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Technical Division's Recent and Ongoing Efforts

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Technical Division is pursuing a highly innovative R\&D program in superconducting (SC) magnets and superconducting radio-frequency (SRF) cavities for accelerators.

The SRF R\&D is focused on the improvement of the quality factor and accelerating field of superconducting accelerating cavities. With the nitrogen doping process discovered at FNAL, SRF cavities are capable of achieving ultra-high Q values. The ongoing research is focused on understanding the root of improved performance and on the preservation of such high Q-factors during operation in accelerators. The nitrogen doping technology has been transferred to the cavity manufacturers and will be applied for the construction of the new SC linear accelerator LCLS-II at SLAC. Fermilab Technical Division is working on the design, assembly and testing of 20 cryomodules for LCLS-II.

Fermilab TD is also developing cryomodules, superconducting cavities and magnets needed for the PIP-II SC linear accelerator, which is Fermilab's plan for providing powerful, high-intensity proton beams to the laboratory's experiments. The SC accelerator magnet R\&D program goal is to provide magnets capable of extending the energy and luminosity frontiers. The backbone of the current R\&D activities are the development of Nb3Sn superconductor technology and testing of different types of magnet that are being fabricated with it. High temperature superconductor materials for accelerator magnet applications are also being investigated. The R\&D program is presently exploring limits of the Nb3Sn magnet technology by developing a 15T Nb3Sn dipole demonstrator. The ultimate goal is the development of magnet technologies based on both high and low temperature superconductors to achieve fields of 20T and beyond. This research is being conducted as part of HFM and LARP and supported by the Superconducting Strand and Cable R\&D Lab.

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