

# Fermi National Accelerator Laboratory

## LDRD Project Data Sheet - FY15

**Project ID:** FNAL-LDRD-2015-010

**Project title:** Dark Energy Survey and Gravitational Waves

**Principal investigator:** Marcelle Soares-Santos

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

The project is to perform a feasibility study of using the Dark Energy Survey (DES) to make an optical identification of a source of gravitational waves triggered by upcoming gravitational wave (GW) detectors that are planned to start taking data by the end of 2015. GW detectors are able to locate only with moderate precision the location of a source of gravitational waves. A dedicated search by DES which has a wide field of view and sensitivity in the near infrared optical bands may result in a pinpoint precision of the source of the gravitational waves allowing for much improved measurements of the source that would otherwise be lacking.

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

Gravitational waves from coalescing neutron star binaries or black hole-neutron star pairs are potential new probes for dark energy and the physics of spacetime – areas of study directly related to the mission of Fermilab. This project will leverage existing DOE investment in the Dark Energy Survey Camera (DECam) and, if successful, be a demonstration of a new kind of probe relevant for high energy particle astrophysics

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

A project was successfully completed. In response to gravitational wave triggers, large search areas were scanned using DECam to look for optical counterparts. A software reconstruction pipeline was written to utilize objects detected through difference imaging. The data was analyzed and several scientific publications were written. The project is in terrific shape for continuation in FY17 with funds initially from a University of Chicago grant and an award of multiple nights on the 4m Blanco telescope to search for potential new candidates when the next LIGO run is performed.

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

This LDRD project is complete. A Final Report will be included in Fermilab FY16 LDRD Annual Report.

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

Prior year(s) costs	FY15	FY16	Total
	51111.60	155643.85	206,756

Project Start Date: 2/1/2015 (est) Total Approved Project funds: \$ 280,103