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Particle-laden turbulence subject to radiation MOHAMMAD HADI POUR ANSARI, MILAD MORTAZAVI, ALI MANI, Center for Turbulence Research, Stanford — It is well established that particle-laden flows play an important role in numerous technological and natural processes. Although the effect of turbulence on particle concentration is well studied in the literature, little is known about particle-flow systems coupled with radiative heating. Radiation is an active ingredient in many of such systems, including clouds, concentrated solar thermal systems, and astrophysical processes. In these environments the carrier gas is typically transparent and radiation is primarily absorbed by particles. Preferential concentration of particles by turbulence leads to inhomogeneous heating of the mixture over a wide range of length scales. This provides dynamical loops that can alter/force the turbulence. When heating is intense, inhomogeneous expansion of the gas alters the flow. For non-intense heating, the induced buoyancy effect can force the turbulence when a gravitational field is present. We will present results from our calculations, using direct numerical simulation of coupled turbulence-particle transport, demonstrating these effects over a wide range of parameters.

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