

BioSketchAmitaDas

Professor **Amita Das** is a distinguished Indian plasma physicist whose research spans laser-plasma interactions, nonlinear plasmas, plasma turbulence, and the properties of strongly coupled and dusty plasma systems. With over 150 publications in peer-reviewed international journals, she has made significant contributions to the field and guided numerous students to earn their Ph.Ds under her mentorship.

Prof. Das earned her Ph.D. from the **Indian Institute of Technology (IIT), Kanpur**, in 1990. Following her graduation, she joined the **Institute for Plasma Research (IPR)**, where she held various positions, including Dean of the Institute. In December 2018, she transitioned to the Physics Department of the **Indian Institute of Technology Delhi**, where she continues her impactful work.

She is a fellow of all three prestigious Indian academies: **INSA (Delhi)**, **IAS (Bangalore)**, and **NASI (Allahabad)**. Prof. Das is also a recipient of several awards, including the **DAE -ORI** Department of Atomic Energy Outstanding Research Investigator award the **J.C. Bose Fellowship Award** from the Department of Science and Technology (DST) and the **Kaw Legacy Award** conferred by the Kaw Family Trust.

Her contributions extend beyond research and teaching to academic leadership. She has held editorial roles for several international journals, including *Physics Letters A*, *Fundamental Plasma Physics* and *Reviews of Modern Plasma Physics*. Currently, she serves as the secretary of the C:16 Commission of the International Union of Pure and Applied Physics (IUPAP).

She has carried out research in many diverse areas of plasma physics independently as well as with several colleagues and students. These studies have resulted in a extensive and wide variety of topics concerning fusion and fundamental plasma science. A limited set of some of her outstanding work includes:

1. **Magnetic confinement studies:** She has developed generic models capturing the essential physics germane to the low frequency tokamak turbulence, self organised bursty heat transport in tokamaks. A simple theory based on the generation and interplay of zonal flows and fields in finite beta plasma has been provided which explains the threshold experimental curve for the low to High confinement modes. Her work in this area his widely recognised with some publications having more than 100 citations.
2. **Fast Electron time scale phenomena:** She initiated the work in the regime of plasma response at fast time scales in which only the lighter electron species are involved in the dynamics. This regime became relevant after the advent of high power short laser pulses and fast diagnostic tools. She developed a novel shock driven anomalous mechanism of energy absorption which were experimentally verified in TIFR and ILE Osaka laboratories. This has importance in the creation of hot spot in fast ignition scheme of laser fusion. Other

interesting fundamental observations include results related to novel mechanism of magnetic field generation, the evolution of its turbulent characteristics in laser plasma experiments and its connection with astrophysical phenomena. etc., solitons and their interaction, dynamics of electron currents in inhomogeneous density etc,. Her work on turbulence and transport

3. **Laser interacting with Magnetized Plasmas:** in the last decade or so, after realising that high magnetic field s of the order of kilo Tesla range can be produced and long wavelength CO₂ lasers can be operated in pulse mode, she started working in the novel regime of laser interacting with magnetised plasma. In this area she has achieved a whole range of interesting results. She identified new mechanism of laser energy absorption techniques which can directly dump energy to the heavier ion species, the possibility of localised heating by gaming the plasm density and magnetic field profiles were demonstrated by her. She found a new regime of vacuum like propagation in plasm medium at very strong magnetic field - which cannot produced in laboratory but can be present in astrophysical scenario. Furthermore, it was shown by her that the magnetised plasma lens can act as an ideal lens to enhance the amplitude of laser field.
4. **Yang Mills system:** She has also recently started working on the non abelian gauge field Yang Mills system for which studies on the color charge dynamics and collective behaviour of streaming instabilities have been studied. These studies have not only solved the decade old problem of Wu Yang ambiguity but has also yielded certain results which have relevance to spintronics etc.