

- ✓ ADITYA-U ($R_0 = 75$ cm, $a = 25$ cm), a moderate sized convectional tokamak of India, equipped with an open divertor configuration was revamped from ADITYA tokamak having single poloidal ring limiter.
- ✓ ADITYA-U operations endeavours towards the demonstration of plasma parameters close to the design parameters of circular plasmas in graphite toroidal belt limiter configuration. Achieved Plasma parameters are: $I_p \sim 213$ kA, duration ~ 400 ms, chord averaged $n_e \sim 3 - 6 \times 10^{19} \text{ m}^{-3}$, core $T_e \sim 500$ eV, stored energy (W) ~ 3 kJ, Max. B_ϕ operated ~ 1.5 T ($\sim 100\%$ of the design parameter) and edge Safety Factor (q) ~ 4 .
- ✓ Significant enhancement in plasma performance is subject to implementation of extensive wall conditioning techniques, viz., lithiumization, He-H₂, Ar-H₂ GDC along with robust control of real-time horizontal position.
- ✓ First attempts to produce shaped plasmas in ADITYA-U by energizing the divertor coil using a Cap-bank. Formation of strike point confirmed through CCD camera, matches quite well with simulation results obtained from simulation code IPREQ.
- ✓ Full deuterium discharges in ADITYA-U has been obtained, one of the major milestones towards the realization of the thermo-nuclear fusion reaction. Observed confinement improvement through isotopes effect.
- ✓ Demonstrated for the first time, a novel technique of Electromagnetic Pellet Injection (EPI) in ADITYA-U for disruption mitigation studies, very much relevant for resolving key challenges for fusion devices such as ITER.
- ✓ Novel concept of 42 GHz ECR assisted two pulse operation (one for low loop voltage start-up & second for heating) simultaneously in a single discharge, executed for the first time in ADITYA-U. Plasma performance improved considerably.
- ✓ The rotation frequency of the 2/1 drift tearing mode has been controlled by controlling background plasma poloidal rotation using Electrode Biasing experiment in ADITYA-U.
- ✓ Spatial profile of carbon impurity ion toroidal rotation velocity is measured using upgraded high resolution spectroscopic diagnostic installed on ADITYA-U and radial electric field is estimated.
- ✓ Neon Puff impurity seeding experiments performed on ADITYA-U at varied toroidal field to study toroidal rotation and R-I modes. Improved confinement seems to be related to the suppression of turbulence due to increase of ExB shear rotation.