Seminário, Quinta-feira 22/10/2026

Local: Auditório Pi

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Título: Gravitational Lensing and Its Applications

Abstract: In this talk, I will first introduce gravitational lensing—the phenomenon where the path of light is bent by gravity—and its various forms. Two types that occur on galactic scales are gravitational microlensing and self-lensing. These phenomena have diverse applications, including the study of stellar physics, mass determination for dark and low-mass objects, and the detection of planetary systems, free-floating exoplanets, and dark objects such as isolated low-mass black holes. Observing the light curves of gravitational lensing events caused by various objects and systems reveals the nature of the gravitational lens and its physical parameters. However, in actual observations, identifying the nature of the lens and determining its physical parameters is not always feasible due to two factors: (1) modeling degeneracies and (2) the presence of noise and the superposition of multiple factors affecting stellar light variations. In this context, simulations based on real observations can resolve modeling challenges associated with these transient and periodic astrophysical events—or at least shed light on the sources of these difficulties. To eliminate noise or disentangle the various factors influencing stellar light, statistical methods based on machine learning, as well as the expansion of astrophysical data series using periodic orthogonal bases (such as Fourier series or Singular Spectrum Analysis) or non-periodic bases (such as wavelet transforms), prove highly useful. In recent years, I have participated in observing gravitational microlensing events, planetary transits, and asteroids; I will conclude the talk by reviewing these activities and their results.