

Abstract Submitted
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Cooperative dynamics in polymer melts: a comparison of theoretical predictions with Neutron Spin Echo experiments MARINA GUENZA, University of Oregon — We present a comparison between theoretical predictions of the Generalized Langevin Equation for Cooperative Dynamics (CDGLE) and Neutron Spin Echo data of dynamics structure factors for polyethylene melts. Experiments, performed by Zamponi and coworkers, cover an extended range of length- and time-scales providing a compelling test for the theoretical approach. Samples investigated include chains with increasing molecular weights, undergoing dynamics across the unentangled to entangled transition. Measured center-of-mass mean-square displacements display a crossover from subdiffusive to diffusive dynamics. The Generalized Langevin Equation for Cooperative Dynamics relates this anomalous diffusion to the presence of the interpolymer potential, which correlates the dynamics of a group of slowly diffusing molecules in a dynamically heterogeneous liquid. Theoretical predictions of the subdiffusive behavior, its crossover to free diffusion, and of the number of macromolecules undergoing cooperative motion are in quantitative agreement with experiments.

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