1142-76-80 **Andrew D Bragg*** (andrew.bragg@duke.edu) and **Josin Tom**. *On the multiscale mechanism generating enhanced particle settling speeds in turbulence.*

According to Maxey (J. Fluid Mech., 174:441–465, 1987), enhanced particle settling speeds in turbulence occur because of the way that inertial particles preferentially sample the fluid velocity gradient field ∇u. However, recent Direct Numerical Simulation (DNS) results in Ireland et al. (J. Fluid Mech., 796:659–711, 2016) show that the settling enhancement is strongest in a portion of the parameter space where preferential sampling of ∇u is very weak. The results also show that the settling can be strongly enhanced with increasing Reynolds number. The analysis of Maxey does not account for these findings, partly since it was restricted to particle Stokes numbers $St \ll 1$. To explain the findings, we have developed a new theoretical analysis, valid for arbitrary St, that employs Probability Density Function (PDF) methods, particle velocity fields constructed using averaging decompositions, and coarse-graining for the fields to reveal which scales of the turbulence contribute to the enhanced settling speeds. This analysis is complemented by results from DNS where we examine how the particle settling speeds vary when the fluid velocity field is subject to different levels of coarse-graining. (Received August 29, 2018)