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13C NMR measurements of Zeeman limited superconductivity in κ-(BEDT-TTF)2Cu(NCS)2 JEFFREY WRIGHT, UCLA , JAMES BRUGGER, UCLA Dept. of Physics & Astronomy, JOHN SCHLUETER, Argonne National Laboratory, REIZO KATO, RIKEN, STUART BROWN, UCLA — The class of superconductors formulated by the BEDT-TTF molecule offers a unique ability to study superconductivity which is Zeeman limited, utilizing their qausi-2D layered structure. The critical field H_{c2}, which usually limits superconductivity due to orbital screening currents, can be suppressed by aligning the applied magnetic field parallel to the conducting layers. In this orientation, the field penetrates in the form of Josephson vortices, and the dominant effect of the magnetic field is from the Zeeman interaction with quasiparticles. We present 13C NMR measurements of the spin lattice relaxation rate as a function of applied field on a single crystal of κ-(BEDT-TTF)2Cu(NCS)2 after aligning the field in this orientation. A quadratic dependence is observed: $R(B) \sim B^2$, which gives clear evidence of k-space nodes in the superconducting gap. Extending these measurements to field strengths near and above the Pauli limit, we observe a phase transition within the superconducting state at B=21.5T, and we comment on the compatibility of these results with the sought after FFLO state.

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