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Title: Probing the deuteron at very large internal momenta

This paper report a measurement of cross sections for electron-induced proton knockout reactions from Deuterium at high momentum transfers and over a wide range of missing momenta, reaching up to about 1 GeV/c. This reach almost doubles the missing momentum range covered by the most recent measurement [PRL 107 (2011) 262501].

I find this work to be innovative and the data presented here are of significant impact and interest that should be published in PRL. However, the submitted manuscript fails to present to the general reader the significance and potential impact of the new data. I therefore strongly recommend publication in PRL, following a major revision of the manuscript.

In my opinion, there are three reasons that seems to drive the general interest in the new data:

1. Universality: The nuclear-factorization assumption put forward by Ciofi and Frankfurt & Strikman, and more recently developed to a quantitative approach using the generalized contact formalism, directly connect the high momentum measurement of the deuteron to all atomic nuclei and nuclear systems. This universality steam from the dominance of SRC pairs in the high momentum tail of nuclear wave-function. A discussion of this connection, with proper reference to the theoretical works mention above, and to the experimental works that show the important of np-SRC pairs with the deuteron quantum number (Subedi et al., Korover et al., Duer et al., etc.), is missing.
2. Relativity: The current manuscript does not discuss relativistic effects even though one could expect them to be significant in the measured momenta range. Questions that immediately come to mind include to what extend the new data supports a non-relativistic description of the deuteron wave function relevant for the high momenta measured here? If they do, why? What can one learn about how to properly account for relativistic corrections and relativity in general for nuclear systems? Do the new data constrain our limited ability to describe the relativistic aspects of nuclear structure at short distance / high momenta?
   For example, Schmidt et al. [Nature 578 (2020) 540] recently utilized the light-cone formalism of Frankfurt & Strikman to gain quantitative insight into these issues. The formalism they follow seem to be quite simple, perhaps too simplistic, but still provide valuable insight. Can the authors of the present work study the impact of relativistic corrections to the PWIA cross-section in a similar manner?
3. Nucleon-Nucleon interaction: Here the authors make the connection clear. However no modern EFT calculations are compared with the new data. It is true that these are limited by strong regulators are high-momenta, however there are several interactions such as the Norfolk potentials [M. Piarulli] that do suffer letter from such effects. In addition, even with high-momentum regulators, it is interesting to observe out to what momenta can these interactions be coupled with a high-resolution one-body interaction model and still explain experimental data. Recent analysis of nuclear form-factor data suggest this can be quite high.

In addition, there is no reference to relevant previous works that study nuclei heavier than deuterium. These include A=3 [124 (2020) 212501; PRL 94 (2005) 082305; 94 (2005) 192302] and 12 [Nature 578 (2020) 540] that study the NN force to short distance structure of SRC deuteron like pairs.

More general comment: Not enough information is given on the measurements. The data was taken using a new detection system (SHMS at Hall C in 12 GeV setting) and the reader is referred only to unpublished thesis (with no Web link) for details. In addition, the analysis itself is not transparent enough to the reader. More information should be provided in the form of supplementary materials or similar. See details below.

(the following are comments in chronological order some are more and some less important)

The scale of Fig. 2 is misleading as it is very hard to assess the quality of the agreement between the data and theory in the 0 – 700 MeV/c region. Please add an insert with a blowup on that region.

I noticed (and appreciate) the availability of the crosse-section data in txt format and the same should be done for the relevant calculations so that the interested reader can examine the results in more detail.

Page 1 introduction: Should place more emphasis on the importance to the broader physics community, as suggested above. Elucidating the short-distance structure of nuclei and nuclear force via deuteron measurements is a fascinating problem of a broad interest. However, the present work does not, in my opinion, meet this criterion.

Page 2 introduction "determining whether or to what extent the description of nuclei in terms of nucleon/meson degrees of freedom is still valid before having to include explicit quark degrees of freedom". Do the authors really think that (e,e'p) measurement can address the question of nucleon/meson and partonic degrees of freedom? At the end of the day the data are compared with calculations that have large freedom in their description of the off-shell electron-nucleon cross-section and even more so in the modeling of the short-distance part of the NN interaction. Therefore, even if partonic physics becomes important at high-momenta, it can probably be masked by effective nucleon-based interaction that will fit the data. In any case, it is ok if the authors want to make such connections, however, it will probably be better to do so as part of a broader discussion of the relation between SRC studies and the partonic structure of nuclei, e.g. by referencing the EMC effect and the EMC-SRC connections published in the last years.

The distributions of the fundamental measured quantities such as Q^2, x_B , ω, P_p should be shown. The measurements were done in 3 momentum bins. The overlap and the matching between the bins should be shown. This can be a part of a supplementary materials document that allow the referees and the reader to assess the quality of the data.

How the was the contribution of the target walls removed / subtracted?

“hits in three of the four scintillator planes.” At least three?

What about systematic uncertainties due to software cuts, acceptance corrections etc.?

What is the size of the radiation correction? Please detail on its calculation procedure.

“a weighted average of the cross sections were taken in the overlapping regions of pr”. Show consistency.

Figure 1: The data presented in the figure (with a logarithmic scale) is not accessible enough to the reader. Tables as supplementary material can help the reader.

“cach” should be “each”.

Fig. 2 and relevant discussion on Page 5: what about EFT calculations below and above their cutoffs?

Pages 5-6 include extensive phenomenological verbal description of Fig 2. However, what it misses a discussion of the possible meaning of what is actually observed? For example: “the MS CD-Bonn model was able to partially describe the data over a larger range…” – what does it mean? “all models were unable to describe the data” above some momentum-what that means?