

## **Dust in fusion plasmas: Insights from the Magnetized Dusty Plasma Experiment**

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It is well-known that plasma-wall interactions can lead to the injection of micron-sized “dust” particles into fusion plasmas. In particular, the larger dust particles are known to transit through the scrape-off layer, eventually becoming deposited on surfaces throughout the vacuum chamber. The presence of the dust can, of course, be a major source of impurities, can lead to loss of density control, and, in the case of ITER, can pose a significant personnel hazard because the dust grains can trap radioactive material. Models of dust production in ITER remain poorly understood, with estimates that have ranged from milligrams to hundreds of grams per day. Therefore, studies from the basic dusty plasma community may offer important insights into the behavior of dust in fusion plasmas.

The Magnetized Dusty Plasma Experiment (MDPX) device is a large bore (50 cm diameter x 158 cm long), multi-configuration, 4-Tesla class, superconducting magnet and integrated plasma chamber that has been operating at Auburn University since April, 2014. While the MDPX device is primarily focused on fundamental studies of dusty plasmas at high magnetic fields, it provides a flexible, multi-user research platform that can be used for a wide variety of high magnetic field studies. This presentation will discuss dust generation and transport in fusion devices, the challenges encountered while modeling dust dynamics, and the insights that recent experiments on grain charging, particle growth, and dust transport in MDPX device may be able to provide critical information to the fusion community.

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