

'Snowballs in Hell': production of hadrons and loosely bound objects in ultra-relativistic nuclear collisions

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We will summarize our understanding of hadron production in ultra-relativistic nuclear collisions. The data from 2 decades of experiments at the AGS, SPS, RHIC and LHC accelerators span an energy range from about $\sqrt{s_{NN}} = 3$ GeV to 3 TeV. The data are analyzed in a statistical hadronization model which includes strangeness and charm. It turns out that all data are described very well with three key thermodynamic parameters, the chemical freeze-out temperature T_{chem} , the baryon chemical potential μ_b , and the chemical freeze-out volume V_{chem} . The characteristic energy dependence of T_{chem} provides direct information on the QCD phase boundary. Particular emphasis is placed on the understanding of the production of loosely bound objects such as light nuclei and anti-nuclei, as well as (anti-)hypernuclei. For hypernuclei we will comment on the current status of cross section and life-time measurements. We will also comment on the production of charmonia and charmonium-like states such as X(3872). The overall success of the approach implies that the inclusive yields of possible exotic states such as $nn\Lambda$ and $\Omega\Omega$ can be predicted with good precision for central nuclear collisions.