Abstract Submitted
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Testing the spin-dependent polaron-pair transition model for lowtemperature PEDOT:PSS through electrically detected spin-Rabi beat detuning[1] DOUGLAS L. BAIRD, KIPP J. VAN SCHOOTEN, RACHEL BAARDA, JOHN M. LUPTON, CHRISTOPH BOEHME, Department of Physics and Astronomy, University of Utah, Salt Lake City, Utah — Poly[styrenesulfonate] doped poly[3,4-ethylenedioxythiophene] (PEDOT:PSS), which is a well-known organic metal at room temperature, exhibits a very distinct spin-dependent transition at low temperatures (<70K). We have studied this with pulsed electrically detected magnetic resonance spectroscopy which revealed a two-spin s=1/2 pair recombination process with very weakly spin-spin coupled pairs that are exposed to very weak hyperfine fields. This is in contrast to strong hyperfine fields reported for similar mechanisms in other materials [1]. In absence of hyperfine fields, the detuning behavior of spin-Rabi oscillation controlled electronic transition rates as predicted by Rajevac et al. [2] can be tested. This theory predicts that the Rabi-beat frequency approaches twice the detuning (= difference between excitation frequency and the Larmor frequency of the spins), in contrast to the Rabi nutation frequency, which approaches the detuning frequency. Our electrically detected spin-Rabi beat oscillation measurements as a function of the detuning experimentally confirm these predictions with very high precision.
[1] W. J. Baker et al., Phys. Rev. Lett. 108, 267601 (2012).
[2] V. Rajevac et al., Phys. Rev. B 74, 245206 (2006).

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