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Measurements of the Order Parameter at the Nematic - Smectic-A Pseudotransition for a Liquid Crystal Aerosil Dispersion

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A gel of aerosil particles has been observed to substantially disrupt the nematic to smectic-A transition. The structure factor for the short-range smectic fluctuations in the liquid crystal - aerosil samples is well described by modelling the aerosils as a quenched random field. In this experiment we measured the integrated intensity of the peak corresponding to smectic-A fluctuations as a function of temperature around the pure material nematic to smectic-A transition temperature. For the pure system it was found that the liquid crystal (8OCB) was partially aligned by the windows of the sample holder. This complicated measurements. By contrast the 8OCB-aerosil sample was isotropic and the scattering was recorded at closely spaced intervals in temperature. It was found impossible to identify the pseudotransition temperature for the 8OCB-aerosil sample. There was no discontinuity in the integrated scattering for the signal-to-noise ratio achieved. Further measurements are planned on 10CB which has a first order isotropic to smectic-A transition. This should be easier to identify and is likely to be systematically smeared out with increasing densities of aerosil.