
Lyman-alpha intensity mapping during the epoch of reionization

Eli Visbal*¹ and Matthew McQuinn²

¹Center for Computational Astrophysics, Simon's Foundation Flatiron Institute (CCA) – 162 5th Ave,
New York, NY 10003, United States

²University of Washington – United States

Abstract

Lyman-alpha is a particularly attractive line for intensity mapping during the epoch of reionization (EoR). In contrast to other galaxy lines such as CO(1-0) or CII, strong Ly α emission can be produced without metals, which may not be abundant in small galaxies during reionization. I will present Ly α intensity mapping simulations during the EoR that include the complex radiative transfer effects of Ly α photons scattering through the neutral intergalactic medium. Utilizing a Monte Carlo approach to radiative transfer, we find that Ly α scattering smooths spatial fluctuations in Ly α intensity on small scales and that the spatial dependence of this smoothing depends strongly on the mean neutral fraction of the IGM. Thus, Ly α intensity mapping is a promising way to measure the global reionization history. I will also discuss the signal-to-noise of future Ly α intensity mapping observations with SPHEREx. I will show that by cross-correlating with galaxies it should be possible to accurately measure the Ly α signal on large scales.

*Speaker