

# SCALARON DARK MATTER DYNAMICS AND THE ROLE OF HIGGS NON-MINIMAL COUPLING

SEMINAR

**DR. SHIBENDU GUPTA CHOUDHURY**

CTP, Jamia Millia Islamia, New Delhi



07 JANUARY 2026



03:00 PM



PAMU SEMINAR ROOM



## Abstract

In this talk, I will discuss how the scalar degree of freedom emerging in  $R^2$ -gravity, namely the scalaron, can naturally serve as a viable dark matter (DM) candidate. The scalaron interacts only gravitationally with Standard Model fields through Planck-suppressed couplings, making it consistent with the current absence of DM detection beyond gravity. I will show how a non-minimal coupling of the Higgs field to gravity modifies the induced trilinear scalaron-Higgs interaction that governs the early-universe evolution of the scalaron. The interplay between the  $R^2$ -gravity contribution and that from the non-minimal coupling determines both the initial conditions and evolution of the scalaron, leading to cold DM behavior at later epochs. Remarkably, depending on the strength of the non-minimal coupling, the scalaron mass can either lie in the meV range or within the keV-MeV window to yield the observed relic abundance, subject to additional constraints from collider and astrophysical observations.

*Everyone is invited to attend*