Abstract Submitted
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Magneto-photocurrent in organic photovoltaic cells; the effect of short-lived charge transfer states[1] EITAN EHRENFREUND, A. DEVIR-WOLFMAN, B. KHACHATRYAN, Technion-Israel Institute of Technology, B. GAUTAM, University of Utah, N. TESSLER, Technion-Israel Institute of Technology, Z.V. VARDENY, University of Utah — The spin degrees of freedom are responsible for the magnetic field effects in organic devices at low magnetic fields. The MFE is formed via a variety of spin-mixing mechanisms, such as the hyperfine (typical strength: B_{hf}<0.003 T), triplet-polaron or triplet-triplet (B_{trip}<0.1 T) interactions, that limit the response by their respective strength. We report on magneto-photocurrent (MPC) response of bulk hetero-junction organic photovoltaic cells in an extended field range B=0.00005 - 8 Tesla, and found that spin mixing mechanisms are still operative even at the highest fields. In fact, the response MPC(B) can be divided into three main regions, each with a different sign: sharp response that increases with B up to $B_1 \sim 0.04$ T; broad response that decreases with B in the range from B_1 to $B_2 \sim 0.3$-0.7 T; and even broader response that increases above B_2; this response does not saturate even at 8.5 T. We attribute the latter MPC component to short-lived charge transfer excitons (CTE) where spin-mixing is caused by the difference of the donor/acceptor g factors; a mechanism that is increasingly more effective at high magnetic field.

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