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Radiation power loss study during gas puff induced disruptions in Aditya-U Tokamak

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Understanding the density limit in a tokamak is very crucial for projecting the fusion grade tokamak machine. An important role in the disruptions for density limit is played by magneto-hydrodynamic (MHD) instabilities associated with the steepening of the current density profile due to the current channel contraction. This shrinkage in the current channel due to increasing densities is related to the plasma edge cooling induced by influx of particles. Thus the disruption associated with density limit not only depends on the magneto-hydrodynamic (MHD) physics, but also seems to involve transport and atomic processes as well. The gas puff experiments are carried out in a tokamak to understand the physics of plasma disruptions. We report here the study of radiation power loss in disruptive discharges. In Aditya tokamak, multiple pulses of hydrogen gas were injected during the current flattop in the plasma discharge. The gas puff lead to an increase of 20-80 % in central plasma density and many fold increase in the radiation power loss from the plasma edge [1]. The nature and distribution of radiation power loss was distinguishable in disruptive discharges and those discharges that had improved confinement [2], some of which were due to the edge cooling induced fluctuation suppression [3]. Similar experiments are carried out in Aditya-U tokamak with various gases, in which along with further establishment of the results obtained in Aditya with thorough data analysis, many interesting outcomes observed during the experiments in Aditya-U will be reported in this presentation.

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