Nuclear Lunch Questions

Evidence for intrinsic charm quarks in the proton

21 September 2022

1 Questions

1. When the paper says 'infinite number of quark-anti-quark pairs', is this a virtual particle situation, or are they real? Are these sea quarks? **(Nisha)**

2. Are the intrinsic charm determined here a virtual particle situation, and does this provide an explanation why the proton contain a quark whose mass is larger than the proton mass, or whether this implies that mass of the proton may vary in some situations? **(Alexandra)**

3. Does it appear from internet searches whether this collaboration or any other also look for intrinsic strangeness? **(Chriag)**

4. In what sense are the data from EMC and LHC be combined for use in this paper What species (or several species) of nuclei were used for the EMC and the LHC datasets, and why? **(Bikash)**

5. For quarks and gluons, what is a radiative correction? **(Bradley McClung)**

6. If the parton momentum fraction, x, of the cc-bar quark is about 0.4, why does such a high value of x only correspond to 0.6% of the total momentum of the proton? **(Justin Bryan)**

7. If smaller x is used to probe deeper structure of the proton (which is what the EIC is claiming they will be doing) why is x=0.4 used to show evidence of the cc-bar pair? Wouldn't one need smaller values of x find heavier quarks? What is the famous "EMC Effect" ? **(Sijan)**

8. Given that they appear so large, what makes the uncertainty bands, such as in Fig. 2, acceptable? Does the top left-most plot in Fig. 2 suggest that the model only works well for high rapidity? **(Justin Warren)**

9. Why is 5 sigma required for "discovery"? (just find a few reliable looking opinions on the internet) **(Andrius)**