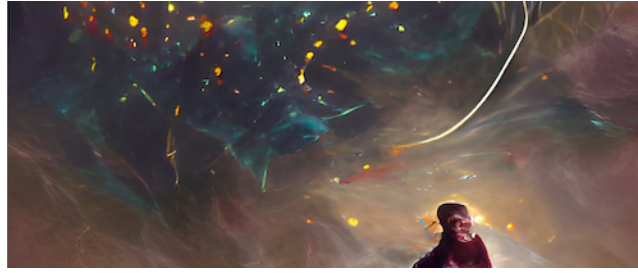


Cosmic Cartography 2022: Exploring the Cosmic Web and Large-Scale Structure



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Thermal Instabilities and Shattering in the High-redshift Cosmic Web - A Source for Low-metallicity Strong HI Absorbers

Wednesday, 9 March 2022 14:20 (20 minutes)

We present a cosmological zoom-in simulation of two 5×10^{12} halos and a Mpc-long cosmic filament connecting them at $z \sim 2$, to study the evolution of the IGM and the cosmic web around this system at unprecedented resolution. At $5 > z > 3$, the halos lie in a cosmic sheet with multiple coplanar filaments which contain most of the halos. The collapse of the sheet at $z \sim 5$ generates a strong shock that leads to thermal instabilities, shattering, and a multiphase medium of kpc-scale cold clouds pressure confined in a hot medium. These clouds are detectable as LLSs, though they lie well outside halos or filaments. They are metal-free, similar to several recently observed systems. This effect is unresolved in state-of-the-art cosmological simulations, which underestimate the HI content of the cosmic web.

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