Abstract Submitted
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Generation and electrical detection of spin collectivity in monolithic thin-film polymer devices[1] SHIRIN JAMALI, GAJADHAR JOSHI, HANS MALISSA, University of Utah, JOHN LUPTON, Universitt Regensburg-University of Utah, CHRISTOPH BOEHME, University of Utah — Collectivity in paramagnetic spin ensembles, analogous to electric dipoles resonantly driven in the Dicke regime, occurs under magnetic resonance, when the driving field amplitude B_1 reaches the order of the Zeeman field B_0. Measurements of spin-dependent transition rates between weakly spin-coupled charge carrier pairs in organic semiconductors have shown that this spin-Dicke regime can be reached experimentally by lowering B_0 to a minimum posed by random local hyperfine fields, requiring radio frequency (RF) driving fields, while maximizing B_1 [2,3]. Here we show that this can be accomplished using a microscopic monolithic thin-film device consisting of a polymer diode on a ˜1μm SiO_2/SiN layer stack grown on a Cu thin-film wire for strong homogeneous RF excitation, which in turn is supported by a crystalline Si substrate. This setup allows for B_1>2mT, and thus the observation of spin-collectivity in super-yellow (SY) poly (p-phenylene vinylene) (PPV), a polymer with much stronger local hyperfine fields than the deuterated polymers previously used [2]. [1] R.C.Roundy, M. E. Raikh, *Phys.rev. B* 88, 125206 (2013). [2] D. P. Waters et al. *Nature Phys.* 11, 910 (2015). [3] S. L. Bayliss, et al. *Nature Com.* 6, 8534 (2015).

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