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A comparison of theoretical models for the spatial clustering of inertial particles in homogeneous, isotropic turbulence ANDREW BRAGG, LANCE COLLINS, Cornell University — In this talk we will consider two theoretical models for the clustering of inertial particles in turbulence, one by Chun *et.al.* (J. Fluid Mech. 536:219, 2005) and the other by Zaichik *et.al.* (Phys. Fluids. 19:113308, 2007). Although their predictions for the RDF (Radial Distribution Function) are similar in the regime $St \ll 1$ we will show that the two theories describe the physical origin of clustering in quite different ways. The Chun *et.al.* theory describes the origin of the clustering in terms of a local drift mechanism which arises because inertial particles sample more strain than rotation, and the Zaichik *et.al.* theory describes the origin of the clustering in terms of a drift mechanism which is influenced by both the local dynamics of the fluid velocity gradient tensor and also by the particle memory of its interaction with the fluid velocity field in its path history. We will discuss an artificial test case that demonstrates the physical mechanism described in the Chun *et.al.* theory does not completely describe the mechanism responsible for the clustering. Finally, we explain the discrepancies between the two theories and explain, despite those discrepancies, why their predictions in the regime $St \ll 1$ are so similar.

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