

## Fermi National Accelerator Laboratory LDRD Project Data Sheet - FY15

**Project ID:** FNAL-LDRD-2015-029

**Project title:** Nb3Sn superconducting RF cavities to reach gradients up to 90MV/m and enable 4.2K operation of accelerators

**Principal investigator:** Sam Posen/Alexander Romanenko

**Project description:** (short description and explanation of cutting edge, high-risk, high-potential science or engineering)

This proposal seeks to advance Nb3Sn superconducting RF (SRF) cavities towards performance measurements of gradients up to 90MV/m and 4.2K operation. The work will be to identify and correct a cavity surface defect in otherwise very promising recent research at Cornell University and to develop an optimized production-ready Nb3Sn layer forming technique.

**Tie to Mission:** (explain the project's relevance or anticipated benefits to Fermilab's and DOE's missions)

Future accelerators based upon SRF cavities hold tremendous promise but cost considerations are tied to the achievable gradient and other operational parameters. If successful, the research would represent another breakthrough in SRF making such future accelerators much less expensive for a given desired energy.

**Previous year's accomplishments:** (as applicable)

A coating chamber / furnace design has been completed. Under the LDRD project, the furnace and specialized door have been procured. Most of the materials required for coating Nb3Sn have been acquired under the LDRD. Actual coating of cavities and subsequent testing will be pursued under a LDRD award.

**Work proposed for current fiscal year and anticipated / desired results:**

Continuing work on this project will now be performed under an Early Career Award from DOE to Sam Posen. July 15 2016 was a transition date used for the end of any new LDRD costs and for the start of the ECA award. There were about \$243K of costs obligated before the July 15 date that are in the process of being costed under the LDRD. Work on the project, as far as LDRD is concerned is complete, except for receiving and costing the materials.

**Project funding profile:** (costs, budgets, projected budgets, and total)

Prior year(s) costs	FY15	FY16	FY17	Total
N/A	124828	695079	243011	1,062,918

Project Start Data: 2/1/2015

Total Approved Project funds: \$ 1,297,987