Contra

A New Code for Adiabatic Contraction of Dark Matter Halos

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Contra is a new publicly available code that calculates the contraction of a dark matter halo in response to condensation of baryons in its center. The code is based on the modified contraction model of Gnedin et al. (2004, ApJ, 616, 16; astro-ph/0406247), which improves upon the model of Blumenthal et al. (1986) and reproduces the galaxy and cluster halo profiles in ART gasdynamics cosmological simulations to within 20%.

The mass distribution of a dark matter halo is assumed to be spherically symmetric, but the baryon distribution does not need to be spherical. The initial dark matter distribution can be specified as a numerical table or chosen from the following analytical profiles: Navarro, Frenk, White (1997); Navarro et al. (2004); or Sersic (1968).

Contra calculates the contracted dark matter profile consistent with the specified baryon profile, as well as the line-of-sight velocity dispersion for a tracer population with a given density profile and velocity anisotropy (isotropic distribution, constant beta parameter, Osipkov-Merritt, or Mamon-Lokas 2005 anisotropy model). The circular velocity in the contracted potential and the velocity dispersion of the tracer population will be useful for interpretations of rotation curves of disk galaxies, kinematics of satellite galaxies, mass reconstruction in elliptical galaxies and clusters of galaxies using lensing and X-rays.

The code and detailed instructions are available for download at

http://www.astronomy.ohio-state.edu/~ognedin/contra/