High-Field ESR Spectroscopy on $GdO_{1-x}F_xFeAs$ Superconductors

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We address an intensively discussed issue of a possible interplay between magnetism and superconductivity in the iron pnictide high temperature superconductors. For that we have undertaken a detailed investigation of a series of $GdO_{1-x}F_xFeAs$ samples by means of high-field/high-frequency electron spin resonance spectroscopy (HF-ESR) together with measurements of thermodynamic and transport properties [see, A. Alfonsov, *et al.*, Phys. Rev. B **83**, 094526 (2011)]. By performing temperature dependent HF-ESR measurements on Gd^{3+} ions in a broad range of magnetic fields up to 15 T and excitation frequencies up to 350 GHz we have obtained evidence that though the long range magnetic order in the FeAs planes is suppressed upon the fluorine, i.e. electron doping, short range static on the ESR time scale magnetic correlations between Fe spins remain even up to the doping level optimal for superconductivity. This result suggests that $GdO_{1-x}F_xFeAs$ compounds may feature coexistence of quasi-static magnetism and superconductivity on a large doping range which emerges as a generic property of iron pnictides.