



Statistical mechanics of collisionless orbits. III. Comparison with N-body simulations

<http://www.firstlight.cn> 2010-10-01

We compare the DARKexp differential energy distribution, $N(E) \propto \exp(\phi_0 - E)$, obtained from statistical mechanical considerations, to the results of N-body simulations of dark matter halos. We first demonstrate that if DARKexp halos had anisotropic velocity distributions similar to those of N-body simulated halos, their density and energy distributions could not be distinguished from those of isotropic DARKexp halos. We next carry out the comparison in two ways, using (1) the actual energy distribution extracted from simulations, and (2) N-body fitting formula for the density distribution as well as $N(E)$ computed from the density using the isotropic Eddington formula. Both the methods independently agree that DARKexp $N(E)$ with $\phi_0 \approx 4-5$ is an excellent match to N-body $N(E)$. Our results suggest (but do not prove) that statistical mechanical principles of maximum entropy can be used to explain the equilibrated final product of N-body simulations.

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