

Winter Meeting 2025



Contribution ID: 130

Type: **not specified**

Relativistic Navier-Stokes: recent developments

Monday 3 February 2025 11:45 (25 minutes)

The Navier-Stokes equations are ubiquitous in the physical description of our universe, but their relativistic counterpart, as originally formulated many decades ago, suffer severe issues. Alternative formulations, like the widely used Muller-Israel-Stewart (MIS) theories that successfully describe the quark-gluon plasma, have also been recently found to present limitations. Moreover, weak processes in neutron star mergers are believed to give rise to an effective viscosity, for which MIS descriptions find similar limitations. In recent years, a well-behaved version of relativistic Navier-Stokes has been proposed, for which all these limitations are absent, appearing as a promising alternative. We present recent developments in numerical evolutions of the relativistic Navier-Stokes equations, that we use to provide the first description of experimental data of central heavy-ion collisions measured by ALICE.

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