

Abstract Submitted
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Orbital nature of spin magnetic moment CHIH-PIAO CHUU, University of Texas, MING-CHE CHANG, University of Texas, QIAN NIU, University of Texas — In view of the application of spintronics, it is important to understand the physical observable of the spin, i.e. its magnetic moment. We show by constructing a wave-packet in the upper bands of the Dirac equation that the spin magnetic moment (Bohr magneton) is a direct result of the self-rotation in the wave-packet. In this sense, a non-relativistic electron is really a rotating charged object, confirming the original speculation on the physical nature of the electron spin. In a Bloch band of a crystal, a wave-packet can acquire additional self-rotating orbital angular momentum, giving rise to a change of the spin magnetic moment and causing a modification of the g-factor from 2.

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