Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Three-dimensional Lagrangian statistics of a turbulent free-shear jet BIANCA VIGGIANO, Portland State University, THOMAS BASSET, ROMAIN VOLK, LAURENT CHEVILLARD, MICKAËL BOURGOIN, Laboratoire de Physique de lENS de Lyon, RAÚL BAYOÁN CAL, Portland State University — A fundamental study of a free-shear jet is performed to investigate the highly anisotropic and inhomogeneous flow field through Lagrangian statistics. Experiments were conducted within a Lagrangian Exploration Module, an icosahedron apparatus, to facilitate optical access of three high speed cameras. This enables the generation of 3D particle trajectories by implementing stereoscopic particle tracking velocimetry and results in three component tracks of position, velocity and acceleration of the tracer particles within the vertically-oriented jet. The total measurement volume is 80 x 80 x 200 mm^3, which includes over 50 nozzle diameters downstream, where the jet becomes self-similar. Lagrangian statistical analysis is performed to identify intermittent behavior at the centerline of the jet and at the turbulent/non-turbulent interface. Further, the applicability of Taylor's frozen flow hypothesis is investigated.

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Date submitted: 01 Aug 2019 Electronic form version 1.4