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Systematic Study of High-pT Direct Photon Production with the PHENIX Experiment at RHIC

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Direct photons are a powerful probe to study the initial state of matter created in relativistic heavy ion collisions since photons do not interact strongly once produced. They are emitted in all stages of the collision: the initial state where photon production can be described by pQCD; the Quark-Gluon Plasma (QGP) dominated by thermal emission; and the final hadron-gas phase. In addition, high p_T photons are expected to be produced by the interaction of jet partons with dense matter.
The direct photon yields measured in heavy ion collisions by the PHENIX experiment are in good agreement with a NLO pQCD calculation scaled by the number of binary nucleon collisions within current experimental errors and theoretical uncertainties. While this suggests that the initial-hard-scattering probability is not reduced, the agreement with pQCD calculations might just be a coincidence caused by mutually counterbalancing effects like energy loss and Compton like scattering of jet partons.
PHENIX recorded high-statistics Au+Au and Cu+Cu data sets in 2004 and 2005. Combined with p+p data taken in 2005, these new data sets allow to measure direct photons and to evaluate the nuclear modification up to very high p_T. We present the status of the systematic study of high-p_T direct photon production in ultra-relativistic high energy Au+Au and Cu+Cu collisions.

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