The Emerging QCD Frontier: The Electron Ion Collider

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The self-interactions of gluons determine all the unique features of QCD and lead to a dominant abundance of gluons inside matter already at moderate x. Despite their dominant role, the properties of gluons in matter remain largely unexplored. We have been able to address certain aspects at RHIC, CEBAF and HERA and have found tantalizing hints of saturated gluon densities in measurements of e+p collisions at HERA, and of d+Au and Au+Au collisions at RHIC. Saturation physics will certainly have a profound influence on heavy-ion collisions at the LHC. But getting to the heart of the matter unveiling the collective behavior of dense assemblies of gluons under conditions where their self-interactions dominate will require an Electron-Ion Collider (EIC): a new facility with capabilities well beyond those of any existing accelerator. Such a collider could be sited either at BNL or JLAB. Precision measurements at the EIC, directly interpretable within the framework of QCD, will open a new window into the non-linear regime of universal strong color fields; extracting the properties of this regime can radically transform our understanding of key features of the strong interactions. With its wide range in energy, nuclear beams, high luminosity and clean collider environment, the EIC offers an unprecedented opportunity for discovery and for precision studies. In this talk I will outline the compelling physics case for e+A collisions at an EIC and discuss briefly the status of machine design and detector concepts.