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Spatio-temporal imaging of polarization fluctuations near the glass transition[1] NATHAN ISRAELOFF, PHILIP CRIDER, HASSAN OUKRIS, Northeastern University — Mesoscopic scale spatio-temporal fluctuations are mapped using novel non-contact atomic force microscopy (NCAFM)-based methods in polymer (PVAc) films near the glass transition. Utilizing the localized electrostatic interaction of a NCAFM conducting tip, we measure polarization fluctuations within depths as small as 10nm. Applying a sinusoidal bias voltage between the AFM tip and sample results in a response in the AFM cantilever frequency that is offset by surface potential due to thermally induced local polarizations. The measured fluctuations agree quantitatively with predictions. Measurements of these spontaneous fluctuations along a single space-dimension as a function of time yield space-time maps of the dynamics. Spatial and temporal correlation functions were studied as a function of temperature. Results show the expected slowing of the dynamics with decreasing temperature, and hints of spatially varying dynamics. Space-time maps will be compared with recent model simulations which show foam-like space-time trajectories.

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