

COSMOLOGICAL IMPLICATIONS OF UNIFICATION: TOPOLOGICAL STRUCTURES AND GRAVITATIONAL WAVES

SEMINAR



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Abstract

Grand unified theory (GUT) provides a rationale for the arbitrariness of the Standard Model (SM) and explains many enigmas of nature at the outset of a single gauge group. The GUTs predict the proton decay, and the spontaneous symmetry breaking (SSB) of the higher symmetry group may lead to the formation of topological defects, which are indispensable in the context of cosmological observations. Topological defects such as magnetic monopoles, cosmic strings, and their composite structures arise naturally in various GUTs through symmetry-breaking phase transitions in the early Universe. I will discuss the formation of strings and their various composite structures in $SO(10)$ GUTs. We will discuss the realizations of 'metastable' strings (MSS), 'quasistable' strings (QSS), and 'walls bounded by strings' (WBS) in $SO(10)$ GUTs. We will explore the stochastic gravitational wave background emitted from such networks of composite structures. The gravitational waves emitted from MSS, QSS and WBS with superheavy (GUT scale) strings can explain the recent exciting evidence of the stochastic gravitational waves in the NANOGrav and other pulsar timing array data.

Everyone is invited to attend