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Magnetocaloric Evidence for FFLO Superconductivity in κ -(BEDT-TTF)₂Cu(NCS)₂¹ NATHANAEL FORTUNE, Smith College, CHARLES AGOSTA, Clark University, SCOTT HANNAHS, JU-HYUN PARK, National High Magnetic Field Laboratory, SHUYAO GU, LUCY LIANG, Smith College, JOHN SCHLEUTER, Argonne National Laboratory — We present new magnetocaloric and calorimetric measurements of the high field superconducting state in the layered structure superconductor κ - (BEDT-TTF)₂Cu(NCS)₂. The strongly field-orientation dependent phase transition between the low field superconducting state and high field superconducting states is first order and is nearly temperature independent, occurring at the Clogston-Chandrasakar paramagnetic limit H_p . Magnetocaloric measurements dT/dH as a function of magnetic field reveal that the system becomes strongly paramagnetic at the cross over from the low field to high field state. At lower temperatures, we are able to resolve small changes at the phase boundary due to the absorption/release of latent heat when increasing/decreasing field, indicating that the high field state is higher entropy than the low field state. These results provide strong new evidence for the formation of paramagnetic spin domains within an inhomogeneous FFLO superconducting state. They also allow us to rule out alternative explanations involving the formation of spin density waves within a homogenous superconducting state.

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