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Further Background Information on Heavy ion collisions at LHC

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Here's a short (and highly incomplete) bibliography on heavy-ion physics. It includes some of the most famous papers in the field, recent reviews or useful books. If you read the electronic version, just click on the references to access these papers. Otherwise, the best is to go to the SLAC database, http://www.slac.stanford.edu/spires/hep/, widely used by high-energy physicists. Enjoy the reading !

RHIC results

A general description of heavy-ion physics with emphasis on RHIC physics was published recently by Scientific American

• M. Riordan and W. A. Zajc, *The first few microseconds*, Sci. Am. **294N5** (2006) 24 http://www.sciam.com/article.cfm?articleID=0009A312-037F-1448-837F83414B7F014D

Slightly more technical discussions on RHIC results are summarized by the PHENIX and STAR collaborations

• **PHENIX** Collaboration, K. Adcox et al., *Formation of dense partonic matter in relativistic nucleus nucleus collisions at RHIC: Experimental evaluation by the PHENIX collaboration*, Nucl. Phys. **A757** (2005) 184 [nucl-ex/0410003]

• **STAR** Collaboration, J. Adams et al., *Experimental and theoretical challenges in the search for the quark–gluon plasma: The STAR collaboration's critical assessment of the evidence from RHIC collisions*, Nucl. Phys. **A757** (2005) 102 [nucl-ex/0501009]

A theoretical interpretation of RHIC data can be read in

• M. Gyulassy and L. McLerran, *New forms of QCD matter discovered at RHIC*, Nucl. Phys. **A750** (2005) 30 [nucl-th/0405013]

Lattice QCD at finite temperature

For a lecture on QCD at finite temperature on the lattice, see

• F. Karsch, *Lattice QCD at high temperature and density*, Lect. Notes Phys. **583** (2002) 209 [hep-lat/0106019]

A much shorter description of the main lattice results is

• F. Karsch, *Lattice results on QCD thermodynamics*, Nucl. Phys. **A698** (2002) 199 [hep-ph/0103314]

Hydrodynamical description

The seminal paper by Bjorken on the hydrodynamical description of a high-energy heavy ion collision is

• J. D. Bjorken, *Highly relativistic nucleus-nucleus collisions: The central rapidity region*, Phys. Rev. **D27** (1983) 140

For a recent review on hydro in heavy-ion physics, see

• P. F. Kolb and U. W. Heinz, *Hydrodynamic description of ultrarelativistic heavy-ion collisions*, nucl-th/0305084

Statistical models

The status of thermal model descriptions of particle production in heavy ion collisions is presented in

- P. Braun-Munzinger, K. Redlich and J. Stachel, *Particle production in heavy ion collisions*, nucl-th/0304013

Flow

The original paper on elliptic flow in heavy-ion collisions is

- J.-Y. Ollitrault, *Anisotropy as a signature of transverse collective flow*, Phys. Rev. **D46** (1992) 229

Photons

A very nice (and short) review on the calculation of thermal photon production in quark–gluon plasma can be read here

- F. Gelis, *QCD calculations of thermal photon and dilepton production*, Nucl. Phys. **A715** (2003) 329 [hep-ph/0209072]

Concerning prompt photon phenomenology, I refer you to the recent

- P. Aurenche, M. Fontannaz, J.-P. Guillet, E. Pilon and M. Werlen, *A new critical study of photon production in hadronic collisions*, Phys. Rev. **D73** (2006) 094007 [hep-ph/0602133]

For a rather exhaustive description of (thermal and prompt) photon production, see the "photon section" of the CERN Yellow report

- F. Arleo et al., *Photon physics in heavy ion collisions at the LHC*, hep-ph/0311131

Heavy-quarkonium suppression

The original paper on the suppression of heavy-quark bound states as a signature of QGP formation is

- T. Matsui and H. Satz, *J/ψ suppression by Quark–Gluon plasma formation*, Phys. Lett. **B178** (1986) 416

The part of the CERN yellow report on heavy-quarkonia can be found here

- M. Bedjidian et al., *Hard probes in heavy ion collisions at the LHC: Heavy flavour physics*, hep-ph/0311048.

Parton energy loss and jet quenching

The very first mention on parton energy loss is due to Bjorken in an unpublished preprint, which you can find here

- J. D. Bjorken, *Energy loss of energetic partons in quark–gluon plasma: Possible extinction of high $p_\perp$ jets in hadron - hadron collisions*, FERMILAB-PUB-82-059-THY,

http://lss.fnal.gov/archive/1982/pub/Pub-82-059-T.pdf

A famous paper on the jet quenching in heavy ion collisions is
• X.-N. Wang and M. Gyulassy, *Gluon shadowing and jet quenching in A + A collisions at* $\sqrt{s}$*= 200 GeV*, Phys. Rev. Lett. **68** (1992) 1480

For a short and more recent description of jet quenching, see
• R. Baier, Nucl. Phys. A715 (2003) 209 [hep-ph/0209038]
• C. A. Salgado, *RHIC results from LHC perspectives*, hep-ph/0510062

The section on "jet physics" in the CERN Yellow Report is
• A. Accardi et al., *Hard probes in heavy ion collisions at the LHC: Jet physics*, hep-ph/0310274.

Strangeness enhancement

The original paper on the prediction of the strangeness enhancement is
• J. Rafelski and B. Muller, *Strangeness production in the quark–gluon plasma*, Phys. Rev. Lett. **48** (1982) 1066

A more complete review on this subject is
• P. Koch, B. Muller and J. Rafelski, *Strangeness in relativistic heavy ion collisions*, Phys. Rept. **142** (1986) 167

Books

The best document (although maybe slightly technical) on heavy-ion physics at the LHC is the CERN Yellow Report
• M.L. Mangano, H. Satz, U.A. Wiedemann Editors, *Hard probes in heavy-ion collisions at the LHC*, CERN-2004-009, http://doc.cern.ch/cernrep/2004/2004-009/2004-009.html
I gave above the references of three different parts on photon, heavy-quarkonium and jet physics.

An interesting book which gathers most facets of high-energy heavy ion collisions is
• R.C. Hwa, X.-N. Wang Editors, *Quark–gluon plasma. vol. 3*, River Edge, USA, World Scientific (2004) 777 p. (actually, several reviews quoted above come from this book)

Finally,
• C. Y. Wong, *Introduction to high-energy heavy ion collisions*, Singapore: World Scientific (1994)
is a pedagogical introduction (yet slightly outdated) to heavy-ion physics.