Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Simultaneous electrical and optical detection of magnetic resonance in MEH-PPV[1] MARZIEH KAVAND, DOUG BAIRD, KIPP VAN SCHOOTEN, HANS MALISSA, RACHEL BAARDA, JOHN M. LUPTON, CHRISTOPH BOEHME, Department of Physics and Astronomy, University of Utah
— While it is established that spin Pauli blockade controlled s=1/2-pair transitions are dominant spin-dependent transitions [1] at room temperature in poly[2-methoxy-5-(2-ethylhexyloxy)-1,4-phenylenevinylene] (MEH-PPV), there is controversy whether these pairs are unipolar or bipolar [1]. Spin-dependent processes can be observed with electrically (conductivity) and optically (photoluminescence) detected magnetic resonance. The former is sensitive to unipolar and bipolar processes [1] while the latter is sensitive only to bipolar charge carrier recombination [2]. Here, we present experiments on MEH-PPV organic light emitting diodes where the transient current and electroluminescence response to a pulsed magnetic resonance excitation of charge carriers is measured by detection of both observables on the same device at the same time. The measurements were made at various temperatures and injection (bias) conditions. Correlations between the dynamics of electrically and optically detected signals under these various conditions allows to discrimination between spin-dependent processes which affect one of the two observables only and those that affect both.

[1] C. Boehme, J.M. Lupton, Nature Nanotechnol.8 (9), 612-615 (2013).
[2] S.-Y. Lee et al. J. Am. Chem. Soc.133, 072019 (2011).

[1]We acknowledge support by the Department of Energy, Office of Basic Energy Sciences under Award #DE-SC0000909.

Christoph Boehme
Department of Physics and Astronomy, University of Utah

Date submitted: 14 Nov 2013 Electronic form version 1.4