Contribution ID: **331** Contribution code: **FRAD01** Type: **Contributed Oral Presentation**

Xsuite Contributions to Modeling of Collective Effects in Present and Future Colliders: Synergies Between FCC and EIC

Friday 15 August 2025 09:30 (20 minutes)

The design, optimization and possibly operation of future particle colliders such as the Future Circular Collider (FCC) and the Electron-Ion Collider (EIC) require advanced, flexible, and collaborative modeling frameworks to address complex collective effects in beam dynamics. Central to this effort for the FCC is Xsuite—a Python-based modular toolkit combining symplectic particle tracking with detailed models of synchrotron radiation, impedances, space charge, electron cloud, beam-beam interactions, and feedback systems. Xsuite's contributions to FCC studies have been substantial, and its potential extension to EIC opens new avenues for collaborative research. This platform fosters international cooperation by enabling researchers across continents to share models, simulation results, and expertise seamlessly. Such synergy facilitates high-fidelity exploration of beam dynamics phenomena critical to machine performance, including beam collective effects and luminosity degradation, with computational efficiency on both CPU and GPU architectures. By harmonizing modeling efforts for FCC and EIC, the platform can contribute to a coherent understanding of beam dynamics across different collider designs. We discuss ongoing and potential progress in adapting and extending Xsuite for joint FCC and EIC studies, emphasizing the advantages of collaborative workflows and the transformative impact these tools can have on the design and operation of next-generation colliders.

Please consider my poster for contributed oral presentation

No

Would you like to submit this poster in student poster session on Sunday (August 10th)

No

Footnotes

Can fit also in MC1

Funding Agency

I have read and accept the Privacy Policy Statement

Yes

Author: PIELONI, Tatiana (École Polytechnique Fédérale de Lausanne)

Presenter: PIELONI, Tatiana (École Polytechnique Fédérale de Lausanne)

Session Classification: Colliders and other Particle and Nuclear Physics Accelerators (contributed)

Track Classification: MC1 - Colliders and other Particle and Nuclear Physics Accelerators