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TATA INSTITUTE OF FUNDAMENTAL RESEARCH

ICTS Seminar

Title : The Black Hole Shadow & Beyond

Speaker : Prashant Kocherlakota (Black Hole Initiative at Harvard University, USA)

Date : Tuesday, 18 March 2025

Time : 10:00 AM (IST)

Abstract : Black holes (BHs) exhibit striking observational signatures, including a central brightness depression seen in the first high-resolution BH images. This feature, linked to the “BH shadow,” arises from strong gravitational lensing near the event horizon. I will begin by discussing the formation of this shadow, its role in probing BH spacetimes, and the potential of future high-resolution, multi-wavelength BH movies. Such observations will not only sharpen our understanding of gravitational physics but also capture the base of the relativistic jet in M87, where it connects to the supermassive BH. Jets—magnetized plasma streams—are hypothesized to be powered by BH spin energy via a Penrose-like process, and future observations may confirm whether energy extraction occurs in astrophysical BHs. Beyond observations, BHs pose deep theoretical challenges: What is their internal structure? Under what conditions do they form? I will conclude by highlighting our recent findings on light focusing within BH interiors and their implications for understanding the formation of the inner horizon, the culprit behind a blueshift instability—an instability that may hold the key to what really lies inside a black hole.

Venue : Online

Zoom Link: <https://icts-res-in.zoom.us/j/96461024767?pwd=qPPWum6lTH6jutHzfybCkul2Nkjbxs.1>

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