

Fermi National Accelerator Laboratory LDRD Project Data Sheet - FY16

Project ID: FNAL-LDRD-2016-034

Project title: R&D and Experimental Instrumentation for the Initial Set of Critical Scientific Experiments in IOTA and the FAST Injector

Principal investigator: Swapan Chattopadhyay

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

An experiment with a proton/ion beam will be to understand how such a beam behaves in the Integrable Optics Test Accelerator (IOTA) ring given that it is space-charge dominated. For this experiment to be done, the injection line will be instrumented with diagnostics such as beam position monitors and beam loss monitors that are special purpose to IOTA. A second experiment involves a pencil-like electron beam that tightly controlled in order to understand the optical properties of the IOTA ring. This experiment will require some special-purpose optical elements and very fast photo detectors. The LDRD project is to procure the above special-purpose equipment to enable the first set of experiments to be conducted.

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

The IOTA and FAST accelerators have been chosen as test accelerators to help pave the way to develop much more intense beams than have been done before. Such beams are required for future experimentation in high energy physics including neutrino physics. As such, this LDRD project is tied to the mission and strategic future of Fermilab.

Previous year's accomplishments: (as applicable) FY16, the project has just started late in the fiscal year FY16.

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

The two initial experiments have been identified and progress will be made incrementally each fiscal year to procure, install, and commission the special-purpose elements as the IOTA and FAST facilities become available. The results of these experiments will be described and submitted to peer-reviewed journals.

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

Prior year(s) costs	FY17	FY18	FY19	Total
N/A	125,000	125,000	125,000	375,000

Project Start Date: 10/01/2016 Total Approved Project funds: \$ 375,000