



## ICTS Astrophysics & Relativity Seminar

**Title** : Dark matter searches using gravitational-wave detectors

**Speaker** : Nancy Aggarwal (University of California, USA)

**Date** : Thursday, 12 December 2024

**Time** : 3:00 PM (IST)

**Abstract** : In this talk I will talk about a precision measurement experiment to look for higher frequency gravitational waves (GWs). I will also summarize projects looking for dark matter signals in GW-detectors in multiple frequency bands. Gravitational waves at frequencies higher than the LIGO band can bring us completely new information about the universe. Besides being the most-interesting frequency region for looking at cosmological phenomena, they can also convey signatures of dark matter candidates like ultralight bosons through black hole superradiance and light primordial black holes (PBHs). I will introduce a new global initiative to study GW sources and detectors at ultra-high-frequencies (MHz-GHz), as well as a new experiment to look for GWs in the radio frequency band (10 kHz to 300 kHz) using levitated optomechanical sensors. I will summarize the design of this radio-frequency levitated sensor detector (LSD), the current experimental progress, as well as a path forward for future improvements. I will also show upper limits that LSD could place on the light PBHs, as well as recent upper limits on ultralight PBHs using a new analysis technique on LIGO data. If time permits, I will also show a new way to look for dilatonic dark matter in the auxiliary channels of LIGO. Finally, I will give a sneak-peek into future experiments that will shine light on numerous questions in fundamental physics ranging from gravitational waves, dark matter, cosmology, beyond-the-standard- model physics, and quantum gravity.

**Venue** : Feynman Lecture Hall

Zoom Link: <https://icts-res-in.zoom.us/j/96552202490?pwd=jk2veGAuTChs98B4wCQLCbGtLSQvjd.1>

Meeting ID: 965 5220 2490

Passcode: 977956