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Examining dynamic length scales in a two-dimensional colloidal system ZACH NADLER, CARA HAGEMAN, VIKRAM PRASAD, ERIC R. WEEKS, Physics Dept., Emory University — We study polystyrene colloids placed at an oil-water interface as a quasi-two-dimensional colloidal system. As the area fraction of the colloidal particles is increased, we see liquid, hexatic, and crystalline phases. The liquid phase is structurally disordered; the hexatic phase has long range orientational order but poor translational order; and the crystalline phase has long range orientational and translational order. We classify these different phases using structural and dynamic parameters from prior work. Using a laser tweezer we trap and drag a particle along the interface and observe its effect on the surrounding colloids. Our interest is in how the response changes near phase transition boundaries, where the ordering of particles can qualitatively change. We characterize the response by the structural defects induced by the dragged particle, as well as the perturbed motion of the surrounding particles. These responses are localized around the dragged particle, and we study how the localization length scale changes with the area fraction of the colloids.

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