

Probing Reionization History with Topological Tests

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Abstract The most rapid and interesting phase of reionization was the overlap phase, when the ionized bubbles created by individual sources merged. This occurred when the volume-averaged neutral fraction was approximately half, and therefore cannot be probed by Gunn-Peterson troughs that become opaque at much smaller neutral fractions. Overlap is fundamentally a topological transition, and can be detected observationally by using topological statistics. The most promising observational tools for applying such tests are (a) Lyman alpha galaxy counts, and (b) 21 cm tomography. I will review the physics of Lyman alpha radiative transfer in a partly neutral IGM, and discuss the practical issues involved in implementing a topological test of reionization using either Lyman alpha galaxies or 21 cm observations.