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HI galaxy simulations for SKAO peculiar velocities

Thursday 6 February 2025 12:00 (20 minutes)

With the advent of next-generation radio observations with the upcoming SKA Observatory, HI Galaxy surveys will be able to probe the late-time Universe with unprecedented sensitivity, offering the possibility to constraint cosmology in a complementary manner to standard spectroscopic surveys. In preparation for this scientific case, realistic simulations of large-sky volumes with good resolution are needed. In this talk I will discuss Semi-analytic models (SAM) that combine the advantages of relatively large box sizes and resolutions fine enough to resolve galaxy substructures. In particular, I will present a study of HI galaxies 21cm lines based on the state-of-the-art Galaxy Evolution and Assembly (GAEA) SAM. We model the characteristic double-peak feature of the 21cm lines and obtain predictions for the HI Tully Fisher relation. We validate the simulation by constructing mock light cones for comparing to real observations and exploring systematic effects. We further predict the redshift distribution of HI galaxies, in particular of HI galaxies for which the TF signal is detectable, depending on survey specifications. These type of study are key for understanding the realistic constraining power of HI galaxy redshift surveys with the SKAO, and in particular of peculiar velocity surveys.

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