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Effects of mechanical rotation on spin current MAMORU MATSUO, IMR, Tohoku Univ., JUN'ICHI IEDA, SADAMICHI MAEKAWA, IMR, Tohoku Univ., CREST-JST — In the frontier of spintronics, much attention is paid on the control of spin current. Due to the exciting progress of nanomechatrononics, the importance of mechanical manipulation of electron spin will increase. We discuss theoretically effects of mechanical rotation on spin current using generally covariant Dirac equation in the non-relativistic limit. Coupling between rotation and spin is represented by Levi-Civita connections and spinor connections. By taking the non-relativistic limit, we show these connections introduce SU(2) gauge potentials. We derive spin current and forces acting on electron spins in terms of the SU(2)xU(1) theory. The non-relativistic correspondences of the inertial effects, such as energy-momentum redshifts effects, Sagnac-type effect and spin-rotation coupling are discussed in the context of spintronics.

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