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Studies for Electro- and Photoproduction

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The emergence of nucleon properties from quark and gluon dynamics is a topic that still has many open questions and offers a vast ground for exploration. The discovery of many unexpected new resonance candidates such as the XYZ states and pentaquarks has been challenging the quark model. While high-energy collisions of hadrons and nuclei are a good tool for investigating these topics, they are prone to kinematical effects from hadron decays into the final states. In turn, lepton colliders have been limited by statistics so far: a high-luminosity Electron Ion Collider (EIC) at high energies is called for. In view of the upcoming EIC and JLab experiments, we present sensitivity and feasibility studies for exclusive XYZ photoproduction. We also study polarization observables in pentaquark photoproduction as a means of improving detection sensitivity and tackling the quantum numbers and couplings of these states. Furthermore, the EIC has been mainly designed and will be an excellent tool for electro-production experiments. Therefore, we analyse electron-scattering data to get insight into the inclusive proton structure functions in the resonance region. We use the information from exclusive production channels to systematically isolate resonant from non-resonant contributions, and study the respective Q^2 evolutions. Ultimately, this gives insight into the proton PDFs at large x and might further our understanding of quark-hadron duality.