MATTER FROM MOTION: BARYOGENESIS IN EQUILIBRIUM

SEMINAR

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Abstract

The observed matter–antimatter asymmetry of the Universe remains one of the fundamental puzzles in modern cosmology. Conventional baryogenesis mechanisms rely on the Sakharov conditions, including departure from thermal equilibrium. However, a time-dependent scalar background can bias particle and antiparticle populations, enabling baryogenesis even when the relevant interactions remain in thermal equilibrium.

In this talk, I will discuss this possibility within a minimal dynamical scotogenic framework, where neutrino masses are generated radiatively and a spontaneously broken global $U(1)_{B-L}$ symmetry gives rise to a Nambu–Goldstone boson, the Majoron. A rolling Majoron field induces an effective chemical potential for B-L, allowing a lepton asymmetry to develop through rapid lepton-number-violating interactions without requiring a decay-induced CP asymmetry. This mechanism enables successful leptogenesis at relatively low right-handed neutrino mass scales. I will also discuss its implications for neutrino masses and multicomponent dark matter, connecting particle physics with early-Universe cosmology.

Everyone is invited to attend