



Contribution ID: 74

Type: **Invited talk**

Exploring the Glue that Binds Us All: Science of the Electron Ion Collider in the US

Monday, 21 September 2015 09:30 (30 minutes)

Deep Inelastic Scattering is arguably the best experimental technique employed by physicists to study the fundamental structure of nucleons and nuclei. Much of what we know about the quark gluon structure of the nucleons and nuclei comes from experiment performed in polarized and unpolarized fixed-target experiments around the world, and those performed at DESY using the HERA collider. However many important questions related to the gluon's role in QCD still remain unanswered. Many of these relate to collective behavior of partons (mostly gluons) in (polarized) nucleons and in nuclei at high energy. Without understanding those, we simply can not say we understand QCD, the theory of strong interactions in the Standard Model, completely. The missing experimental data that will guide our understanding of QCD and address those questions, will require high-energy polarized electron-nucleon, and electron-nuclear collisions with a wide range in the size of the nuclei. High-energy and polarization are critical for addressing this in a future collider. The Electron Ion Collider (EIC) being considered in the US is planned with precisely this in mind. Further, the systematic study of the nucleon and its spin properties, including the position and momentum correlations amongst the partons inside the nucleons (resulting in possible tomographic images of the nucleons) will require a sufficiently high luminosity. I will summarize the gluon related open questions in QCD and present the capabilities of the EIC in addressing them. I will also present the present status of the EIC project, and invite you to support it and get involved.

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Session Classification: 1.