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Transitions of a hard-sphere colloidal crystal to a colloidal crystal with attractive interactions[1] MATTHEW GRATALE, MATTHEW LOHR, YE XU, ARJUN YODH, Department of Physics and Astronomy, University of Pennsylvania — Recently, colloid experiments have probed and found interesting differences in the properties of disordered glassy media as a function of the sign of the interparticle interaction [1-3]. Here, we report experiments on colloidal crystals whose constituent particles have interactions that can be rapidly varied from repulsive hard-sphere-like to attractive. Micron-size colloidal particles are suspended in a binary fluid mixture of water and 2,6-lutidine near the critical temperature of 307 K [4]; by changing temperature, the interparticle interactions can be rapidly switched from repulsive to attractive, and the accompanying variations in structure and dynamics can be tracked. Preliminary results show that when the interparticle attraction turns on, the lattice constant decreases and the system transitions from a "repulsive" crystal into a fluid-crystal coexistence phase. This fluid-crystal coexistence phase consists of small, dense "attractive" crystalline domains separated by "voids" filled with a very dilute colloidal fluid. These voids appear to originate at the grain boundaries and the lattice defects of the original repulsive crystal. [1] Eckert *et al.*, PRL **89**, 125701 (2002). [2] Kaufman *et al.*, J. Chem. Phys. **125**, 074716 (2006). [3] Zhang *et al.*, PRL **107**, 208303 (2011). [4] Hertlein *et al.* Nature **451**, 172-175 (2008).

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