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Recent Work

Title

Using heavy ion beams to drive inertial fusion

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Session L5 - Emerging Beam-Plasma Research Opportunities.

INVITED session, Sunday afternoon, May 02

Governor's Square 14, Adam's Mark Hotel

[L5.005] [Using Heavy Ion Beams to Drive Inertial Fusion](#)

Christine Celata (Lawrence Berkeley National Laboratory)

Heavy ion accelerators hold the promise of being an electrically-efficient, reliable way to deliver energy to an inertial fusion target. The heavy ions would be used to implode the target, causing nuclear fusion, the energy from which would be used to produce commercial electricity. The power requirements of the target (~ 500 TW at a few GeV) mean that many (~ 100) intense ion beams must be accelerated simultaneously. Unlike accelerator beams in the classic high energy or nuclear physics accelerators or light sources, dynamics of the intense beams are not single particle, but rather are space-charge-dominated and described by nonneutral plasma physics. In the present heavy-ion-fusion accelerator designs, the beam space charge is so large that each beam must be essentially completely neutralized after the accelerator in order to focus it onto a few-millimeters target spot. An overview of present experimental and theoretical investigations of the nonneutral beam plasma physics of beams in the accelerator, and results of both theory and experiment on desired and undesired neutralization of the beams will be reported.

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