Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

**Laser Induced Fluorescence to measure flow velocity of Argon neutrals in a plasma environment**[1] ARMIN EWERT, Bundeswehr University Munich, RYAN MARSHALL, PAUL BELLAN, California Institute of Technology — Laser Induced Fluorescence (LIF) is being implemented on the Caltech Water-Ice Dusty Plasma Experiment to measure the neutral particle velocity. Argon neutrals are excited by a chopped 696 nm tunable diode laser having <1 MHz line width. An unchopped sample of the laser beam passes through the plasma to a photodiode to provide a signal for a PID controller that stabilizes the laser frequency. The 772 nm fluorescence emitted by the excited argon neutrals is detected by a photomultiplier connected to a lock-in amplifier synchronized to the chopper. The system now resolves 1 m/s but the flow velocity appears to be much slower as the measurements are irreproducible other than showing that the velocity is less than 1 m/s. This irreproducibility (large error bar) results from a small drift of the lock-in signal. A search for the cause of this drift is underway by looking for correlations of drifts of various parameters with the lock-in drift. At the time of writing a prime suspect is the slightly changing laser wavelength that might be caused by plasma variations as it is used to lock the wavelength to a defined absorption level. Finding the cause of the lock-in drift and then eliminating it should enable resolving much slower velocities.

[1]NSF No 1740655 and NASA No JPL.1573433

Armin Ewert
Bundeswehr University Munich

Date submitted: 02 Jul 2019 Electronic form version 1.4