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Relativistic Dissipative Spin Hydrodynamics from Kinetic Theory

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Semi-classical evolution equations for the scalar and axial-vector components of the Wigner function are treated in the relaxation time approximation to introduce a framework of relativistic dissipative hydrodynamics of particles with spin 1/2. We show that a classical treatment of spin is consistent with earlier calculations using the Wigner function approach with a quantum description of spin. We then derive non-equilibrium corrections to the spin tensor. The detailed structure of the non-equilibrium spin tensor reveals the existence of multiple spin transport coefficients [1,2]. This development indicates that it might be necessary to incorporate the effects of the multiple hydrodynamic gradients to properly characterize the nature of spin-polarization observed in heavy-ion collisions.
[1] Bhadury, S. et. al. Phys.Lett.B 814 (2021) 136096.
[2] Bhadury, S. et. al. Phys.Rev.D 103 (2021) 1, 014030.

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