Star and Structure Formation: From First Light to the Milky Way
Astrophysics Conference, August 18 – 22, 2003, ETH Zurich, Switzerland

The angular momentum problem in CDM halos

Elena D'Onghia, Max-Planck Institute of Astronomy (MPIA)

Abstract Cosmological models of hierarchical clustering predict that galactic disks form as a result of gas infall into cold dark matter (CDM) halos. The disk scale lenghts and rotation curves are determined by the gravitational potential and by the specific angular momentum distribution which the gas acquired from tidal interaction with the cosmological density field and which was modified during the protogalactic collapse phase. Analytical calculations have shown that the observed scale lengths and other properties of galactic disks are reproduced if the disk material retained its initial specific angular momentum when settling into the galactic plane. In the past cosmological N-body/SPH simulations have showed that the scale lengths and specific angular momenta of simulated disks are a factor of 10 smaller than observed (so called angular momentum problem of galaxy formation). We use a set of high-resolution simulations including gas and dark matter to study the formation of disks in a cosmological context. We focus on the following questions: is the halo merging history playing a role in building small disks or increasing the numerical resolution are the simulated disks of the observed size? Is the disk material retained its initial specific angular momentum or is it lost and why?