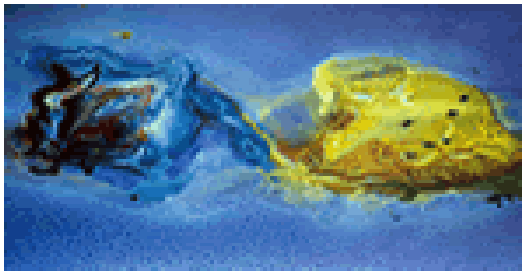

Contribution ID: **142** Type: **Talk**

Relativistic fluid dynamics of spin-polarized systems of particles

Wednesday, 1 August 2018 17:20 (20 minutes)

A new framework for relativistic fluid dynamics of particles with spin 1/2 is presented. It is based on the conservation laws for baryon number, energy and momentum, and angular momentum. The conservation laws lead to hydrodynamic equations for the charge density, local temperature, and fluid velocity, as well as for the spin polarization tensor. The resulting set of differential equations extends the standard framework of perfect-fluid hydrodynamics, with a conserved entropy current, in a minimal way.

In addition, the properties of the relativistic spin density matrices for spin-1/2 particles, which have been used recently in works on the polarization of Lambda hyperons, are discussed. Their relations to the Pauli-Lubański four-vector and different forms of the spin tensor are elucidated. Some numerical results in full 3+1D space-time coordinates are presented.

The proposed framework forms a basis for hydrodynamic interpretation of polarization measurements of Lambda hyperons in heavy-ion collisions.

Based on the recent works by:
[1] W. Florkowski, B. Friman, A.Jaiswal, E. Speranza, arXiv:1705.00587, Phys.Rev. C97 (2018) no.4, 041901
[2] W. Florkowski, B. Friman, A.Jaiswal, R.Ryblewski, E. Speranza, arXiv:1712.07676, submitted to PRD,
[3] W. Florkowski, B. Friman, A.Jaiswal, R.Ryblewski, E. Speranza, forthcoming

Primary authors: FLORKOWSKI, Wojciech (Institute of nuclear Physics, Krakow); Dr RYBLEWSKI, Radoslaw (Institute of Nuclear Physics PAN); SPERANZA, Enrico (Frankfurt University); FRIMAN, Bengt (GSI); JAISWAL, Amaresh (National Institute of Science Education and Research)

Presenter: Dr RYBLEWSKI, Radoslaw (Institute of Nuclear Physics PAN)

Session Classification: Deconfinement

Track Classification: D: Deconfinement