

Nuclear suppression at large p_T and x_F : Direct photons from RHIC to LHC

We discuss a common feature of all known reactions on nuclear targets - a significant suppression at large Feynman x_F and large transverse momenta p_T of produced particles. The main emphasis is devoted to production of prompt photons 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 p_T and small isotopic corrections at larger p_T , one should not expect any nuclear effects. However, data from the PHENIX experiment demonstrate a significant large- p_T suppression in central d+Au and Au+Au collisions that cannot be induced by coherence phenomena. We demonstrate that such an unexpected result is subject to the energy sharing problem in multiple initial state interactions. Using the colour dipole approach we describe first the large- p_T production of direct photons in the RHIC kinematic region in agreement with available data. We study also a rise of nuclear effects with rapidity(x_F) caused besides corrections for energy deficit by an increasing onset of coherence phenomena. In the LHC energy range we analyze relative manifestation of these effects presenting predictions for large- p_T suppression at different rapidities. 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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