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Resolving the R_{pA} and v_2 puzzle of D^0 mesons in p - Pb collisions

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It has been a challenge to understand the experimental data on both the nuclear modification factor and elliptic flow of D^0 mesons in p-Pb collisions at LHC energies. In this work^[1], we study these observables with an improved multi-phase transport model. After including the Cronin effect (or transverse momentum broadening) and independent fragmentation for charm quarks, we provide the first simultaneous description of the D^0 meson R_{pA} and v_2 data at $p_T \le 8$ GeV/c. The model also provides a reasonable description of the D^0 meson p_T spectra and the low- p_T (below ~1.5 GeV/c) charged hadron spectra, R_{pA} and v_2 . We find that both parton scatterings and the Cronin effect are important for the D^0 meson R_{pA} , while parton scatterings are mostly responsible for the D^0 meson R_{pA} and v_2 . Therefore, it is crucial to include the Cronin effect for the simultaneous description of the D^0 meson R_{pA} and v_2 . Since the Cronin effect is expected to grow with the system size, this work also implies that it could be important for heavy hadrons in large systems.

Experiment/Theory

Theory/Phenomenology

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