ABSTRACT ORAL CONTRIBUTION

A NEW ALGORITHM TO ESTIMATE DARK MATTER HALO CONCENTRATIONS

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We present a new algorithm to estimate the concentration of N-body dark matter halos using the integrated mass profile. The method uses the full particle information without any binning, making it reliable in cases when low numerical resolution becomes a limitation for other methods. We test the performance of this method by estimating halo concentration both on mock and N-body halos. We compare these results against two other methods: maximum radial velocity measurements and radial particle binning. Our tests show that the accuracy of the new method varies with halo resolution, outperforming the other two methods. We also measure the mass-concentration relationship on N-body data. We find that in the probed halo mass range $(10^{10}h^{-1}\mathrm{M}_\odot < M_h < 10^{14}h^{-1}\mathrm{M}_\odot)$ the three methods give consistent results within the statistical uncertainties. We only find a small deviation at low masses, $M < 10^{12}h^{-1}\mathrm{M}_\odot$, where the new method yields lower median concentration values by $20\% - 30\%$ compared to the velocity and density methods. From these results we believe that the new method is a promising tool to probe the internal structure of dark matter halos.

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