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Colloidal Wigner Crystals Near the Melting Transition EMILY RUSSELL, DAVID WEITZ, Harvard University — We demonstrate the formation of colloidal "Wigner" crystals at low particle volume fraction. Particles are suspended in a nonpolar solvent and charged by the addition of a small amount of surfactant, generating a long-range interparticle repulsion which induces crystallization above a critical volume fraction of order 10%. Confocal microscopy allows us to study in detail the three-dimensional structure and dynamics of these colloidal crystals as we vary the volume fraction, and we find a growing population of especially mobile particles with large local Lindemann parameter as we approach the critical volume fraction. We discuss our results and the implications of our findings to competing ideas of the mechanism of bulk crystal melting.

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