

Cosmic Web Studies in Fuzzy Dark Matter Cosmologies

Wednesday, 31 May 2023 12:06 (5 minutes)

Fuzzy dark matter (FDM) modifies the internal properties of dark matter halos and large-scale cosmic environments. In this talk I will share selected insights from recent work based on cosmological N -body simulations. We find that the concentration of FDM-like halos peaks around two decades above the half-mode mass, breaking the approximate universality of halo density profiles observed in Λ CDM. Shape parameter profiles (intermediate-to-major and minor-to-major axis ratios) of FDM-like halos are more elongated around the virial radius and less elongated near the center, deviating from the monotonicity observed in Λ CDM. We reassess intrinsic alignment correlations in FDM-like cosmologies and comment on their importance in upcoming weak lensing surveys. Finally, the cosmic web itself sees its mass distribution gradually reshuffled as the axion mass is reduced, leading to changes in the cosmic tidal fields. We quantify the mass and volume filling fractions of cosmic environments and find that in FDM-like cosmologies, 2D cosmic sheets host a larger share of the matter content of the Universe compared to Λ CDM. We show that FDM-like cosmologies exhibit more peaked log overdensity probability distribution functions and systematically higher skewness estimates compared to Λ CDM, particularly at high redshift. These results suggest that the internal properties of dark matter halos and large-scale cosmic environments may offer powerful constraints on FDM and other alternative dark matter models.

Would you be interested in presenting a poster? (this will not impact the decision on your talk)

no

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