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Cosmology with the Lyman-a forest

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The Lyman-a forest is a unique large-scale structure tracer at Mpc scales and below at high redshifts (2 < z < 4). One of the key advantages of the Lyman-a forest is that, since the density fields are only mildly non-linear at the respective redshifts, a much wider range of scales can be used to robustly probe cosmology than with most galaxy surveys, making the Lyman-a fluctuations a powerful probe of early-Universe physics when combined with tracers that are sensitive to very large scales, e.g,~cosmic microwave background (CMB) anisotropies. I will present the first measurement of the 3D Lyman-a forest power spectrum, the detection of the CMB lensing – Lyman-a forest power spectrum signal and discuss ongoing work to perform a full-shape cosmological analysis of Lyman-a forest data in the framework of the effective field theory of large-scale structure from cosmological surveys such as eBOSS, DESI and future spectroscopic surveys.

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