

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Upper Critical Field and SdH Quantum Oscillation Studies in Organic Superconductor β'' -(BEDT-TTF) $_2$ SF $_5$ CH $_2$ CF $_2$ SO $_3$ KYUIL CHO¹, BRAUNEN E. SMITH, WILLIAM A. CONIGLIO, LAUREL WINTER, CHARLES C. AGOSTA, Clark University, JOHN A. SCHLUETER, Argonne National Laboratory — Upper critical fields and SdH quantum oscillations in the organic superconductor β'' -(BEDT-TTF) $_2$ SF $_5$ CH $_2$ CF $_2$ SO $_3$ have been studied by measuring the in-plane rf penetration depth with a tunnel diode oscillator technique. Previous measurements from other groups, with the applied field parallel to the conducting layers, were inconsistent. We report here that for the applied field parallel to the conducting layers the low temperature upper critical fields exceed the Pauli paramagnetic limit calculated by using a semi-empirical method. We will also discuss SdH quantum oscillation with the applied field perpendicular to the conducting layers, which has been found to have a frequency of 181 T and an effective mass of 1.84 m_e . The effective mass is consistent with those of other groups, but the oscillation frequency smaller than theirs (\sim 196 T).

¹We thank the DOE BES grant #ER46214 for support.

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Date submitted: 19 Dec 2007

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