

Project Code: PDF – FT - 0007

Title of the Project	Alternate scheme of pre-ionization to assist Ohmic driven plasma current start-up in SST-1
Abstract	The proposed method of preionization is based on a JxB gun device (similar to the one tested in JFT, DIVA tokamaks and, also in Stellarator) in which electrodes are separated by a gap of a few mm extended to a region near the outer limiter. A high speed valve injects gas into the discharge region between two electrodes. Both sides of the electrodes are covered with ceramic plates to confine the gas and discharge in the gun. A triggering pin is mounted on one of the electrodes. The gun is mounted in an assembly which can be moved in or out to select the proper (optimal) position for injecting the plasma. A pulsed power supply will be used to generate the current waveform to produce arc discharge between the electrodes for various pressure ranges from 10^{-5} to 5×10^{-4} Torr. The amount of plasma can be varied by controlling the arc current with appropriate switching system. In presence of external magnetic field, the resulting $J \times B$ will drive the plasma away from the gun. In this proposed work, the PDF candidate would design and develop a JxB gun based system and test it on a linear plasma

	device (such as APPEL) or toroidal plasma device (BETA or ADITYA-U). In this proposal, a systematic study to find the optimized breakdown conditions to by scanning the pressure and breakdown voltage.
Research Focus Area	In SST-1 tokamak, the usual ECR-assisted breakdown can also be replaced by the alternate scheme proposed above. This would be a available during the operational window of SST-1, when for some reasons ECRH is unavailable (e.g., non-availability of LHe or faults in ECRH system or associated systems)
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	The design and development of JxB gun based system would be done from scratch