Contribution ID: **25** Contribution code: **WEB3** Type: **Invited Oral Presentation**

Proposed Ultralow-Emittance Beam Source for High-Luminosity Hadron Colliders

Wednesday 29 October 2025 11:45 (30 minutes)

Laser Doppler cooling of ion bunches in a Paul trap is a demonstrated method of achieving millikelvin bunch temperatures, with the ions forming a Coulomb crystal with a solid-like structure. This is proposed as a source for accelerators that would be a factor 10^5 lower in emittance than conventional plasma sources. Methods to transport the crystalline bunch while limiting emittance growth are examined, including a novel ring in which the bunch maintains a fixed orientation relative to the outside world (i.e. does not rotate with the ring as usual). In this geometry, magnetic focussing can confine all three dimensions of the bunch without RF. This ring can circulate a 3D crystalline bunch with heating rates of less than 1K/s.

Footnotes

Funding Agency

I have read and accept the Privacy Policy Statement

Yes

Author: BROOKS, Stephen (Brookhaven National Laboratory)

Presenter: BROOKS, Stephen (Brookhaven National Laboratory)

Session Classification: Advanced Cooling Applications

Track Classification: COOL'25