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Photon production in the early stages of ultrarelativistic heavy ion collisions

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We introduce a model for the early stages of ultrarelativistic heavy ion collisions, in which initial strong color fields decay to a quark-gluon plasma via the Schwinger mechanism; the dynamics of the coupled fields+plasma system is studied consistently by means of relativistic transport theory coupled to classical equations of motion for the fields. This model is useful to grasp important properties of the early time evolution of the quark-gluon plasma produced in heavy ion collisions, with particular reference to isotropization and thermalization, as well as to the particle production time and chemical composition of the plasma. We then use this model to discuss photon production in the early stages of the collision, with emphasis on photon multiplicity and spectrum, and compare the results obtained within a standard MC-Glauber initialization.

Summary

We introduce a model for the early stages of ultrarelativistic heavy ion collisions, in which initial strong color fields decay to a quark-gluon plasma via the Schwinger mechanism; the dynamics of the coupled fields+plasma system is studied consistently by means of relativistic transport theory coupled to classical equations of motion for the fields. This model is useful to grasp important properties of the early time evolution of the quark-gluon plasma produced in heavy ion collisions, with particular reference to isotropization and thermalization, as well as to the particle production time and chemical composition of the plasma. We then use this model to discuss photon production in the early stages of the collision, with emphasis on photon multiplicity and spectrum, and compare the results obtained within a standard MC-Glauber initialization.

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Primary author: RUGGIERI, Marco

Presenter: RUGGIERI, Marco

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