
Mocking Cosmic Intensities: The tail of the HI luminosity function

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Abstract

The current and upcoming generation of 21 cm Line Intensity Mapping (21 cm LIM) surveys promises a minimum order-of-magnitude increase in sensitivity, leading to the elusive detection of the 21 cm auto-power spectrum. These surveys promise to offer unprecedented insights into the involvement of neutral hydrogen (HI) in early galaxy formation and evolution and provide a powerful synergistic probe of the large-scale structure in enormous volumes of the Universe. In line intensity mapping, one does not resolve individual galaxies but only the smoothed integrated emission from all sources of flux. From a modelling standpoint, this presents a significant dynamic range of possible sources to be resolved in simulation. I'll present progress into developing a flexible and accurate modelling framework for IM experiments based on the Peak Patch method. We adopt a sub-grid scheme and model the 21 cm LIM signal as a combination of halo and continuous field components. We produce a set of high-resolution cosmological simulations, which resolve the entire relevant population of dark matter halos, and use them to validate and test our sub-grid method. The resulting mocks include the effect of this unresolved population on IM statistics in a manner coherent with the cosmic flow, enabling, for example, accurate studies of cross-correlations, on the full-sky.

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