

Abstract Submitted
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Status of New Caltech Water-Ice Dusty Plasma Experiment¹ AN-DRE NICOLOV, PAUL BELLAN, Caltech — A new water ice-dusty plasma experiment under construction will provide a significant upgrade of the existing Caltech water-ice dusty plasma experiment. The upgrade has a larger vacuum chamber with many more ports and, in contrast to the liquid nitrogen cooling used in the previous experiment, each RF electrode will now be cooled by a cryocooler to enable lower and controlled temperatures. As in the previous experiment, water vapor injected into the chamber via an adjustable leak valve will spontaneously nucleate to form quickly growing ice grains having size and shape depending on gas species, RF power, ambient pressure, and ambient temperature. The previous experiment showed that at low background pressures, the ice grains are elongated, fractal-shaped, and that they levitate with alignment along the RF field. The new experiment will investigate how grain properties depend on ambient conditions, especially much colder background gas temperatures. Assembly is 40% complete at time of writing with the lower electrode system (heater, diode, RF connector, insulator, guard, plasma-facing electrode) installed on the lower cryocooler which is mounted on a welded SS bellows to provide an adjustable separation between the RF electrodes.

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