# ICTS String Seminar

**Title** : On the Asymptotic Causal Structure in Gravitational EFTs

**Speaker** : Alessandro Longo (Astroparticule et Cosmologie, Université Paris Cité, France)

**Date** : Monday, 25 May 2026

**Time** : 3:30 PM (IST)

**Abstract** : It is usually assumed that a healthy EFT should not allow superluminal propagation. In the presence of gravity, however, the notion of superluminality becomes subtle, since there is no invariant way to compare with an underlying Minkowski light cone. One can instead resort to an asymptotic criterion: whether the EFT can induce signal propagation faster than what is allowed by the asymptotic structure of spacetime. In this work, we study the asymptotic causal structure of gravitational EFTs by analysing signal propagation in black-hole backgrounds in the presence of higher-derivative operators. We show that in spacetime dimensions $D>4$, the effective light cones can lead to genuine asymptotic superluminality, which can be used to constrain the regime of validity of the EFT. By contrast, in $D=4$ the asymptotic causal structure is universally identical to that of Schwarzschild: prompt null curves remain insensitive to higher-derivative corrections and no asymptotic time advance is possible. We first study the representative operator $R_{\mu\nu\rho\sigma}F^{\mu\nu}F^{\rho\sigma}$, then show that this conclusion is true for any EFT, as it relies only on the asymptotic behaviour of the metric. Finally, we discuss two ways to define superluminality in $D=4$ spacetimes: introducing a covariant cut-off by putting the theory in an asymptotically-AdS background, or imposing a hard cut-off by working at finite distance.

**Venue** : Online
Zoom Link: https://icts-res-in.zoom.us/j/88092766911?pwd=R3ZrVk9yeW96ZmQ4ZG9KRzVhenRKZz09
Meeting ID: 880 9276 6911
Passcode: 232322