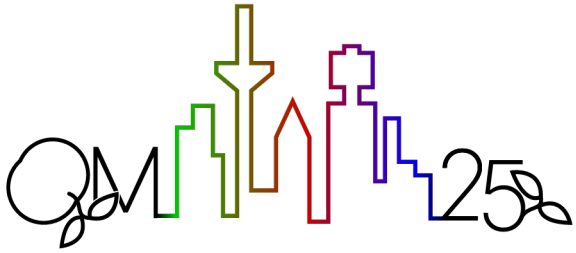

Contribution ID: **740** Type: **Poster**

Vector and Tensor Spin Polarization for Vector Bosons at Local Equilibrium

We derive expressions for the vector and tensor components of the spin polarization of massive vector bosons at local thermodynamic equilibrium, considering second-order spacetime gradients of thermodynamic fields —temperature, chemical potential, and flow velocity—in a relativistic fluid. A set of Feynman rules is developed to compute the Wigner function and matrix-valued spin-dependent distribution (MVSD) functions at each gradient order. Due to time-reversal symmetry, the leading contribution to spin alignment—defined as the 00-component of tensor polarization—appears at second order in MVSD, for which we provide an analytic formula. We analyze the physical implications of the various contributions to vector and tensor polarization, identifying that spin alignment can arise from the curl of the rotational component of thermal vorticity and the gradient of the acceleration component, contributions previously unexplored. These formulae predict a contribution to the spin alignment which can be compared with observations in relativistic heavy-ion collisions via numerical simulations.

Category

Theory

Collaboration (if applicable)

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