BARS IN CUSPS

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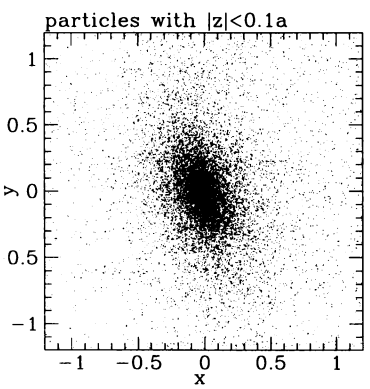
In order to investigate the stability properties of galaxy models with central density cusps, N-body simulations of oblate models with density $\rho \propto m^{-1}(m+a)^{-3}$ where $m^2=R^2+[z/q]^2$ and distribution functions $f(E, L_z)$ (computed as in Dehnen, 1995) have been performed with the following results.

1. An E7 model with identical amounts of stars of either sense of rotation was stable over 30 $t_{\rm dyn}(r=a)$. This is interesting for the bending instability has been argued to set in at about this flattening and be responsible for the absence of flatter elliptical galaxies (Merritt & Sellwood, 1994).

2. Rapidly rotating E$\gtrsim$E5 models quickly form weak bars inside the cusp, which are stronger for the more flattened, faster rotating initial configurations. The bars grow in a self similar fashion from inside out: the pattern speed decreases with increasing bar length and time. This process is initiated at the origin, where, because of finite N, the actual density no longer follows the power law, and stops when the edge of the cusp is reached. A typical example is given in the figure showing the x-y-coordinates of particles with $|z|<0.1a$ after $\sim 20 t_{\rm dyn}(r=a)$ for an initially rapidly rotating E7-model. The bar has axis ratios of about 5:3:1, and extends almost to corotation. However, it has no sharp edge, but an inhomogenous density with a cusp steeper than the initial model. No sign of a buckling instability has been observerd.



References

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