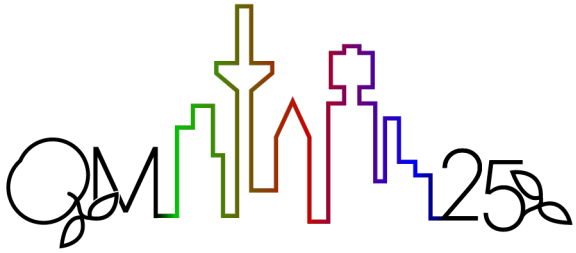

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Hybrid approach to perfect and dissipative spin hydrodynamics

A hybrid framework of spin hydrodynamics is proposed that combines the results of kinetic theory for particles with spin 1/2 with the Israel-Stewart method of introducing non-equilibrium dynamics. The framework of kinetic theory is used to define the perfect-fluid description that conserves baryon number, energy, linear momentum and spin part of angular momentum. This leads to the entropy conservation although, in the presence of spin degrees of freedom, the perfect-fluid formalism includes extra terms whose structure is usually attributed to dissipation. The genuine dissipative terms appear from the condition of positive entropy production in non-equilibrium processes. They are responsible for the transfer between the spin and orbital parts of angular momentum, with the total angular momentum being conserved.

Based on:
1) "Generalized thermodynamic relations for perfect spin hydrodynamics", arXiv:2405.03263 [hep-ph] by W. Florkowski and M. Hontarenko,
2) "Hybrid approach to perfect and dissipative spin hydrodynamics",
arXiv:2408.03106 [hep-ph] by Z. Drogosz, W. Florkowski, and M. Hontarenko, Phys. Rev. D110 (2024) 096018.

Category

Theory

Collaboration (if applicable)

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