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Early Evolution of the Milky Way's satellite system

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Gerhard Hensler is the Vice President of the Austrian Society of Astronomy and Astrophysics OeGAA. He studied of Astronautics and Physics at the Technical University Berlin from 1970 to 1977, and received a Ph.D. in Astrophysics at University Observatory Goettingen in 1981. He was full Professor and Director at the Institute of Theoretical Physics and Astrophysics of the CAU of Kiel between 1990 and 2003, and the Full Professor for Theoretical Astronomy at the Institute of Astronomy, University of Vienna since 2003.

Abstract

The dwarf spheroidal galaxies (dSphs) around the Milky Way (MWG) belong to the most poorly understood class of astronomical objects and serve as the most challenging targets of astrophysical research for various reasons: At first, in LCDM cosmology a huge number of subhalos is expected to surround massive galaxies what is contrasted by the observed number of satellite galaxies around the MWG. In addition, it is debated whether the recently detected ultra-faint dSphs can account for this mismatch. Secondly, the accretion of satellite galaxies by the MWG should have lead to the built-up of the Galactic halo and should have left behind kinematic and chemical witnesses as stellar streams and abundance similarities to the existing dSphs. Again, these envisaged signatures are not observed. Although it must be expected that the evolution of the baryonic matter in the CDM subhalos is not only influenced by the simple gas loss due to ram-pressure stripping and galactic winds, but also by tidal effects of the mature galaxy and interactions among the satellite members themselves, yet only evolutionary models of isolated dSphs are explored. We have therefore undertaken to simulate the evolution of the system of DM subhalos simultaneously with a baryonic mass content down to 10^5 Msun for the vicinity of a MWG-type galaxy from the Via Lactea II cosmological simulations and implied the effects of star formation and its self-regulation, the chemical enrichment by stars and the chemo-dynamics of the gas phases. The simulation starts at z=4.56 with in initial gas content of 17% of the DM mass. Here we will present results of the first 2 Gyrs after the onset of the models. We demonstrate the action of tidal, ram-pressure, and merging effects on the star-formation history, mass function and chemistry of the satellites and the formation of the stellar and gaseous galactic halo.

All are welcome! Tea, coffee, biscuits will be served at 2:45 P.M.