

Anomalous correlation between superconductivity and magnetism in iron pnictide superconductor $\text{LaFeAsO}_{1-x}\text{F}_x$ near the phase boundary

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Anomalous correlation between superconductivity and magnetism in $\text{LaFeAsO}_{1-x}\text{F}_x$ near the boundary between these two phases is demonstrated by muon spin rotation (μSR) measurement. It is inferred from zero field μSR that a part of the specimen ($x = 0.057$) exhibits magnetism below 100 K, where the volume fraction of the magnetic domain reaches 15% at the lowest temperature (~ 4.5 K). Transverse field μSR measurements under 0.05 T and 7 T indicate that the signal corresponding to the magnetic domain shows negative frequency shift which is *further enhanced* below superconducting transition temperature ($T_c \simeq 25.5$ K). The magnitude of the shift below T_c reaches 0.1~0.15 MHz at lower temperatures *irrespective of external field*, indicating that the enhancement below T_c is not due to the artifact of magnetic vortices. Moreover, depolarization rate in magnetic domain exhibits increase below T_c . These behaviors are in agreement with our previous observation in a sample of different origin ($x = 0.06$)[1], suggesting close similarity with CeCu_2Si_2 .

[1] S. Takeshita *et al.*, J. Phys. Soc. Jpn. 77, 103703 (2008).