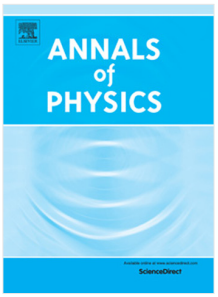

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Ö.F. Dayi, E. Yunt

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Spin Currents of Charged Dirac Particles in Rotating Coordinates

Ö. F. Dayi, E. Yunt

Physics Engineering Department, Faculty of Science and Letters,

Istanbul Technical University, TR-34469, Maslak–Istanbul, Turkey *

Abstract

The semiclassical Boltzmann transport equation of charged, massive fermions in a rotating frame of reference, in the presence of external electromagnetic fields is solved in the relaxation time approach to establish the distribution function up to linear order in the electric field in rotating coordinates, centrifugal force and the derivatives. The spin and spin current densities are calculated by means of this distribution function at zero temperature up to the first order. It is shown that the nonequilibrium part of the distribution function yields the spin Hall effect for fermions constrained to move in a plane perpendicular to the angular velocity and magnetic field. Moreover it yields an analogue of Ohm's law for spin currents whose resistivity depends on the external magnetic field and the angular velocity of the rotating frame. Spin current densities in three-dimensional systems are also established.

* *E-mail addresses:* dayi@itu.edu.tr, yunt@itu.edu.tr