Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Enhancement of spin-lattice relaxation rate of β''-(BEDT-TTF)$_2$SF$_5$CH$_2$CF$_2$SO$_3$ in its high-field superconducting phase HSIN-HUA WANG, GEORGIOS KOUTROULAKIS, Department of Physics & Astronomy, University of California, Los Angeles, SEBASTIAN MOLATTA, Hochfeld-Magnetlabor Dresden (HLD-EMFL), Helmholtz-Zentrum Dresden-Rossendorf; Institut für Festkörperphysik, TU Dresden , HANNES KÜHNE, Hochfeld-Magnetlabor Dresden (HLD-EMFL), Helmholtz-Zentrum Dresden-Rossendorf, YUE-SHUN SU, Department of Physics & Astronomy, University of California, Los Angeles, JOHN SCHLUETER, Materials Science Division, Argonne National Laboratory, JOACHIM WOSNITZA, Hochfeld-Magnetlabor Dresden (HLD-EMFL), Institut für Festkörperphysik, TU Dresden, STUART BROWN, Department of Physics & Astronomy, University of California, Los Angeles — We report a ^{13}C NMR study of an organic charge transfer salt β''-(BEDT-TTF)$_2$SF$_5$CH$_2$CF$_2$SO$_3$, focusing on the spin dynamics in its high-field inhomogeneous superconducting phase, a putative FFLO state. A noticeable enhancement of the spin-lattice relaxation rate beyond the normal state value is observed within the limits of the FFLO phase for a range of fields at T=750mK, resembling similar features previously observed in the related compound κ-ET. This enhancement is suppressed upon cooling, and its freeze-out is investigated in detail. Moreover, the angular dependence of the relaxation rate in the vicinity of the aligned in-plane field condition is probed, in an effort to inform the origin of the observed behavior with orbital or hyperfine effects.

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Date submitted: 11 Nov 2016 Electronic form version 1.4