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Ageing effects in single particle trajectory averages

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We study time averages of single particle trajectories in scale free anomalous diffusion processes, in which the measurement starts at some time $t_a>0$ after initiation of the process at the time origin, $t=0$. Using ageing renewal theory we show that for such non-stationary processes a large class of observables are affected by a unique ageing function, which is independent of boundary conditions or the external forces. We quantify the weakly non-ergodic nature of this process in terms of the distribution of time averages and the ergodicity breaking parameter which both explicitly depend on the ageing time t_a. Consequences for the interpretation of single particle tracking data are discussed.

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