

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof. Reference herein to any social initiative (including but not limited to Diversity, Equity, and Inclusion (DEI); Community Benefits Plans (CBP); Justice 40; etc.) is made by the Author independent of any current requirement by the United States Government and does not constitute or imply endorsement, recommendation, or support by the United States Government or any agency thereof.



Managed by Fermi Research Alliance, LLC for the U.S. Department of Energy Office of Science

**Long Baseline Neutrino Facility (LBNF) Corrector Magnets
Cooperative Research and Development Agreement
Final Report**

CRADA Number: FRA-2016-0046

Fermilab Technical Contact: Vaia Papadimitriou

Report Date:
May 21, 2025

NOTICE

This report was prepared as an account of work sponsored by an agency of the United States government. Neither the United States government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States government or any agency thereof.

Available electronically at <http://www.osti.gov/>

Available for a processing fee to U.S. Department of Energy and its contractors, in paper, from:

U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831-0062
phone: 865.576.8401
fax: 865.576.5728
email: <mailto:reports@osti.gov>

Available for sale to the public, in paper, from:

U.S. Department of Commerce
National Technical Information Service
5301 Shawnee Rd
Alexandria, VA 22312
phone: 800.553.6847 or 703-605-6000
fax: 703.605.6900
email: orders@ntis.gov
online ordering: <http://www.ntis.gov/>

In accordance with Requirements set forth in Article XI of the CRADA document, this document is the final CRADA report, including a list of Subject Inventions, to be forwarded to the Office of Science and Technical Information as part of the commitment to the public to demonstrate results of federally funded research.

CRADA number: FRA-2016-0046

CRADA Title: Long Baseline Neutrino Facility (LBNF) Corrector Magnets

Parties to the Agreement: INSTITUTE FOR HIGH ENERGY PHYSICS, CHINESE ACADEMY OF SCIENCES

Sponsoring DOE Program Office(s): Office of Science

DOE Funding Commitment Table (report all DOE funding contributions by year):

Funding Type	Year 1		Year 2		Year 3		Totals
	Funds-in	* In-kind	Funds-in	* In-kind	Funds-in	* In-kind	
Participant 1	0	\$440K	0	\$435K	0	\$335K	\$1210K
Participant 2							
Dept. of Energy	10K		15K		15K		\$40K
Totals							\$1250K

Abstract of CRADA work:

The Long Baseline Neutrino Facility (LBNF) includes at the Fermi National Accelerator Laboratory (Fermilab) site a Beamline which will aim neutrinos towards massive detectors at the Sanford Underground Research Facility (SURF) at South Dakota. The neutrinos will be created by a beam of 60-120 GeV protons extracted from Fermilab's Main Injector interacting with a target located in the end of the LBNF proton beamline. The design of the proton beamline involves 79 conventional magnets; 23 are corrector magnets. These correctors are of a new design which evolved from those built for the Fermilab Main Injector.

Following the production of a prototype corrector magnet by the Institute of High Energy Physics (IHEP) and its testing by both IHEP and Fermilab, IHEP will procure the materials for the 24 (including one spare) corrector magnets needed by the LBNF proton beamline; then, will build, test and certify them.

Summary of Research Results:

There were 26 magnets completed and delivered by October 2020. Fermilab tested 8 successfully. No further work was performed on this agreement. The agreement remained inactive and terminated on 10/03/2024 in conjunction with the contract transition at Fermilab.

Related Reports, Publications, and Presentations:

There are no public reports, presentations or publications from this Agreement.

Subject Inventions listing:

None

Report Date: May 21, 2025

Technical Contact at Fermilab: Vaia Papadimitriou, vaia@fnal.gov

Partner POC Name and Email Address: Fusan Chen, chenfs@ihep.ac.cn

This document contains NO confidential, protectable or proprietary information.