



Project Proposal for Ph.D.

Project Details	
Project Title	Nonlinear dynamical characterization of a low-temperature plasma source
Project Summary (Minimum 500 and maximum 2000 characters)	The observation of nonlinear phenomena in different types of dc / rf / microwave / ECR plasma sources is common. Plasma is a highly complex medium with an inherent ability to self-organize itself against external perturbations and maintain its quasi-neutral nature, which in turn tends to trigger nonlinear features within the discharge. In particular, such nonlinear dynamical behavior have been observed to be quite prominent near to transition regions of plasma discharges. The Plasma Lab at IIT Delhi has been developing and characterizing different types of plasma sources with focus on different applications during the past few decades. Some of the nonlinear characteristics that have been observed in its sources in the recent past include ion acceleration across a null point in ECR based plasma thruster, rotating anode glow balls in dc discharges, nonlinear power coupling regimes in rf discharges to name a few. This research problem would attempt to characterize some of these non-linear phenomena in a typical low temperature plasma source using non-linear dynamical tools to model and explain the behaviour.

Ph.D. Supervisors			
Role	Name of Faculty	Academic Unit in IITD/Institute/University	Email ID (Official)
Supervisor 1	Ramesh Narayanan	Department of Energy Science and Engineering, Indian Institute of Technology Delhi	rams@dese.iitd.ac.in
Supervisor 2	Vikrant Saxena	Department of Physics, Indian Institute of Technology Delhi	vsaxena@physics.iitd.ac.in

Project requirements (Student qualifications, experience required, etc)
*The candidate will be shortlisted based on common shortlisting criteria decided by ScRC (SIRe)
M. Sc. In Physics or M. Tech. in Instrumentation - exposure to electronics and / or vacuum systems may be preferable? - Has some knowledge of numerical techniques?

Source of fellowship/funding (CSIR/UGC/DBT/ICMR/ICAR/NEET-PG/DST-INSPIRE/IRD/FITT Project details, if any)
Institute Fellowship /Own Fellowship

Role of Faculty Members involved:	
Supervisor-1	➤ Prof. Ramesh Narayanan (DESE, IIT Delhi) will mentor the student on the development and characterization of the discharges triggered in low-temperature plasma sources for nonlinear studies
Supervisor-2	➤ Prof. Vikrant Saxena (Physics, IIT Delhi) will mentor the student to understand the theoretical physics concepts of such discharges