

Project Code: PDF – FT - 0009	
Title of the Project	Study of Neutral Particle Dynamics in Plasma devices using a specially designed Pressure measuring instrument
Abstract	Neutral particles (atoms and molecules) surrounding the electrically-charged plasma play an important role in the plasma-wall interactions. When properly controlled, the neutral gas can protect material surfaces from the impact of energetic particles leaving the plasma core. Thus understanding the neutral particle dynamics is of paramount importance for the future fusion devices. This project proposal is aimed at the research efforts to carry out an experimental study of neutral particle behavior in the vicinity of high temperature plasmas. The work will focus on experimental study, analysis, and understanding of the phenomena governing neutral particle dynamics. These would also include plasma characteristics, geometry effects, and neutral particle transport, both in vacuum and across the background plasma. Because of high magnetic fields, vibrations, limited access, and high-energy photon and particle fluxes, the standard off-the-shelf gauges cannot be used for in-situ tokamak operation. This motivated the development of a dedicated neutral pressure measuring instrument having the same

	operational principle as the Lewin-Martin and ASDEX gauges, i.e. electron emission modulation to discriminate against background noise. In this design, the electronic circuitry employs a synchronous demodulation technique which is different than a sample-and-hold method which was used in the ASDEX gauge. In this proposed work, the candidate would re-examine the already developed pressure measuring system and test it thoroughly on a linear plasma device (such as APPEL) or toroidal plasma device (BETA or ADITYA-U)
Research Focus Area	In tokamak experiments, the understanding the neutral particle dynamics is utmost important. Neutral particles (atoms and molecules) surrounding the electrically-charged plasma play an important role in the plasma-wall interactions. When properly controlled, the neutral gas can protect material surfaces from the impact of energetic particles leaving the plasma core. The developed pressure measuring system would be re-examined carefully and be tested thoroughly on a linear plasma device (such as APPEL) or any of the toroidal plasma device (BETA, ADITYA-U, SS-ST and SST-1) based on the device availability.
Qualification	Ph.D. in Physical or Engineering Science
Desired Experience	Hands-on experience in Basic Plasma or tokamak experiment is desirable

	Working knowledge in diagnostics, electronics and instrumentation also desirable
Remarks	Some very preliminary work on the pressure measuring system has already been carried out and the details would be provided to the PDF candidate.