

Search for Broken Time Reversal Symmetry Near the Surface of $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$.

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Beta-detected NMR (β -NMR) of $^8\text{Li}^+$ stopped within a 15 nm layer of Ag on top of a (110)-oriented $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ film ($T_c = 86.6$ K) has been carried out to search for spontaneous magnetism near the surface of the underlying superconductor. The average depth of the ^8Li stopped within the Ag layer was adjusted to 8 nm by decelerating the incoming beam to 2 keV prior to reaching the sample surface. The ^8Li NMR lineshape measures the magnetic field distribution just outside the superconductor. Measurements were made with weak magnetic fields applied parallel to the sample surface. These show a marked increase in resonance linewidth but no change in frequency on cooling below T_c . Spectra taken in 10 G show the same temperature dependence in linewidth as in 20 G, rising from 350 Hz (the nuclear dipolar width of Li in Ag) just above T_c to 800 Hz at 5 K. This broadening indicates the presence of a static, randomly-oriented magnetic field of about 0.7 G associated with superconductivity in the $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$, perhaps arising from a time reversal symmetry breaking complex order parameter.

