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Conceptual frequency analysis-based predictive maintenance

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The Spallation Neutron Source (SNS) Radiofrequency (RF) Systems have operated at over 98.5 percent availability for the last several operational periods. The implementation of a more stringent goal for the SNS RF – to exceed 99 percent availability – coupled with the more general desire to increase reliability for accelerator-driven systems has required a more subtle approach to reducing downtime. Close examination of the top downtime sources revealed that power supplies are the second leading contributor to system interruption in both frequency and duration. Power supply maintenance is nearly always reactive and there is not currently a confirmed method at the SNS to predict when they will fail. The SNS RF Systems engineering team has developed a concept, analogous to methods employed in 3-phase induction motor fault detection and mechanical vibration analysis, that uses frequency domain measurements over time to predict supply failure. This paper will describe the concept, present existing reliability data, and outline the implementation plan.

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Primary author: MOSS, John (Oak Ridge National Laboratory)

Co-authors: TOBY, George (Oak Ridge National Laboratory); LEE, Sung-Woo (Oak Ridge National Laboratory)

Presenters: MOSS, John (Oak Ridge National Laboratory); TOBY, George (Oak Ridge National Laboratory); LEE, Sung-Woo (Oak Ridge National Laboratory)

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