The clumping factor of the IGM at the epoch of reionization in the SPHINX simulations

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Abstract

The clumping factor of the inter-galactic medium (IGM) is one of the most important quantities that determine the process of cosmic reionization. However, theoretical attempts to make predictions about the clumping factor have been hampered by finite resolutions of the simulations, because small-scale structures in the IGM were under-resolved. We use high-resolution (10 pc), cosmological radiation-hydrodynamic simulations, SPHINX, to estimate the clumping factor in the IGM. We present the clumping factors from 10 cMpc box simulation and discuss its implications on the volume-weighted neutral fraction and Thomson optical depth. We also discuss the local clumping factors, which should be useful to make predictions about the local ionization histories with analytic methods.

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