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The beam-size effect at the EIC and LHeC

The beam-size effect was discovered at the VEPP-2 collider and later observed at HERA but remained ever since an elusive and poorly studied phenomenon, despite its impact on the electron and positron beam lifetimes at LEP and KEKB, for example. At the Electron-Ion Collider (EIC), due to very small vertical beam sizes, this effect will be even stronger than at HERA and we propose to test its understanding by use of the van der Meer beam scans [1]. Such an understanding of the electron-hadron bremsstrahlung is essential for a precise determination of the EIC luminosity, and in that context, we have also studied the impact of the beam-size effect on the bremsstrahlung yields at the future Large Hadron electron Collider (LHeC) [2].

[1] K. Piotrkowski, M. Przybycien, When invariable cross sections change: The Electron-Ion Collider case, Phys. Rev. D 103, L051901 (2021), <https://journals.aps.org/prd/abstract/10.1103/PhysRevD.103.L051901>

[2] K. Piotrkowski, M. Przybycien, a publication in preparation

Collaboration / Activity

EIC/ATLAS/STAR/ZEUS

Email

krzysztof.piotrkowski@cern.ch

First author

Krzysztof Piotrkowski

Primary author: PIOTRKOWSKI, Krzysztof (UCLouvain)

Presenter: PIOTRKOWSKI, Krzysztof (UCLouvain)

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