Highlights of Astronomy, Volume 15
XXVIIth IAU General Assembly, August 2009
Ian F. Corbett, ed.

doi:10.1017/S174392131000832X

Modeling mass independent of anisotropy: A comparison between Andromeda and Milky Way satellites

J. Wolf.

Center for Cosmology Physics & Astronomy Frederick Reines Hall University of California
Irvine, CA 92697-4575, US; email: wolfj@uci.edu

Mass profile determinations for dispersion supported galaxies from line-of-sight velocities are subject to large uncertainties associated with the unknown stellar velocity anisotropy. We demonstrate both analytically and with available kinematic data (for systems spanning eight decades in luminosity) that the mass-anisotropy degeneracy is effectively eliminated at a characteristic radius that is close to the 3D deprojected half-light radius of the stars. This allows a simple, yet accurate formula to describe the half-light dark matter masses of all hot systems, including dwarf spheroidal galaxies (dSphs), based on directly observable parameters: $\mathrm{M}_{1/2} = 4\,\sigma^2_{\mathrm{LOS}}\,\mathrm{R}_{\mathrm{half}}\,/\,G$, where $\mathrm{R}_{\mathrm{half}}$ is the 2D projected half-light radius and σ_{LOS} is the luminosity-weighted square of the line-of-sight velocity dispersion. The fact that masses are well-constrained within a characteristic stellar radius has allowed our group to perform systematic, accurate mass determinations for Milky Way dSphs and to conclude that they all have a common mass scale of approximately $10^7\ \mathrm{M}_\odot$ within 300 pc of their centers. We extend this work to the satellite population of Andromeda using Keck/DEIMOS spectroscopy of individual stars. We find that the Andromeda dSphs are also consistent with sharing a common mass, but that it is offset from the scale of the Milky Way dSphs by a factor of ~ 2.