

Contribution ID: 37

Type: **not specified**

Leptogenesis triggered by a first-order phase transition

Monday, June 26, 2023 10:00 AM (45 minutes)

We propose a new scenario of leptogenesis, which is triggered by a first-order phase transition (FOPT). The right-handed neutrinos (RHNs) are massless in the old vacuum, while they acquire a mass in the new vacuum bubbles, and the mass gap is huge compared with the FOPT temperature. The ultra-relativistic bubble walls sweep the RHNs into the bubbles, where the RHNs experience fast decay and generate the lepton asymmetry, which is further converted to the baryon asymmetry of the Universe (BAU). Since the RHNs are out of equilibrium inside the bubble, the generated BAU does not suffer from the thermal bath washout. We first discuss the general feature of such a FOPT leptogenesis mechanism, and then realize it in an extended B-L model. The gravitational waves from U(1)B-L breaking could be detected at the future interferometers.

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