

ACCELERATOR SEMINAR

“Optimal Charging of Accelerating Superconducting Cavities for Reflected Energy Minimization”

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The two big accelerator complexes being built on the outskirts of the city of Lund, to the south of Sweden, are MAX IV, a synchrotron facility, and The European Spallation Source (ESS), to be the brightest Neutron source on the planet. It is going to be a unique location with both X-Ray and Neutron sources at close proximity. The Facility for Research Instrumentation and Accelerator Development (FREIA), at Uppsala University in Sweden has both a cryogenic facility and an RF facility, capable of testing the ESS Accelerator prototype components at an operational 352 MHz, and a peak power of 350 kW, which will serve to certify them for fabrication. In my seminar I will introduce the FREIA Laboratory, talk about its capabilities and the activities going on there, and then concentrate on my contribution to such efforts.

The radio frequency cavities, used to accelerate charged particle beams, need to be charged to their nominal voltage after which the beam can be injected into them. The standard procedure for such cavity filling is to use a step charging profile. However, during initial stages of such a filling process a substantial amount of the total energy is wasted in reflection for superconducting cavities because of their extremely narrow bandwidth. In my talk I will present a novel strategy to charge cavities, which reduces total energy reflection. Practical aspects (saturation, efficiency and gain characteristics) of power sources (tetrodes, IOTs and solid state power amplifiers) are also considered and analysed. The motivation of the talk is to present a methodology to successfully identify the optimal charging scheme for different power sources to minimize total energy requirement.

**Friday, June 12, 2015
11:00 a.m.
CEBAF Center, Room L102**

Coffee before seminar beginning at 10:45 a.m.