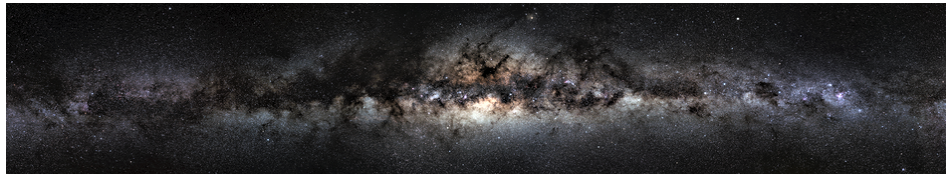


Dark Sectors of Astroparticle Physics (AstroDark-2021): Axions, Neutrinos, Black Holes and Gravitational Waves



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Cosmological Tests of the Early Matter-dominated Epoch by Observing Cosmic Neutrino Background, Gravitational Wave Background and Primordial Black Holes

Wednesday, 8 December 2021 12:00 (40 minutes)

After aLIGO detected the gravitational wave (GW) produced by mergers of binary black holes (BHs), researchers have aggressively studied the origin of the BHs with masses of the order of $O(10) M_{\text{sun}}$. In addition to astrophysical origins through evolutions of Pop.III/Pop.II stars, one of the attractive candidates of those BHs should be Primordial Black Holes (PBHs). The PBHs can be produced even in the early matter dominated Universe due to collapses of regions which have a large curvature perturbation. I will explain the mechanism of PBH formations in the early matter dominated Universe in detail. Next, I will discuss some ideas to test the early matter-dominated epoch realized, e.g., just after inflation by observing the effective number of neutrino species which can be less than three, distinctive spectra of gravitational wave background and a nonzero spin of primordial black holes in future.

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