



Contribution ID: 579 Contribution code: THPD032

Type: **Poster Presentation**

Design and performance of the SNS credited beam power limit system

Thursday 25 September 2025 16:15 (1h 30m)

The US Spallation Neutron Source (SNS) is the world's most powerful pulsed spallation neutron source. The recently completed Proton Power Upgrade (PPU) project doubles the available average beam power from 1.4 to 2.8 MW. However, 0.8 MW of that is intended for a future second target station (STS), which is in the preliminary design phase. The mercury based first target station (FTS) has a safety design basis limit of 2.0 MW, thus a precision credited safety system is needed to ensure the proton beam power cannot exceed this limit. The Beam Power Limit System (BPLS) is a novel FPGA/PLC based safety credited instrument that measures beam energy and charge to calculate beam power and will shut off the proton beam if the power exceeds 2MW + 10% for a specified period of time. This paper will discuss the design challenges and operational performance of the BPLS as a credited system.

Funding Agency

This manuscript has been authored by UT-Battelle, LLC, under contract DE-AC05-00OR22725 with the U.S. Department of Energy (DOE).

Footnotes

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Session Classification: THPD Posters

Track Classification: MC07: Functional Safety and Protection Systems