



Contribution ID: 257

Type: **Poster**

Systematic study of real photon and Drell-Yan pair production in $p+A$ ($d+A$) interactions

Tuesday, 29 September 2015 16:30 (2 hours)

We investigate nuclear effects in production of Drell-Yan pairs and direct photons in proton(deuteron)-nucleus collisions. For the first time, these effects are studied within the colour dipole approach using path integral technique based on the Green function formalism which naturally incorporates the colour transparency and quantum coherence effects. Numerical results for the nuclear modification factor are compared with available data. Besides, we present a variety of predictions for the nuclear suppression as function of transverse momentum, rapidity and invariant mass of the lepton pair that can be verified by experiments at RHIC and LHC. We found that the nuclear suppression is caused predominantly by effects of quantum coherence (shadowing corrections) and by the effective energy loss induced by multiple initial state interactions. Whereas the former dominates at small Bjorken x_2 in the target, the latter turns out to be significant at large x_1 in the projectile beam and is universal at different energies and transverse momenta. Remarkably, the second new source of suppression appears to be significant even in those kinematic regions where the shadowing corrections are naturally suppressed.

On behalf of collaboration:

NONE

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Session Classification: Poster Session

Track Classification: Electromagnetic Probes