
Simulating the LOcal Web (SLOW) - Synchrotron Emission from the Local Cosmic Web

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Abstract

Detecting diffuse synchrotron emission from cosmic web filaments is a long standing problem and only recently radio observations with advanced stacking methods can provide first indications of detections, or at least upper limits to possible emission in these regimes. The ingredients for this emission, namely the magnetic field strength in filaments and the acceleration of Cosmic Rays (CRs) at accretion shocks onto filaments or merger shocks within filaments are even more unknown.

Large-scale simulations of these processes are rare, as they require treatment of magnetic fields and complex CR models. These are only present in a few codes that can be used to run simulations of 100s of Mpc volumes, required for an accurate representation of the local cosmic environment.

We use a constrained simulation of the local Cosmic Web (*Dolag et. al. 2023*) with an on-the-fly spectral Cosmic Ray model (*Böss et. al. 2023*) to study CR acceleration at merger and accretion shocks.

This CR model allows us to trace the time evolution of CR proton and electron spectra and follow their changes due to adiabatic changes of the gas and energy losses due to synchrotron and inverse Compton losses.

In this talk I will briefly introduce the CR model and show its application to studying synchrotron emission from galaxy clusters and cosmic web filaments in the local cosmic environment.

*Speaker