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On the relationship between non-local clustering mechanisms and preferential accumulation ANDREW BRAGG, LANCE COLLINS, Cornell University — In a recent paper (New J. Phys. **16**:055013, 2014) we explained the physical mechanism for the clustering of inertial particles in turbulence contained within the theory of Zaichik *et al.* (Phys. Fluids. **19**:113308, 2007). We showed that for particles with Stokes numbers in the limit $St \ll 1$, particles accumulate outside of vortices due to the "centrifuge mechanism" proposed by Maxey. However, for $St \geq O(1)$, the centrifuge mechanism gives way to a non-local path history symmetry breaking mechanism. Despite the change in the clustering mechanism, the instantaneous particle positions continue to correlate with high-strain, low-vorticity regions of the turbulence. In this talk we show how the non-local mechanism is influenced by, but not dependent upon, the preferential sampling of the fluid velocity gradient tensor along the particles path histories in such a way as to generate a bias for clustering in regions with strong straining motions. Finally, we show how the non-local mechanism still generates clustering, but without preferential accumulation, in the limit where the timescales of the fluid velocity gradient tensor measured along the inertial particle trajectories vanishes (i.e., a white noise velocity field).

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