Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

On the effect of the particle size distribution tails in irradiated turbulent gas-particle mixture GIANLUCA GERACI, MONA RAHMANI, ALI MANI, GIANLUCA IACCARINO, Center for Turbulence Research - Stanford University — Previous investigations of irradiated particle-laden turbulent flows have shown that the heat transfer is sensitive to the particle size distribution when compared to its thermodynamical equivalent feed with homogeneous (monodisperse) particles. In this work we focus on the shape of the particles size distribution and, in particular, we show how the presence of long tails, at the same nominal mass loading, affects the heat transfer between the particles and gas. We use DNS of turbulence with point particles to show that a particle size distribution is able to mitigate the particle clustering and thus increases the efficiency of the energy transfer to the fluid. The addition of a right tail to the same particle size distribution, while redistributing the mass loading towards large particles, lowers the efficiency of the heat transfer to the gas. Furthermore, we show that the addition of a left tail has the opposite effect. The small particles increase the heat transfer, hence the average temperature of the gas at the outlet section. The simultaneous presence of both tails has the same impact on the behavior of the system as the inclusion of the right tail only, indicating the dominance of the large particles.

Gianluca Geraci
Center for Turbulence Research - Stanford University

Date submitted: 31 Jul 2015 Electronic form version 1.4