

Using muons from backscattered photons on targets for various studies at the EIC

Contribution ID: 3

Type: **not specified**

A Future Muon-Ion Collider at Brookhaven National Laboratory: Muon Accelerator Systems

Wednesday, 5 April 2023 13:40 (30 minutes)

There has been significant discussion in the community regarding a future $\mu^+\mu^-$ collider. While such a facility is still decades away from realization, it is also understood that significant technological development and feasibility demonstrations are necessary at lower beam energies. Here we propose such a possibility coupled with a rich physics program. We propose a future Muon-Ion Collider that would serve as a natural extension to the EIC program currently planned in the 2030's and 40's. We envision this collider would be implemented as an upgrade to the EIC, with μ beam energies between 18 GeV and 200 GeV and a luminosity of $10^{33} \text{ cm}^{-2}\text{s}^{-1}$. In this presentation we discuss the challenges of generating μ beams that satisfy the design requirements of such a collider, and review some current efforts in the field to design such beams. We discuss the physics reach of a future muon-ion collider and identify opportunities for synergy between the nuclear and particle physics communities.

Funding acknowledgment: This material is based upon work supported by the National Science Foundation under Grant No. PHY 2012114, and the Center for Frontiers in Nuclear Science at Stony Brook University.

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Session Classification: Afternoon Session