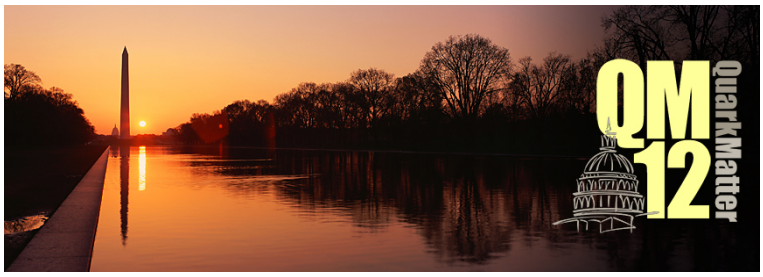

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High-pT direct photons in nuclear collisions: from RHIC to LHC

Thursday 16 August 2012 16:00 (2 hours)

We discuss a production of direct photons at large transverse momenta p_T in nuclear collisions at different energies and rapidities corresponding to RHIC and LHC experiments. Direct photons are very convenient tool for investigation of nuclear effects since
they are not expected to be accompanied by any final state interaction, either energy loss or absorption. Therefore, besides the Cronin enhancement at medium-high p_T and small isotopic corrections at larger p_T, one should not expect any nuclear effects. However, data from the PHENIX experiment at mid-rapidities demonstrate a significant large-p_T suppression in central d+Au and Au+Au collisions that cannot be induced by coherent phenomena (gluon shadowing, Color Glass Condensate). We demonstrate that such an unexpected result is a subject to the energy conservation constraints (ECC) in initial state multiple parton interactions. The corresponding suppression factor falls steeply with p_T and leads to rather strong decrease with p_T of the nuclear modification factor violating so QCD factorization. In the RHIC kinematic region at forward rapidities we include also coherent phenomena as an additional source of nuclear suppression. In the LHC energy range ECC effects are irrelevant at mid-rapidities, but they are going to be important with increasing rapidity. We study for the first time a relative contribution of both sources of nuclear suppression at different rapidities performing predictions that could be verified in the future by experiments at RHIC and LHC. We analyze also a contribution of gluon shadowing as a leading twist shadowing correction modifying nuclear effects especially at small p_T.

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