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Thermodynamic instabilities and strangeness production in hot and dense hadronic matter

One of the very interesting aspects in the high energy heavy-ion collisions experiments and in nuclear astrophysics is a detailed study of the thermody- namic properties of strongly interacting nuclear matter far away from the nu- clear ground state. The main goal of this contribution is to show that thermo- dynamic instabilities and phase transitions can take place at nite net baryon density and temperature, where the onset conditions of decon ned quark-gluon plasma should not still realized. Similarly to the low density nuclear liquid-gas phase transition, we show that a nite density phase transition is character- ized by pure hadronic matter with both mechanical instability (uctuations on the baryon density) that by chemical-di usive instability (uctuations on the strangeness concentration). The main goal is to investigate how the constraints on the global conservation of the baryon number, electric charge fraction, and strangeness neutrality, in the presence of Delta-isobar degrees of freedom, hy- perons, and strange mesons, in uence the behavior of the equation of state in a regime of nite values of baryon density and temperature. It turns out that in this situation hadronic phases with di erent values of strangeness content may coexist, altering signi cantly meson-antimeson ratios.

Experimental Collaboration

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