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Modeling low-order structure functions for inertial particles in isotropic turbulence ANDREW BRAGG, LANCE COLLINS, Cornell University — In this talk we will consider three models for the second order structure function of inertial particle pairs in isotropic turbulence, one by Zaichik *et al.* (New. J. Phys. 11:103018, 2009), the second by Pan *et al.* (J. Fluid. Mech. 661:73, 2010) and the third by Gustavsson *et al.* (Phys. Rev. E. 84:045304, 2011). We find that in general they describe the structure functions in qualitatively similar ways, capturing the influence of the nonlocal dynamics on the formation of caustics and non-smooth scaling behavior in the dissipation range. We then compare the predictions with DNS data and find that although they capture the qualitative behavior of the data consistently, they differ with each other quantitatively, with the theory by Pan *et al.* yielding the closest agreement with the DNS. Finally, we show that a new backward in time dispersion theory we have derived makes improvements to the predictions from the Pan *et al.* theory by improving upon a key closure approximation made in its construction.

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