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Upper critical field study in the organic superconductor β''-$(ET)_2SF_5CH_2CF_2SO_3$: Possibility of Fulde-Ferrell-Larkin-Ovchinnikov state[1] KYUIL CHO, National High Magnetic Field Laboratory, BRAUNEN SMITH, WILLIAM CONIGLIO, LAUREL WINTER, CHARLES AGOSTA, Clark University, JOHN SCHLUETER, Argonne National Laboratory — We report upper critical field measurements in the metal-free- all-organic superconductor β''-$(ET)_2SF_5CH_2CF_2SO_3$ obtained from measuring the in-plane penetration depth using the tunnel diode oscillator technique. For magnetic field applied parallel to the conducting planes the low temperature upper critical fields are found to exceed the Pauli limiting field calculated by using a semi-empirical method. Furthermore, we found a signature that could be the phase transition between the superconducting vortex state (SCVS) and the Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) state in the form of a kink just below the upper critical field and only at temperatures below 1.23 K.

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