

GFA & SwissFEL Accelerator Seminar

An FEL driver for LCLSII: The SLAC superconducting linac based on TESLA technology

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In 2014 a partnership between SLAC, Fermilab, Jefferson Lab, and Cornell University was formed to build a 700 meter long, 4 GeV CW superconducting RF linac to drive the LCLSII FEL. Following a short R&D program intended to adapt the TESLA SRF technology for CW mid-gradient (16MV/m) performance, project-start permission was granted and construction began in 2015.

LCLSII SRF cavities use a newly-developed N2 doping process that substantially improves cryogenic heat-load performance and allows high CW-gradient operation with nominal cryogenic load. The basic 9-cell elliptical cavity shape and fabrication technology were retained in order to take advantage of industrialization established by the European XFEL and the ILC R&D effort. The cryomodule design also follows the XFEL design, but was modified as necessary to handle higher heat-load and increased attention to ambient magnetic field.

The first 1/3 of the 50 year-old copper linac was removed in late 2016 to make space for the SRF cryomodules and solid-state RF sources. Construction of the first four cryomodules (out of 37 total) is completed and test results support design choices and performance targets. Cryomodule installation will begin in late 2017 and should take about a year. Preparation for cool-down begins in 2019 with first-light expected at the end of the year.

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