

# COLLOQUIUM

## State-of-the-Art Superconducting RF Technology for Accelerators

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4:00 p.m. - Wilson Hall, One West

One of the most widely applied methods for accelerating charged particle beams in accelerators is via large electric fields generated using superconducting radiofrequency (SRF) cavities. These high-Q0 electromagnetic resonators provide high duty factor operation and tens-of-MV/m accelerating gradients in applications that range from colliders to X-ray and neutron sources.

In operation, an SRF cavity must maintain high efficiency in the superconducting state under the influence of large amplitude RF fields. To make this possible, cavities are prepared with techniques that include chemical treatment and vacuum assembly in semiconductor-grade cleanrooms. They are cooled with superfluid helium to ~2 K in magnetically shielded cryomodules and excited with high power antennas. Recent advances in SRF R&D at Fermilab have yielded new cavity processing techniques that substantially increase cavity efficiency, which are being implemented in production of cryomodules for the LCLS-II accelerator.

In this colloquium, we will give a general introduction to SRF cavities, including the state-of-the-art processing and assembly procedures developed to prepare these cavities for high field operation. We will overview recent R&D advances and present several novel topics currently under investigation to increase the reach of accelerators and improve understanding of the physics of RF superconductivity.