**INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE**
**2A & 2B, Raja S.C. Mullick Road, Jadavpur, Kolkata-700032, India**

# Seminar Notice

Org. by

## School of Physical Sciences

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| **Title:** | **Evolution and instability of Bondi accretion** |
| **Speaker:** | **Arnab Kumar Ray, Dhirubhai Ambani Institute of Information and Communication Technology (DAIICT), Gandhinagar, Gujarat** |
| **Date:** | **December 20, 2019 (Friday)** |
| **Time:** | **15:00 Hours** |
| **Venue:** | **Physics Seminar Room (C406), 3rd Floor, Centenary Building, IACS** |
| **Abstract:** | Stationary spherically symmetric transonic (Bondi) accretion is a paradigm in astrophysical fluid dynamics. We, however, show that in the stationary regime this process cannot be physically realisable because its mathematical solution lies along a separatrix and passes through a saddle point in the phase portrait of the flow. We argue that the transonic solution is owed actually to the dynamics. In studying the dynamic effects, we subject the stationary flow to a time-dependent radial perturbation, with the equation of the perturbation containing nonlinearity up to any arbitrary order.Casting the perturbation as a standing wave on subsonic solutions, and maintaining nonlinearity in it up to the second order, we get the time-dependence of the perturbation in the form of a Li'enard system. A dynamical systems analysis of the Li'enard system reveals a saddle point in real time, with the implication that instabilities will develop in the accreting system when the perturbation is extended into the nonlinear regime. The instability of initial subsonic states also adversely affects the temporal evolution of the flow towards a final and stable transonic state. We provide numerical support in favour of this claim. |

**All are cordially invited to attend the seminar**