Abstract Submitted
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Theory of Electron Spin Relaxation in ZnO[1] NICHOLAS HARMON, WILLIAM PUTIKKA, Ohio State University, ROBERT JOYNT, University of Wisconsin — Doped ZnO is a promising material for spintronics applications. For such applications, it is important to understand the spin dynamics and particulary the spin relaxation times of this II-VI semiconductor. The transverse spin lifetime T_2^* has been measured by optical orientation experiments, and it shows a surprising non-monotonic behavior with temperature. We explain this behavior by invoking spin exchange between localized and extended states. Interestingly, the effects of spin-orbit coupling are by no means negligible, in spite of the relatively small valence band splitting. This is due to the wurtzite crystal structure of ZnO. Detailed analysis allows us to characterize the impurity binding energies and densities, showing for the first time that optical orientation experiments can actually be used as a characterization tool for semiconductor samples.
[1] N.J. Harmon, W.O. Putikka, and R. Joynt, cond-mat/0808.2913 (2008)

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