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A continuous time random walk description of the hopping dynamics in an aging polymer glass MYA WARREN, JOERG ROTTLER, University of British Columbia — Due to the non-equilibrium nature of the glassy state, structural relaxation becomes increasingly sluggish with the wait time t_w since vitrification. As a result, dynamical correlation functions age, and often obey a simple rescaling with t_w: $C(t, t_w) = C_0(t) + C_{age}(t/t_w^{\mu})$. It has recently been shown that, to first order, scaling also applies to the distributions of local correlations and displacements (the van Hove function). In this study, we use molecular dynamics simulations to measure the statistics of the discontinuous hopping events that characterize structural relaxations during aging. This allows us to map the particle dynamics onto a continuous time random walk, which successfully reproduces the entire distribution of displacements. Our results bear a striking resemblance to the popular trap model of aging. We find that the hop time distribution takes the form of a power law which is independent of t_w, whereas the time to the first hop shifts to longer times with t_w. This two-timescale behavior explains not only the scaling of the distribution functions for times $t \sim t_w$, but also small deviations from perfect scaling that have been observed at longer times.

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