Effect of disorder on a nematic-smectic A phase transition\(^1\) SIMON LAROCHELLE, MEHMET RAMAZANOGLU, Dept. of Physics, University of Toronto, ROBERT J. BIRGENEAU, Dept. of Physics, University of Toronto and Dept. of Physics, University of California Berkeley — Using X-ray scattering, we studied the nematic to smectic A phase transition of the liquid crystal butyloxybenzilidene-octylaniline (4O.8) confined in an aerosil gel. The aerosil particles introduce quenched randomness in the system by providing pinning centers to the liquid crystal molecules. We find that the introduced disorder destroys the long range nature of the phase transition, and that the transition becomes similar to a transition in a finite-size system. Finite low temperature correlation lengths of the ordered moments are measured and the order parameter follows a power law behavior with respect to the reduced temperature in a limited temperature range. We also show evidence for a shift of the effective order parameter critical exponent \(\beta\) with increasing disorder.

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