Edge Toroidal Rotation of Different Ions in ADITYA-U Tokamak

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Intrinsic toroidal rotation velocity (self-driven flow) are very crucial in large tokamak like ITER [1,2]. Intrinsic rotation of two different charge states of Carbon ions (C⁵⁺ at 529nm, C²⁺ at 464.74nm) has been studied in the edge region of ADITYA-U tokamak. In several ohmic discharges, these two lines are monitored using 1m high resolution, Czerny-Turner configuration spectrometer. The intrinsic toroidal rotation of these lines are also studied in the presence medium-Z impurity (e.g. Neon, Nitrogen and Argon) seeded discharges. In medium-Z impurity seeded discharges, the toroidal rotation of the seeded impurity ions (e.g. Neon and Argon ions) is compared with the rotation velocity of C²⁺ and C⁵⁺ ions. In all these scenarios, the flow of neutral Hygrogen atoms is also monitored by analysing the shift in H-alpha line emission (at 656.28nm). All the measurements are done in the flat-top region of discharge. The time resolution as well as the exposure time for the spectroscopic measurement of C⁵⁺ ions is 30ms, while for all other spectral lines it is 20ms. It has been observed that the rotation of C⁵⁺ ions reverses its direction in the edge region as a result of medium-Z impurity injection (e.g. Neon, Argon).

References: