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Coherent quantum control of photoluminescence in organic semiconductors DANE MCCAMEY, S.-Y. LEE, S.-Y. PAIK, J.M. LUPTON, C. BOEHME, Department of Physics, University of Utah — Understanding the fundamental spin process which impact the optoelectronic properties of organic semiconductors will inform the future development of devices which utilize the spin degree of freedom in such materials. Recently, we have demonstrated that the conductivity of organic light emitting diodes can be controlled by coherent manipulation of spins within polaron pairs [1], the precursor states to light emission. In this talk, we test the model proposed there by investigating coherent spin control of the photoluminescent properties of the organic semiconductor MEH-PPV. We coherently evolve the spin symmetry of polaron pairs between the singlet and triplet configurations, and demonstrate that doing so directly modulates the photoluminescence. We show, using spin-beating experiments, that the signal is due to spin pairs, as proposed in [1]. We will also discuss the time-dependent form of the photoluminescence change observed, and in doing so scrutinize the existing models of spin-dependent excitonic recombination found in the literature.

[1] McCamey, D. R. et al, *Nature Mater.* **7**, *723 (2008)*

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