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Knight shifts around nonmagnetic impurities in a trinagular lattice spin 1/2 antiferromagnet: Case of κ-$(ET)_2Cu_2(CN)_3$ KAROL GREGOR, OLEXEI MOTRUNICH, California Institute of Technology — We study effects of nonmagnetic impurities in a spin-1/2 frustrated triangular antiferromagnet with the aim of understanding the observed broadening of ^{13}C NMR lines in the organic spin liquid material κ-$(ET)_2Cu_2(CN)_3$. For high temperatures down to $J/2$, we calculate local susceptibility near a nonmagnetic impurity and near a grain boundary for the nearest neighbor Heisenberg model in the high temperature series expansion. We find that the local susceptibility decays to the uniform one very quickly (few lattice spacings), and with the suggested density of impurities would not explain the observed line broadening present already at elevated temperatures; more extended defects and/or longer-ranged interactions are probably needed. At low temperatures, we assume a gapless spin liquid with a Fermi surface of spinons. We calculate the local susceptibility in the mean field and also go beyond the mean field by Gutzwiller projection. Here the Knight shift decays with a power law and oscillates at $2k_F$. However, with single site impurities the results fall short of the observed inhomogeneous broadening, calling for a better understanding of the appropriate models for the spins and impurities and of the possible ground states that are probed by such experiments.

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