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Study of the expansion and the phase transition of a quark plasma to an hadron phase with the NJL model using a new QMD approach.

One of the challenges of present day in nuclear physics is the understanding of the phase transition between the quark gluon plasma and the hadronic world. We can divide space into cells to create a lattice of partons, or describe the transformation of energy via the Cooper-Frye formula, but in these cases we miss some dynamical aspects.

That is why I will present a study of the expansion and the phase transition with a QCD inspired model : the Nambu-Jona-Lasinio (NJL) model. This model is particularly useful to describe quark matter at low temperature (below Λ_QCD). It provides an effective mass at finite (T,μ), and then cross sections and decay widths for hadrons (possible mixed phase).

Recent results are presented using these data within a Quantum Molecular Dynamics (QMD) code. This code is designed for local interactions at finite (T,μ). It is a fully relativistic code which is Lorentz invariant and avoids the No Interaction Theorem in a different way than previous similar attempts.

Finally we know that there are correlations inside the plasma before the phase transition. We discuss how this scenario can be modeled with these tools to understand this transition in detail and to find observables which distinguish between the different approaches.

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