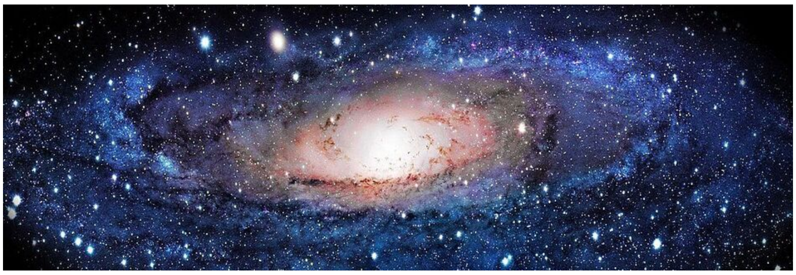

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3 Ways of Probing High Scale Leptogenesis via Gravitational Waves: Primordial Back Holes, Phase transitions and Domain Walls

Wednesday 21 September 2022 14:30 (30 minutes)

Leptogenesis usually involves high scales and it is hard to test in laboratories, Here we will discuss probing high scale and intermediate scale leptogenesis via primordial sources of Gravitational Waves from inflationary tensor perturbations, thermal phase transitions and domain walls.

First we will show Hawking evaporation of primordial black holes (PBHs) can facilitate the generation of matter-antimatter asymmetry via baryogengesis directly or via leptogenesis. We propose a novel test of this scenario by detecting its characteristic doubly peaked gravitational wave (GW) spectrum in future GW observatories. Here the first order adiabatic perturbation from inflation and from the isocurvature perturbations due to PBH distribution, source tensor perturbations in second-order and lead to two peaks in the induced GW backgrounded this would provide a smoking gun signal of non-thermal baryogenesis from evaporating PBHs, which is otherwise impossible to test in laboratory experiments due to the very high energy scales involved or the feeble interaction of the dark sector with the visible sector.

Second we will show leptogenesis in B−L symmetry breaking scenario associated with a strong first-order phase transition that gives rise to detectable gravitational waves (GWs) via bubble collision. And the possible future GW experiments can effectively probe leptogenesis over a wide range of the B−L symmetry-breaking scale.

Third, we propose a novel way of probing high-scale Dirac leptogenesis, a viable alternative to the canonical leptogenesis scenario where the total lepton number is conserved, keeping light standard model neutrinos purely Dirac. This leads to GW signals from collapsing domain walls. We find that most of the near-future GW observatories will be able to probe Dirac leptogenesis scales all the way up to.

Based on the following Refs:
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