

# The Beams and Applications Seminar Series

## A Multi-Mission 8 GeV Superconducting Injector Linac at Fermilab

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**Bldg. 401, room B2100**

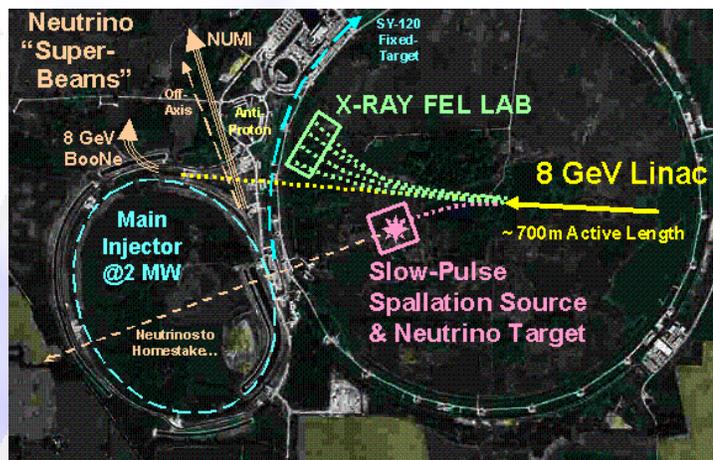
**Friday, Feb. 13, 1:30 pm**

Host: K.-J. Kim, ASD

Fermilab's long-range planning exercise has identified an 8 GeV superconducting injector linac as the leading candidate for Fermilab's next accelerator project:

[http://www.fnal.gov/directorate/Longrange/F\\_LPRC\\_Wrkplans/protondriver\\_files/LRP-PD-Recommendations.pdf](http://www.fnal.gov/directorate/Longrange/F_LPRC_Wrkplans/protondriver_files/LRP-PD-Recommendations.pdf)

The primary mission will be to serve as a single-stage H- injector that replaces both the Fermilab Booster and Linac, enabling 2 MW "Super Beams" for neutrino experiments, antiproton production, and other fixed-target experiments at Fermilab's Main Injector.



With suitable technical modifications, the final 7 GeV of the linac can also accelerate electrons and positrons, protons, relativistic muons, or serve as an antiproton decelerator. The 10 Hz rep rate and 2 MW "Stand-alone" power at 8 GeV means that in addition to providing Super Beams in the Main Injector, it could simultaneously drive an X-ray Free-Electron Laser (XFEL) laboratory, provide beams for a high-intensity 8 GeV neutrino or kaon program, drive the world's most powerful long-pulse spallation neutron source, or provide the world's most intense source of antiprotons.

A number of interesting technical issues arise in the RF design of the 8 GeV Linac, which attempts to capture the economic advantages of the TESLA RF fan-out from one large Klystron to many cavities, while maintaining the precise resonance control needed for a low-energy proton/H- linac.

The 8 GeV Linac project also serves as a bridge to future programs in HEP. It serves as a 1.5% system test for a superconducting Linear Collider, providing an essential demonstration of the reliability and economics of such a machine. Muon/neutrino initiatives could benefit from both the intense proton source, as well as the possibility that the superconducting linac could be re-used in multiple passes to accelerate muons for a neutrino factory or muon collider. Finally, the small emittances in the Main Injector and Tevatron produced by the injector linac significantly improve the parameters available for using the Fermilab accelerators as an injector to the VLHC.

The 8 GeV superconducting linac thus provides both a number of diverse near-term physics opportunities, and a flexible base on which to build the future HEP program.

**For more information visit**

<http://www.aps.anl.gov/asd/physics/seminar.html>

Visitors from off-site please contact Yuelin Li

(ylli@aps.anl.gov, 630-252-7863) to arrange for a gate pass.

This ANL seminar series is a CARA activity and focuses on the physics, technology and applications of particle and photon beams. It is sponsored jointly by the ASD Division, the AWA group of the HEP Division, and the ATLAS group of the PHY Division.