Nuclear Theory

Properties of the partonic phase at RHIC within PHSD

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(Submitted on 9 Jun 2011)

The dynamics of partons, hadrons and strings in relativistic nucleus-nucleus collisions is analyzed within the novel Parton-Hadron-String Dynamics (PHSD) transport approach, which is based on a dynamical quasiparticle model for partons (DQPM) matched to reproduce recent lattice-QCD results -- including the partonic equation of state -- in thermodynamic equilibrium. The transition from partonic to hadronic degrees of freedom is described by covariant transition rates for the fusion of quark-antiquark pairs or three quarks (antiquarks), respectively, obeying flavor current-conservation, color neutrality as well as energy-momentum conservation. In order to explore the space-time regions of 'partonic matter' the PHSD approach is applied to nucleus-nucleus collisions from SPS to RHIC energies. Detailed comparisons are presented for hadronic rapidity spectra and transverse mass distributions. The traces of partonic interactions are found in particular in the elliptic flow of hadrons as well as in an approximate quark-number scaling at the top RHIC energy.

Comments:	Talk presented at the 27th Winter Workshop on Nuclear Dynamics (WWND) in Colorado, USA on February 6 - 13, 2011
Subjects:	**Nuclear Theory (nucl-th)**; High Energy Physics - Phenomenology (hep-ph)
Cite as:	**arXiv:1106.1859 [nucl-th]** (or **arXiv:1106.1859v1 [nucl-th]** for this version)

Submission history

From: V.P. Konchakovski [view email]
[v1] Thu, 9 Jun 2011 17:05:22 GMT (171kb)

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