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DARK MATTER IN EARLY-TYPE GALAXIES

SRDJAN SAMUROVIĆ[1,2,3]

[1]*Astronomical Observatory, Volgina 7, 11160 Belgrade 74, Serbia and Montenegro*

[2]*Dipartimento di Astronomia, Università di Trieste, Via Tiepolo 11, I-34131 Trieste, Italy*

[3]*INAF, Osservatorio Astronomico di Trieste, Via Tiepolo 11, I-34131 Trieste, Italy*
E–mail: srdjan@ts.astro.it

In the thesis the existence of dark matter in the early-type galaxies with and without X-ray haloes was explored. I used high quality long-slit spectra obtained from various sources related to the field, binary, group and cluster galaxies from which, after the reduction procedure, full line-of-sight velocity profiles were extracted. The analyzed spectra extend from the center out to one to three effective (half-light) radii. Some published data from the literature related to the kinematical and photometric parameters were also used.

The velocity profiles were modeled as a truncated Gauss-Hermite series, taking into account velocity, velocity dispersion, and Gauss-Hermite parameters, h_3 and h_4, that describe asymmetric and symmetric departures from the Gaussian, respectively. Comparison of velocity profiles with the predictions of different dynamical models which were constructed: two-integral Jeans model and three-integral Schwarzschild's numerical orbital superposition model was done. From the two-integral modeling it is inferred that some galaxies could not be fitted with this approach thus leading to the conclusion that their distribution function depends on three integrals of motion. This kind of modeling, however, provided useful constraints on the mass-to-light ratios in these galaxies.

A general conclusion is that, while some galaxies can be fitted without the inclusion of dark matter in their haloes, one cannot reject its existence, because the models are marginally consistent at larger radii with this assumption. X-ray haloes, when they are present, show the similar trend of increasing mass-to-light ratio as in the case of two-integral modeling. The three-integral models that were constructed permitted me to explore stellar orbits in different potentials: spherical, axisymmetric and flattened triaxial. For each analyzed galaxy a discussion was presented about which potential is the most appropriate and comparison of results with the results obtained with the two-integral modeling technique (where available) was done.

Absorption features present in the integrated stellar spectra of early-type galaxies that provide information on the chemical evolution of these objects were also studied. Using the aforementioned long-slit spectra absorption line indices were extracted and compared with the available models of chemical evolution of galaxies.

References

Samurović, S., Danziger, I.J.: 2005, *Mon. Not. R. Astron. Soc.*, **363**, 769.