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Acceleration statistics of heavy particles in turbulence FEDERICO TOSCHI, CNR-IAC, Viale del Policlinico 137, I-00161 Roma, Italy, JEREMIE BEC, CNRS-Observatoire de la Cote d'Azur, Nice, France, LUCA BIFERALE, University of Tor Vergata, Roma, Italy, GUIDO BOFFETTA, University of Torino, Italy, ANTONIO CELANI, CNRS-INLN, Valbonne, France, MASSIMO CENCINI, CNR-ISC, Roma, Italy, ALESSANDRA LANOTTE, CNR-ISAC, Lecce, Italy, STEFANO MUSACCHIO, University La Sapienza, Roma, Italy — We study, by means of direct numerical simulations, the dynamics of heavy particle transport in homogeneous, isotropic, fully developed turbulence, up to resolution 512^3 ($R_\lambda \approx 185$). Following the trajectories of up to 120 million particles with Stokes numbers, St, in the range from 0.16 to 3.5 we are able to characterize in full detail the statistics of particle acceleration. We will show that the root-mean-squared acceleration $a_{\rm rms}$ sharply falls off from the fluid tracer value already at quite small Stokes numbers, that at a given St the normalised acceleration $a_{\rm rms}/(\epsilon^3/\nu)^{1/4}$ increases with R_λ consistently with the trend observed for fluid tracers and that the tails of the probability density function of the normalised acceleration $a/a_{\rm rms}$ decrease with St. Two concurrent mechanisms lead to the above results: particle clustering, very effective at small St, and filtering induced by the particle response time, that takes over at larger St.

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