Planetary Nebulae in Elliptical Galaxies: Dynamical Models for Centaurus A

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We use planetary nebulae major- and minor-axis kinematics (Hui *et al.* 1995) of the dust-lane elliptical galaxy NGC 5128 (Centaurus A) to build triaxial dynamical models.

Centaurus A is a round galaxy, so as a first approximation we assume a spherical gravitational potential. The data consist in the flattened photometry of this E2 galaxy (well fitted by a de Vaucouleurs profile along the major axis) and the observed kinematics of Cen A (rotation curves and velocity dispersion profiles along the major and minor axes). The modeling technique is based on a quadratic programming algorithm which allows us to determine a positive distribution function (DF) written as a linear combination of simple basis functions such that the corresponding moments of the DF fit the observations *i.e.* the photometric and kinematical data. The basis functions are Fricke components (Mathieu *et al.* 1996a) allowing for rotation about the intrinsic major and minor axes of the galaxy. We show that no self-consistent models can fit the whole set of data, but models with a dark halo give pretty good fits. The total mass range interior to 50 kpc for Cen A is $3 \times 10^{11} M_{\odot} \leq M_{\rm tot} \leq 5 \times 10^{11} M_{\odot}$, of which 50% is dark matter.

In order to get a more accurate picture of the dynamics of Cen A, a triaxial potential is needed. To this end, we have developped a deprojection technique to approximate the gravitational potential of a galaxy by a triaxial Stäckel potential which admits three exact analytical integrals of motion (Mathieu & Dejonghe 1996b). We will use this potential to build fully triaxial dynamical models with other basis components taking advantage of the Stäckel nature of the potential.

REFERENCES

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