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Superfluid phases for a model of 3He confined in nematic aerogels[1] JOSHUA WIMAN, J A SAULS, Northwestern University — Recently, superfluid ^{3}He has been observed in disordered "nematic aerogel" (N-aerogel) materials.[2] N-aerogels consist of 9 nm diameter strands that are predominantly oriented along one axis, producing far more anisotropy in confinement than was possible with previous experiments using anisotropic silica aerogels. In one class of N-aerogels, Dmitriev et al. have reported the first observation of the superfluid Polar phase, a phase which is stabilized by uniaxial anisotropy and not present in pure bulk ^{3}He. The strong nematic order and small radius of the strands suggest that they may be modeled as arrays of parallel line impurities. We show that the experimentally determined phase diagram, including Polar, polar-distorted A, and B phases, for this class of N-aerogels is well accounted for by strong-coupling Ginzburg-Landau theory with a regular array of such line impurities. We also determine the locations of these phase transitions to be insensitive to positional disorder of the impurities.

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[2]V. V. Dmitriev, A. A. Senin, A. A. Soldatov, and A. N. Yudin, Phys. Rev. Lett. 115, 165304 (2015).

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