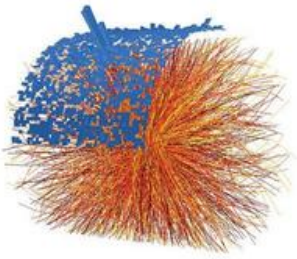

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Challenges of direct photon production at forward rapidities and large pT

Tuesday 9 September 2014 15:05 (30 minutes)

Using two different models we investigate production of direct photons in proton-nucleus and nucleus-nucleus interactions at RHIC and LHC energies.

Direct photons produced in interactions with nuclear targets represent a cleaner probe for investigation of nuclear effects than hadrons, since photons have no final state interaction and no energy loss or absorption is expected in the produced hot medium.

Therefore, besides the Cronin enhancement at medium-high transverse momenta pT and isospin effects at larger pT, one should not expect any nuclear effects. However, this fact is in contrast to the PHENIX data providing an evidence for a significant large-pT suppression at mid rapidities 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 results is subject to deficit of energy induced universally by multiple initial state interactions (ISI) towards the kinematic limits (large Feynman xF and/or large pT).

To enhance the effects of coherence, one should be cautious going to forward rapidities and higher energies. In the LHC kinematic region ISI corrections are irrelevant at mid rapidities but cause rather strong suppression at forward rapidities and large pT. Contribution of coherent effects associated with gluon shadowing is effective predominantly at small and medium-high pT.

We perform a comparison of numerical calculations in the color dipole approach with calculations in the QCD improved parton model and compare both models with available data from the RHIC and LHC collider experiments. We perform also predictions for expected onset of ISI effects at forward rapidities which can be verified by the future measurements at LHC.

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