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The thermal model on the verge of the ultimate test: the LHC data

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In our model, both the light (u,d,s) quark sector and charm(onium) have found a unified description, thus providing very different probes for a possible delineation of the phase boundary between deconfined and hadronic matter produced in nucleus-nucleus collisions from low (AGS) energies up to RHIC energy.
A purely thermal production (at chemical freeze-out) appears natural for u,d,s-carrying hadrons and a good degree of consensus has been achieved with the RHIC data, at least for central collisions.
We are rather confident in predicting the chemistry of ligh-quark hadrons at the LHC.
In contrast, charmed hadrons and charmonia can be produced at chemical freeze-out only as a result of a “distribution” into hadrons of charm quarks produced in primary hard collisions.
Our model describes rather well the RHIC and SPS data on charmonia, which will be reviewed briefly.
We expect that generation at the phase boundary is at the LHC the exclusive mechanism (thus lifting the present controversy whether charmonia melt or not in the deconfined stage at RHIC and SPS energies).
With some of the model ingredients (like the volume at chemical freeze-out) already constrained by the first LHC data, the main uncertainty in our predictions remains the charm cross section in Pb-Pb, where shadowing is not yet known.
In addition to the overall hadron abundancies, including those of light (hyper)nuclei and their antiparticles, we provide predictions for charmonia and for charmed hadrons, to be confronted soon with the LHC data.

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