ON THE DYNAMICS OF VERY FLATTENED ELLIPTICALS

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Our aim is to study the generic phase-space structure of flattened ellipticals by investigating a few typical cases. Here we report on the E4 elliptical NGC 4697.

The construction of 2-integral and 3-integral distribution functions asks for photometry and kinematic data. In the course of the data analysis, we additionally detected a nuclear dust lane at 3.4″ or 0.4 kpc from the centre, which could be confirmed with HST data. This was put to good use to constrain the inclination.

A comparison of the Lucy-deprojection method with the multi-gaussian expansion method shows that both produce similar results, though the latter produces a smoother and analytically known spatial density.

The potential, obtained assuming a constant M/L, and the observed moments are the basis for quadratic programming models (Dejonghe, 1989). The 3-integral model is based on a Stäckel third integral. The original potential is retained where appropriate, in order to minimize errors due to the Stäckel approximation.

The mass-to-light ratio of NGC 4697 appears to be a fairly well determined $(M/L)_B = 4.8h_{50}$, and is much better constrained than would be the case for spherical anisotropic models with comparable data. We found that a 2-integral model cannot be excluded as long as the Satoh parameter k is allowed to vary. This qualifies an earlier claim of Binney *et al.*(1990). On the whole, the 3-integral model produces better and smoother fits, mainly with $\sigma_\varpi > \sigma_z$.

Our analytical distribution functions permit insight in the internal dynamics of the galaxy through detailed contour plots for all deprojected moments up to order 2. Because of the Stäckel approximation we can relatively easily construct a view of a flattened elliptical in action space.

References

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