Magneto-photocurrent in organic photovoltaic cells; the effect of short-lived charge transfer states\textsuperscript{1} EITAN EHRENREUNDE, 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.

\textsuperscript{1}Supported by the US-Israel BSF.