ABSTRACTS OF PAPERS POSTED DURING THE SESSION ON GALACTIC DYNAMICS AND CHAOTIC DYNAMICAL SYSTEMS[*]

FACE-ON VIEWS OF 3D BARRED GALAXIES

P. A. Patsis[1], Ch. Skokos[1], and E. Athanassoula[2]

[1]Research Center for Astronomy, Academy of Athens, 14 Anagnostopoulou str. , GR-10673, Athens, Greece
[2]Observatoire de Marseille, 2 Place Le Verrier, F-13248 Marseille Cedex 4, France

Abstract: We study the conditions that favour boxiness of isodensities in the face-on views of orbital 3D models of barred galaxies. Boxy isophotes are typical features at the end of the bars of early type (SB0, SBa) barred galaxies seen not far from face-on, as well as, in snapshots of N-body simulations. In order to explain the dynamical reasons for their appearance by means of the orbital theory, we study the face-on structures supported by stable periodic orbits in analytic 3D models of barred galaxies. The potentials of our models consist of three components, namely a Miyamoto disk, a Plummer sphere bulge, and a Ferrers bar. The models studied have different mass values for the three components of the potential, as well as different values of the bar pattern speed. In every model we find the families of periodic orbits belonging to the x1-tree and construct weighted profiles using only the stable orbits of these families. The basic result of our study is that boxiness in the face-on views of 3D barred models is an effect caused by the coexistence of several stable periodic orbits belonging to different families. The morphology of boxy isodensities/isophotes is not necessarily similar to the morphology of individual stable, rectangular-like orbits. The consideration of several families of orbits for building a face-on profile may lead to boxy features close to the end of bars, with the ratios of their projection on the major axis of the bar to the projection on the minor axis being different from the corresponding ratios of individual orbits or families of orbits. 3D orbits that are introduced due to vertical instabilities play a crucial role in the face-on profiles and enhance their rectangularity. This happens because at the 4:1 radial resonance region we have several orbits with boxy face-on projections, instead of few rectangular-like x1 orbits, which, in a fair fraction of the models studied, are unstable at this region. We also find that it is the pattern speed that mostly affects the elongation of the boxy feature, in the sense that fast bars are more elongated than slow ones.

Acknowledgements
Ch. Skokos was supported by the Research Committee of the Academy of Athens and the Greek State Scholarships Foundation (IKY).

[*] *Proceedings of the 6th Hellenic Astronomical Society Conference, 15-17 September 2003, Penteli, Greece*