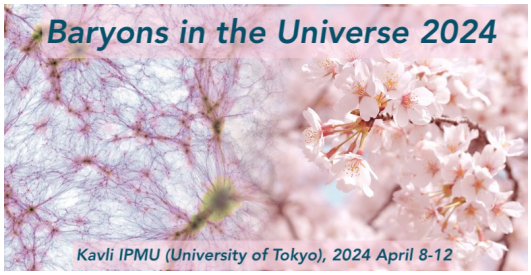

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New methods to probe baryons with LSS and CMB on cosmological scales

Friday, 12 April 2024 11:40 (20 minutes)

Baryon fluctuations carry valuable cosmological and astrophysical information. On large scales, cross-correlations between matter and baryon (or electron) fluctuations probe initial conditions, interactions and dynamics during early Universe, such as primordial isocurvature, a smoking-gun signature of inflationary models. On scales corresponding to inter- and circum-galactic media, precise measurements of free electron abundance might give hints on the strength of baryonic feedback which push the gas away from the halo centers; improving our current understanding of galaxy formation, further elucidating the 'missing baryon' problem, for example, or on the influence of baryons on matter perturbations beyond halo scales, with implications for the so-called sigma8 tension. The small-scale baryon isocurvature can also be a probe of initial conditions. Furthermore, optical depth is a tracer of the reionization history. In particular, at redshifts 2<z<4 accessible to upcoming galaxy surveys, the mean ionization fraction probes the ionization of the second electron in helium. In this talk I will introduce multiple new methods to probe baryon fluctuations from upcoming galaxy and intensity mapping surveys alone (Hotinli and Holder; to appear) as well as new methods that utilize the LSS and CMB cross-correlations (e.g. Hotinli, Hotinli et al, Caliskan et al. 2023 and Kumar-Anil et al, upcoming). I will also showcase new work on probing helium reionization with CMB and LSS (Caliskan et al. 2023, Anil-Kumar et. al and Madden et. al., upcoming).

Presenter: HOTINLI, Selim