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**Status of Development of Laser Induced Fluorescence Diagnostic for a Dusty Plasma**[1] RYAN S MARSHALL, California Institute of Technology, ARMIN EWERT, Bundeswehr University Munich, PAUL M BELLAN, California Institute of Technology — Laser Induced Fluorescence (LIF) provides the temperature and flow velocity of plasma neutrals or ions by measuring their velocity distribution directly via Doppler Shift. An ultra-narrow, tunable diode laser is used to pump the 696 nm neutral Argon line in the Caltech Water-Ice Dusty Plasma Experiment with LIF emission detected at 772 nm. The LIF diagnostic gives reasonable, reproducible measurements of the neutral atom temperature both with and without ice grains. The laser frequency is controlled with $\sim 1.5$ MHz resolution (i.e., 1 part in $10^8$) corresponding to a $\sim 1$ meter per second smallest detectable flow velocity. Despite this precision, no flow has been detected so far. A major difficulty is that the laser wavelength drifts over time. To combat this, PID stabilization is being applied to further improve the velocity resolution. Also, vacuum pump vibrations that slightly modulate the transmission of the vacuum window have been attenuated. Concurrently, a wall of magnets has been used to improve confinement and allow lower pressure operation in an unsuccessful attempt to obtain ion LIF (different wavelengths used) measurements.

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