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Title

Bloch oscillations of exciton-polaritons and photons for the generation of an alternating terahertz spin signal

Source

PHYSICAL REVIEW B vol.84 no.12 125314 DOI: 10.1103/PhysRevB.84.125314  
SEP 15 2011

Abstract

We analyze theoretically the spin dynamics of exciton-polaritons and photons during their Bloch oscillations in a wire-shaped microcavity. The reduced system dimensionality induces a specific momentum-dependent energy splitting between the TE- and TM-polarized eigenmodes. As a consequence, the spin of the particles oscillates during their motion along the wire. We show that the periods of the Bloch oscillations and of the spin precession can become commensurate. Under such conditions, linearly polarized exciting pulses can be transformed in a THz alternating spin current. The structure acts as a spin-optronic device which converts the polarization and emits spin-polarized pulses. Finally, we propose two different schemes which allow us to maintain the intensity of the spin signal for much longer than the polariton lifetime.