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A study of the behaviour of dispersed tungsten micro particles in the STOR-M tokamak

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Fusion reactors such as the tokamak, represent an attractive means of energy production in terms of high power output, low emissions, few waste products and safe operation. Unfortunately, multiple fundamental problems still need to be addressed for a working reactor. The plasma wall interaction (PSI) is one of these crucial problems.

In a tokamak, a region known as the scrape off layer (SOL) exists between the plasma and the plasma facing material of the reactor wall. In an effort to remove heat, accumulated fusion products and impurities from the reactor, divertor plates primarily made of tungsten have been placed in the high heat flux region of the SOL.

The goal of our research is to simulate the behaviour of the sputtered chamber wall particles (in particular those from the divertor plates) inside of STOR-M (Saskatchewan Torus Modified). An injector was designed and built which could introduce tungsten micro particles (dust) into the reactor in a controlled and precisely timed manner. As Tungsten is a high Z material, it is particularly interesting to study Bremsstrahlung effects and potential disruptions which could be detrimental to the plasma. The dust dispenser is being tested in an apparatus specifically devised for injector calibration and dust characterization, before installation on STOR-M.

STOR-M is equipped with a compact-torus injector, a promising device for reactor fueling. The dust dispenser will be used to both embed tungsten particles in the STOR-M plasma and introduce tungsten impurity into STOR-M discharge during CT Injection. The resulting effects of tungsten dust in the plasma will be analysed.

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