Contribution ID: **1608** Contribution code: **WEPB046** Type: **Poster Presentation**

Voltage regulator upgrade for 12-pulse thyristor power supplies

Wednesday 4 June 2025 16:00 (2 hours)

This presentation outlines the work performed for the Accelerator Controls Operations Research Network (ACORN) project, ongoing at Fermi National Accelerator Laboratory (FNAL). The project requires an upgrade to the voltage regulator for thyristor-based power supplies. The current voltage regulator, designed and built by FNAL in the early 1980s, relies on electronic components that are no longer available , requiring an updated design for new thyristor power supply installations. This design effort will be a collaboration with Oak Ridge National Laboratory (ORNL), which will manage and conduct the design work. A significant research effort was made to understand the analog circuits used in the Fermilab regulator. Schematics were analyzed, simulations created, and bench-top testing conducted to verify the functionality of each card in the regulator chassis. The ORNL team intends to implement the analog circuits' functionality digitally using a Field Programmable Gate Array (FPGA), anticipating enhancements in both functionality and long-term maintenance capabilities. This presentation will cover the Fermilab voltage regulator's functionality and the design efforts conducted by ORNL.

Footnotes

Paper preparation format

Word

Region represented

America

Funding Agency

Oak Ridge National Laboratory, Fermi National Accelerator Laboratory

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Session Classification: Wednesday Poster Session

Track Classification: MC7: Accelerator Technology and Sustainability: MC7.T11 Power Supplies