

The coexistence of superconductivity and magnetism in $\text{NdO}_{0.5}\text{F}_{0.5}\text{BiS}_2$: A muon spin rotation study

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The superconductivity in BiS_2 based layered compounds $\text{Bi}_4\text{O}_4\text{S}_3$ and $\text{REO}_{0.5}\text{F}_{0.5}\text{BiS}_2$ ($\text{RE}=\text{La}$, Nd , Pr , Ce , and Yb) has attracted much interest, since these compounds are layered in structure and similar to that of high T_c cuprates and Fe-pnictides. It is interesting that T_c of $\text{LaO}_{0.5}\text{F}_{0.5}\text{BiS}_2$ increases from 2.7 K to above 5 K when La is replaced by Nd. Similarly, T_c of LaFeAsO goes from 27 K to above 50 K. We have performed muon spin rotation measurements on ambient-pressure-grown polycrystalline $\text{NdO}_{0.5}\text{F}_{0.5}\text{BiS}_2$ down to 0.025K to investigate the relationship between superconductivity and magnetism in this compound. And this is the first time that a possible magnetic phase transition has been observed at low temperatures (below 1K).