



Contribution ID: 163

Type: **not specified**

How to model the effect of small-scale structures on light propagation?

Wednesday, September 9, 2015 12:30 PM (20 minutes)

In standard cosmology, observations are interpreted as if light propagated through a universe whose inhomogeneities are modeled by perturbations with respect to the FLRW spacetime. However, the very narrow light beams associated with point-like sources—such as supernovae—probe the Universe at extremely small scales ($\sim AU$), up to which the perturbative approach should break down. In this talk, I will present an alternative framework where the lensing due to small-scale structures is treated as a diffusion process.

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Session Classification: CMB, LSS and cosmological parameters