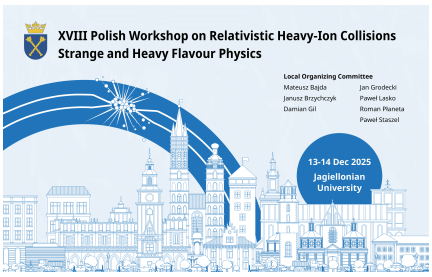

Contribution ID: **5** Type: **not specified**

Exact Wigner functions for chiral spirals

At present, our understanding of the non-equilibrium aspects of a relativistic spin fluid is derived from the study of Wigner function coupled with the semiclassical expansion. In our work, we present an exact computation (up to quantum loop corrections) of the Wigner functions for quarks in a field of oscillating pion condensate. The oscillating pion condensate enters the equation of motion as a mean field, allowing for an exact solution. The spinors thus obtained are used to compute all components of the Wigner functions. Axial current obtained using these exact Wigner functions reproduce expressions in existing literature. Furthermore, we find that during an adiabatic change of the periodic potential into a uniform one, the polarization vector is twisted from its original direction. Finally, our analysis also reveals a scenario that indicates incompatibility with the conventional semi-classical expansion.

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