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Bartosz Fornal

Testing Models with Extra U(1) Gauge Symmetries with Gravitational Waves

Abstract

Primordial gravitational waves constitute a powerful tool in probing particle physics models via their effects in the early Universe. In particular, models with extended gauge symmetries predict a stochastic gravitational wave background from various processes connected to symmetry breaking such as first order phase transitions and the dynamics of topological defects (cosmic strings and domain walls). Concentrating on two models of this type – one with an extra U(1) dark gauge group constructed to address the neutron lifetime anomaly, and the other with an additional U(1) lepton gauge group leading a low-scale seesaw mechanism for the neutrinos – I will demonstrate how current and upcoming gravitational wave experiments may be used to probe such theories, shedding light on some of the open questions in particle physics.