Abstract Submitted
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Spin-orbit induced spin precession in 2D hole systems DIMITRIE CULCER, Advanced Photon Source, Argonne National Laboratory, Argonne, IL 60439 and Department of Physics, Northern Illinois University, De Kalb, IL 60115, CHRISTIAN LECHNER, Institut fuer Theoretische Physik, Universitaet Regensburg, D-93040 Regensburg, Germany, ROLAND WINKLER, Advanced Photon Source, Argonne National Laboratory, Argonne, IL 60439 and Department of Physics, Northern Illinois University, De Kalb, IL 60115 — It is well known that two-dimensional hole systems are characterized by an effective spin 3/2. Recently it was shown that the spin density matrix for such spin-3/2 systems can be decomposed into a sequence of multipoles which has important contributions from higher-order multipoles beyond the ones known for electron systems [1]. We will show that these multipoles can precess even in the absence of a magnetic field if strong spin-orbit interactions are present. Particularly simple and enlightening expressions for the spin polarization and higher order multipoles emerge in certain geometries. We will discuss an experimental setup in which this precession can be observed and investigate promising spintronics applications. [1] R. Winkler, Phys. Rev. B 70, 125301 (2004)

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