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Snapshots of fireballs at freeze-out from heavy-ion collisions at different energies

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Identified hadron spectra from relativistic heavy-ion collisions allow one to reconstruct the final state of the fireball. In principle, one could deduce its previous evolution from a back extrapolation of the final state. It is also important to study the collisions at different energies, since hot matter at different energy and baryon densities is created that way. One is then interested in any irregularities of the collision energy dependence that might indicate the onset of deconfinement or the vicinity of the critical point.

We reconstruct the freeze-out state of the fireball produced in cental Au+Au or Pb+Pb collisions in the energy range from 7.7 GeV up to 2760 GeV per colliding nucleon pair. The date stem from the RHIC beam energy scan programme and from the LHC. Transverse momentum spectra of protons, antiprotons, charged pions and kaons have been fitted with the blast-wave model that includes production via resonance decay. We present how the composition of spectra looks at different energies as a function of the transverse momentum. The freeze-out temperature decreases with increasing collision energy, while the transverse expansion velocity grows. The decrease of the freeze-out temperature seems to stop at the collsion energy of 130 GeV; afterwards the temperature stays constant or grows slightly.

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