Title: Relativistic fluid dynamics - theory and applications in heavy-ion physics

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A few microseconds after the big bang, quarks and gluons roamed freely in our universe, forming a state called the "quark-gluon plasma" (QGP). As the universe expanded and cooled, the QGP hadronized, i.e., quarks and gluons formed hadrons. Nowadays, one tries to recreate the QGP in collisions of heavy atomic nuclei at ultrarelativistic bombarding energies. In the first part of this talk, I give an introduction into heavy-ion physics and how the collective properties of the QGP can be probed in ultrarelativistic nuclear collisions. Experimental data show that the QGP exhibits a surprising degree of collectivity which can only be explained if its viscosity over entropy density ratio is rather small. In a situation like this, the dynamical evolution of matter can be described by fluid dynamics. In the second part of this talk, I present a novel derivation of the equations of motion of dissipative relativistic fluid dynamics from the Boltzmann equation, that resolves problems and open questions of previous attempts to the derive these equations.