Low temperature magnetism of PrF_3 single crystal, micro- and nanopowders

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The "PrF_3-liquid ^{3}He" system is of interest because of the possibility for using the magnetic coupling between the nuclei of the two spin systems for the dynamic nuclear polarization of liquid ^{3}He. The resonance magnetic coupling between liquid ^{3}He nuclei and the ^{141}Pr nuclei of microsized (45 mkm) Van Vleck paramagnet PrF_3 powder has been discovered by authors [1]. The series of nanoscopic samples (size 10 - 50 nm) of Van Vleck paramagnet PrF_3 were synthesized. The X-ray and HRTEM experiments showed high crystallinity of synthesized samples [2]. The NMR spectra of ^{141}Pr in the synthesized PrF_3 powders were investigated. The simulations of ^{141}Pr NMR spectra are in good agreement with experimental data. At the first time, NMR in zero magnetic field was carried out on PrF_3 samples (including nanosized powders) on a specially build pulsed NMR spectrometer.

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[1] A.V. Egorov et al., JETP Lett. **86**, 416 (2007).
[2] M.S. Tagirov et al., J. Low. Temp. Phys. **162**, 645 (2011).