Research
Journal of
Physics

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Executive Summary

Transparencies in A Relativistic Glauber Model for Nuclear C

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One still do not fully comprehend the colour transparency (CT) phenomenon in the intermediate (few to ten GeV) energy domain, forty years after it was first predicted in high-energy QCD; for a current review. The CT model foresees the creation of hadrons in small-sized structures in reactions with strong momentum transfer. The hadron's interactions with a nuclear (A) medium in its final (or initial) state are severely repressed because of the small transverse size, which also causes colour multipoles to disappear. An important topic is at what resolution scales the CT phenomenon begins to significantly reduce nuclear opaqueness. The extraction of non-perturbative partonic distribution functions as CT plays a role in the QCD factorization theorems from the map of this transition is crucial for understanding the change from hadronic to partonic degrees of freedom.

Measurements at higher momentum transfers at hadron beam facilities can provide additional data to further clarify the CT situation for the proton. Proton knockout can also be assessed by other kinematics. The quantum diffusion model's parameter space can be thoroughly explored theoretically to pinpoint the parameter values that are both consistent with the $^{12}C(e,e'p)$ measurements and still result in an observable shift in the anticipated FSI in quasielastic deuteron breakup. There, the kinematics can be adjusted to achieve maximal FSI; as a result, a CT signal would produce a greater change in transparency than a conventional one.

The measured *s*-shell projections are around 25% bigger than the RMSGA predictions, however, the measured p-shell transparencies agree with the predictions presented here. The measured *s*-shell transparencies cover a wide missing-energy range (20 to 80 MeV), therefore contributions from reaction channels other than $1s_{1/2}$ knockout cannot be completely ruled out as a cause of the disparity. Fixed missing energy that corresponds to the energy centroid of the single-particle strength is also used to generate the results. A model for the broad energy distribution of this shell is necessary to compare the results with the model for *s*-shell knockout in more detail.

Journal Reference

Cosyn, W.; Ryckebusch, J., 2022. Nuclear C(*e,e′p*) Transparencies in a Relativistic Glauber Model. Physics 2022, 4, 672–676.

KEYWORDS
Colour transparency, nuclear knockout reactions