

Abstract Submitted
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Optical Spin-Orbit Coupling in Dirac Metamaterials¹ ANDREW COOK, University of Oregon Dept. of Physics, JENS NÖCKEL, UO Dept. of Physics — We explore hypothetical metamaterial cavities in which “optical spin-orbit coupling” of continuous vector electromagnetic fields can be made nearly isospectral to electron spin-orbit coupling in the hydrogen atom. 4 by 4 matrix formulations of Maxwell’s equations suggest that certain simultaneous variations of ϵ and μ make Maxwell’s equations very similar the Dirac equation; we call such systems “Dirac metamaterials.” We present solutions to Maxwell’s eqns. in hydrogen-like cavities and discuss the semiclassical meaning of various perturbation terms including the $\mathbf{L} \cdot \mathbf{S}$ coupling term and a Darwin-like term.

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