

**Fermi National Accelerator Laboratory  
LDRD Project Data Sheet - FY14**

**Project ID:** FNAL-LDRD-2014-016  
**Project title:** HF GaN Driver  
**Principal investigator:** Greg Saewert

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

The project is to develop a new type of electronic switch, for use by accelerator components, using newly available Gallium nitride (GaN) transistors capable of very fast switching transition times (<2ns), operating at relative high (~500V) voltages under moderate loads, and having repetition rates in the range of tens of megahertz. Previous technologies are able to meet individually some of the requirements ... what is new is R&D towards a switch that is able to have all the desired characteristics simultaneously.

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

Very fast, high repetition high voltage switches have use in accelerator components used in high energy physics. The development of this particular new device would have benefits towards powering kicker magnets that would be capable of kicking beam on a bunch-by-bunch basis as desired in a high intensity accelerator facility. Such switches would have other potential uses in driving electrodes, Pockel Cells, or driving Q switches in lasers.

**Previous year's accomplishments:** (as applicable) FY14, not applicable

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

The proposed work first requires the development of a circuit to drive a GaN transistor on the nanosecond time scale at megahertz frequencies. The design effort requires trying a number of different drive transistors and measuring the performance limits using custom printed circuit boards utilizing high speed layout techniques. At the end of FY14, measured performance of at least one circuit board should be obtained.

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

<b>Prior year(s) costs</b>	<b>FY14</b>	<b>FY15</b>	<b>FY16</b>	<b>Total</b>
N/A	76577	279885	-	356430