



INDIAN INSTITUTE OF TECHNOLOGY MANDI

भारतीय प्रौद्योगिकी संस्थान मंडी

Institute Colloquium

“Journey Of Droplet Through Various
Spatio-Temporal Scales”



Prof. Saptarshi Basu
Department of
Mechanical Engineering
Indian Institute of Science
(IISc), Bengaluru



**07th November,
2025**



05:00 PM



**Auditorium,
North Campus**

Journey Of Droplet Through Various Spatio-Temporal Scales

Prof. Saptarshi Basu

Affiliation: Department of Mechanical Engineering, Indian Institute of Science
(IISc), Bengaluru

Abstract: -

In the first part of his seminar, he will present the gamut of works currently being pursued in his lab at IISc ranging from interfacial transport to large-scale gas turbines. he will showcase different interesting results mostly in the domain of multiphase systems related to droplet combustion, bacteria, virulence coupling with flow, colloids and interfaces, vortex interaction with substrates, and high-pressure combustion systems.

He will highlight two topics in detail in the second part of his talk. The first one will be related to how droplet level transport with unique experiments can be utilized to understand and predict the spread of respiratory pandemics like COVID-19. He will show how simple modeling, experiments involving surrogate respiratory droplets in levitators, and impingement of cough droplets on facemasks can be used to unearth the essential physics of transmission pertaining to COVID-19. The other topic will be related to interaction of complex fluid droplets with shock waves and associated flow. This part will highlight the design and implementation of a diaphragm-less, gas less portable shock tube. Subsequently, he will showcase high-fidelity experiments and new physics regarding the interaction of such shock fronts with droplets leading to instabilities and atomization. He will offer insights into such intricate physics. The shock-droplet atomization is central to closed coupled atomizer used for generating metal powder for additive manufacturing.

Bio-Sketch: -

Prof. Saptarshi Basu completed his Ph.D. from University of Connecticut in 2007 before joining University of Central Florida as an assistant professor. In 2010 he relocated to India and joined the prestigious Indian Institute of Science in Bangalore, where he is the INAE and KSIIDC Chair Professor in the Department of Mechanical Engineering.

Prof. Basu primarily works on multi-phase systems, especially droplets at multiple length and timescales across multiple application domains, ranging from surface patterning to

combustion. He has completed extensive research on the transmission of aerosols relating to COVID-19, and on the efficacy of facemasks. His research marries fundamental aspects of classical fluid mechanics like vortex dynamics and swirling flows and the more interdisciplinary aspects of interface transport of droplets in multiphase systems.

Prof. Basu is a fellow of Indian National Academy of Engineering, National Academy of Sciences, ASME, Institute of Physics, Royal Aeronautical Society and Royal Society of Chemistry. He is the recipient of a DST Swarnajayanti Fellowship in Engineering. Prof. Basu also received the Distinguished Alumnus Award from University of Connecticut, K.N Seetharamu Medal and prize from ISHMT and Rajib Goyal Prize in Applied Sciences. Basu also is a co-founder of a biotech startup specializing in AI-based Point-of-Care diagnostics, and a technical advisor to a tech startup involved in micro-gas turbines.

Prof. Basu serves as an editor or guest editor of several journals including scientific reports, *Experiments in Fluids*, and *European Physical Journal Special Topics*. His research is funded by the Department of Defence, Indian Space Research Organization, Department of Science and Technology, Indo-German Science and Technology Center, Indo-US Clean Energy Center, the National Science Foundation, and industries like Siemens and Tata Motors. Additionally, Basu has guided more than 25 Ph.D. students over his career.
