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What can we learn from hydro for hadron?

One of the recent puzzles in hadron physics is how to define energy, momentum, spin and stress density distributions inside a hadron. The standard picture is that a hadron is a femtometer spherical ball, whose radial density profile is dictated by Strong Interaction. Given the so-called gravitational form factors (GFFs) either from the experimental measurements or theory, the energy, momentum and stress density distributions can be obtained from the Fourier transform of these GFFs, known as the Sachs distribution. However, this rigid-body picture is in sharp contradiction with Einstein's relativity. Since hadrons are intrinsically relativistic systems, this textbook definition has led to a number of difficulties in interpreting the physical hadronic densities. Hence the Sachs formalism is under intense scrutiny in recent years. In this talk, I will argue that a hadron is a relativistic medium and we can use relativistic hydrodynamics to define and to extract the physical densities. This view also allows us to clarify the roles of the traditional Sachs distribution as well as the light-front distribution. This formulation makes the connection to the recent developments in relativistic spin hydrodynamics.

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