astronomía, Universidad La Serena, La Serena, Chile*
[3] *Instituto de Física - UFRJ, Rio de Janeiro, Brazil*
[4] *Departamento de Ciencias Físicas, Universidad Andrés Bello, Santiago, Chile*
[5] *Departamento de Ciências Exatas e Tecnológicas, UESC, Brazil*
[6] *Observatorio Astronómico, Universidad Nacional de Córdoba, Argentina*
[7] *Departamento de Astronomia, IF - UFRGS, Brazil*

The Magellanic Clouds (MCs) constitute an interacting pair of galaxies influenced by the Milky Way gravitational field. Several studies have shown the effects of the changing tidal field on the structure of both Clouds. How the varying tidal field affects their stellar populations may be gauged via star clusters, where this connection may be more confidently stablished due to the accurate determination of the clusters astrophysical properties. Our objective is to perform an analysis of the structural parameters of 56 Large Magellanic Cloud (LMC) and 34 Small Magellanic Cloud (SMC) clusters located in the galaxies outskirts searching for signatures of tidal-dynamical effects eventually altering their evolution. To achieve our goal, AO assisted observations in BVI bands with the 4.1m SOAR telescope have been carried out, in the scope of the VISCACHA (VIsible Soar photometry of star Clusters in tApii and Coxi HuguA) survey, in which an homogeneous, deep and high quality photometry is being produced. The structural parameters central stellar density, central surface brightness, core and tidal radius were obtained from King model fittings to the surface brightness and radial density profiles. By grouping clusters according to different regions we found that (i) the westernmost LMC clusters, the nearest ones to the SMC, have a larger dispersion of their core radius than those of the clusters located elsewhere; (ii) older clusters present a spread of core radius, similar to results from studies of inner MCs populous clusters.

Keywords / galaxies: star clusters: general — Magellanic Clouds

Contact / jsantos@fisica.ufmg.br