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Development of a Dust Dropper for Dusty Plasma Experimentation CHIOMA UDEMGBA, University of Mississippi, DENNIS MANSFIELD, ALIYA MERALI, STEPHANIE WISSEL, ANDREW ZWICKER, Princeton Plasma Physics Laboratory — Dusty plasma research has applications in many scientific disciplines, from space physics to fusion engineering. Experimentally creating these complex systems requires the addition of fine dust particles to low temperature plasmas in a controlled way. This project focuses on engineering a dust particle dropper to insert 104-106 spherical SiO2 beads (40μm diameter) into argon plasma at 10-3-10-4 Torr at a steady rate. Dust particles are deposited at as low as 0.04 mg/s and as high as 3 mg/s into the plasma with the use of an adapted particle dropper (Mansfield, 2010) consisting of a piezoelectric disk that confines particles to a central 2.54 cm circle when it is driven with a 2.0 kHz signal. The device regulates the motion of the dust particles using both acoustical and mechanical constraints in order to provide linearity and strict control of particle deposition through a central 0.08 cm aperture. The use of this device will allow for a reproducible addition of dust particles into plasma and enable the production of stable dusty plasma which aids in investigating the charge accumulation of dust clouds, as well as the study of the formation and characterization of dusty plasmas. (See J. Blumenkopf's abstract for information on simulation of dusty plasmas in a DC field.)

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