

Observations of Intrinsic Toroidal Rotation using X-Ray Crystal Spectrometer in ADITYA-U Tokamak

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A soft X-ray Crystal spectrometer has been developed to measure toroidal rotation velocity and ion temperature in the core of ADITYA-U Tokamak [1, 2] using Doppler shift and Doppler broadening of helium like argon emission in the x-ray region respectively. The spectrometer uses cylindrically bent Si (111) crystal and two dimension CCD detector to measure resonance spectral line of Ar XVII (1S2 1S0 –1S 2P 1P1) and satellite lines in the wavelength region of 3.94 Å-4.0 Å, viewing the plasma tangentially at an angle of 26° with respect to the toroidal direction in the magnetic axis. Central electron temperature is measured through line ratios and compared with other diagnostics. Neoclassical toroidal rotation has been calculated using theory and compared with observations from the experiment. The effect of variation in edge plasma parameters on the core plasma rotation has also been studied. Detailed discussion on the first results is presented in the paper.

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