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**Study of Excitons in $MAPbI_3$ by optical Faraday rotation** P. ODENTHAL, Y. YAO, N. GUNDLACH, W. TALMADGE, C. ZHAENG, D. SUN, Universty of Utah, ZG YU, Washington State University, Z. V. VARDENY, Y. S. LI, Universty of Utah — Recently metal halide perovskites have gained much interest due to their rapid rise in solar cell efficiency. Their large Rashba effect and anomalously long spin lifetime at low temperature reveal the perovskites great promise for spintronic applications. Exciton physics should dominate the (spin dependent) optoelectronic properties of the $MAPbI_3$ at low temperatures. A complete understanding of the exciton physics in metal halide perovskites is therefore needed. Faraday rotation measurement in a pump-probe scheme provides unique insight into the perovskites' exciton physics, as it is sensitive to the quantum beating between spin-polarized exciton states. By varying the energy of the probe beam or the fluence of the pump beam, we probe difference species including possibly free excitons, bounded excitons, and free carriers. Our recent results of unusual energy and fluence dependent spin dynamics will be presented and discussed by considering the exciton physics. We acknowledge funding from the University of Utah and the Department of Energy Office of Science (DE-SC0014579).

Patrick Odnethal
Universty of Utah

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