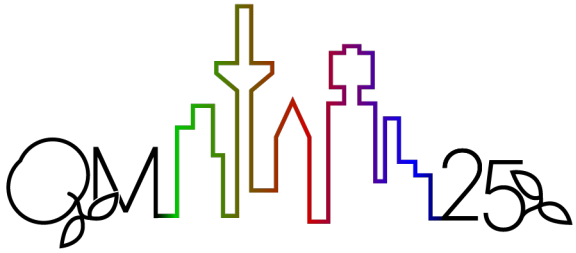

Contribution ID: **14** Type: **Poster**

Baryon polarization and meson spin alignment in a thermal model with spin-vorticity non-equilibrium

Motivated by recent progress in spin hydrodynamics, we investigate the spin density matrix of baryons and vector mesons allowing for non-equilibrium between spin and vorticity.
We explain how the coalescence of partially polarized quarks, as well as the transfer of angular momentum from vorticity to the spin of the baryon generically create a partially coherent density matrix.
We argue that spin-vorticity non-equilibrium has the potential to solve the long-standing puzzles within the phenomenology of spin in heavy ion collisions, namely the combined understanding of baryon polarization and meson spin alignment, as well as the azimuthal dependence of baryon longitudinal polarization. Since in the case of vector mesons, this degree of coherence can be experimentally ascertained by measuring off-diagonal matrix elements, We suggest that a measurement of azimuthal dependence of off-diagonal matrix elements of the vector meson and quarkonium spin density matrix can falsify and constrain this picture.

Based on
[1] Kayman J. Goncalves,R. Ryblewski, G. Torrieri, upcoming work
[2] Kayman J. Goncalves,P.H. De Moura and G. Torrieri Phys.Rev.D 108 (2023) 3, 034032
[3] Kayman J. Goncalves,G. Torrieri Phys.Rev.C 105 (2022) 3, 034913

Category

Theory

Collaboration (if applicable)

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Session Classification: Poster session 1

Track Classification: Chirality