



भारतीय खगोलभौतिकी संस्थान Indian Institute of Astrophysics

IIA Colloquium

11:30 a.m., Monday, 30th March 2026
IIA Auditorium

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Jets and Winds from Young Stellar Objects: New Insights from JWST

Jets and winds are ubiquitous in the Universe, observed across a wide range of astrophysical systems—from active galactic nuclei and gamma-ray bursts to microquasars, proto-planetary nebulae, and newly formed stars. Although these outflows span orders of magnitude in scale, energetics, and kinematics, they are widely thought to arise from a common physical process: magneto-centrifugal ejection of matter. Young stellar objects provide an exceptional laboratory for investigating this mechanism, owing to their proximity and the availability of a rich set of observational tracers that probe accretion and outflow physics from sub-au to parsec scales. Over the past decade, a convergence of transformational observations and major theoretical advances has fundamentally reshaped our understanding of how jets and winds are launched from young stars. High-resolution, high-sensitivity observations from facilities such as ALMA and the James Webb Space Telescope have revealed previously unseen components of molecular and atomic outflows, traced their connection to accretion activity, and mapped their interaction with disks and envelopes. In parallel, new theoretical developments in non-ideal magnetohydrodynamics, disk turbulence, and magnetized disk winds have provided a more nuanced and physically grounded picture of accretion–ejection coupling. In this talk, I will present an observationally driven overview of these developments, with particular emphasis on how new JWST results are reshaping our physical picture of jet and wind launching in young stellar systems.

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