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ICTS Astrophysics & Relativity Seminar

- Title** : A Dynamical Test for Cooling-Induced Entrainment in a Runaway Supermassive Black Hole Tail
- Speaker** : Ish Kaul (University of California, Santa Barbara)
- Date** : Thursday , 20 August 2026
- Time** : 3:30 PM (IST)
- Abstract** : Recently, JWST observations confirmed the first runaway supermassive black hole (RBH-1) moving at $\sim 950 \text{ km s}^{-1}$ through the ambient hot circumgalactic medium (CGM). This RBH-1 left behind a 62 kpc long trail of cold $\text{H}\alpha$ and $[\text{OIII}]$ emitting gas in its wake of radius 0.7 kpc and a velocity gradient of $\sim 200 \text{ km s}^{-1}$ along its length. This bears uncanny resemblance to cold tails formed in simulations of cold clouds embedded in hot winds in the context of galactic winds and the CGM. Using 3D hydrodynamical simulations with radiative cooling, along with theoretical predictions from turbulent mixing layer theory, I model the coherent downstream wake. I will show that the observed velocity gradient in the tail is naturally and quantitatively explained by accretion induced drag from radiative mixing layers. These results provide the first dynamical test for cooling-induced entrainment in an astrophysical system. Finally, I will show some remaining mysteries about the origin of cold gas in this system. If time permits, I will also discuss some new distinct results from multigroup radiation-MHD simulations of AGN accretion disks.
- Venue** : Feynman Lecture Hall
Zoom Meeting: <https://icts-res-in.zoom.us/j/95083846541?pwd=wz2YkJOBHvOGoxwHpiX6320I8i0XQ8.1>
Meeting ID: 950 8384 6541
Passcode: 602030