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From randomly accelerated particles to Lévy walks: non-ergodic behavior and aging GUENTER RADONS, TONY ALBERS, Tech Univ Chemnitz, INSTITUTE OF PHYSICS, COMPLEX SYSTEMS AND NONLINEAR DYNAMICS TEAM — For randomly accelerated particles we detected, and were able to analyze in detail (PRL 113, 184101 (2014)), the phenomenon of weak-ergodicity breaking (WEB), i.e. the inequivalence of ensemble- and time-averaged mean-squared displacements (MSD). These results, including their aging time dependence, are relevant for anomalous chaotic diffusion in Hamiltonian systems, for passive tracer transport in turbulent flows, and many other systems showing momentum diffusion. There are, however, several related models, such as the integrated random excursion model, or, space-time correlated Lévy walks and flights, with similar statistical behavior. We compare the WEB related properties of these models and find surprising differences although, for equivalent parameters, all of them are supposed to lead to the same ensemble-averaged MSD. Our findings are relevant for distinguishing possible models for the anomalous diffusion occurring in experimental situations.

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