

PHYSICS DEPARTMENT SEMINARS



21/10/2026

Feza Gürsey Seminar Room
Seminar 15:30

Speaker:

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When dark energy density changes sign: Theoretical approaches and conceptual frameworks

The recent conjecture arising from graduated dark energy suggests that the universe has recently undergone a rapid transition from an anti-de Sitter vacuum to a de Sitter vacuum through a sign-switching cosmological constant. Despite the success of this phenomenological model in effectively alleviating cosmological tensions, incorporating it into a consistent theoretical framework remains challenging, given that it involves a transition from negative to positive energy density. In this talk, we will trace how the phenomenon of sign-changing dark energy density evolved from the idea of screening cosmological constant. We will focus on the theoretical construction of such models within the context of two distinct types of modified gravity: matter-type and geometry-type. After outlining how matter-type theories are equivalent to general relativity with nonminimal matter interactions, we will demonstrate the potential of teleparallel $f(T)$ gravity to produce a sign change in the dark energy density and discuss previously unexplored solution spaces specific to the exponential infrared model. By revisiting the conventional assumptions regarding the dark energy sector, we will present a conceptual framework based on the inertial mass density and active gravitational mass density rather than the equation of state parameter.