Contribution ID: **346** Type: **not specified**

Probing flavor violation and baryogenesis via primordial gravitational waves

Wednesday 15 May 2024 14:30 (15 minutes)

We show that observations of primordial gravitational waves of inflationary origin can shed light into the scale of flavor violation in a flavon model. The mass hierarchy of fermions can be explained by a flavon field. If it exists, the energy density stored in oscillations of the flavon field around the minimum of its potential redshifts as matter and is expected to dominate over radiation in the early universe. The evolution of primoridial gravitational waves acts as a bookkeeping method to understand the expansion history of the universe. Importantly, the gravitational wave spectrum is different if there is an early matter dominated era, compared to radiation domination expected from standard cosmological model and gets damped by the entropy released in the flavon decays, determined by the mass of the flavon field m_S and new scale of flavor violation $\Lambda_{\rm FV}$. Furthermore, the flavon decays can source the baryon asymmetry of the universe. We show that the $m_S - \Lambda_{\rm FV}$ parameter space in which the correct baryon asymmetry is produced can also be probed by gravitational wave observatories like BBO, DECIGO, U-DECIGO, ARES, LISA, ET, CE etc. for a blue-tilted gravitational wave spectrum. Our results are compatible with primordial origin of NANO-GRAV observations.

Mini Symposia (Invited Talks Only)

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Session Classification: Gravity & Gravitational Waves

Track Classification: Gravity & Gravitational Waves