

# Dynamics of a Liquid Helium I Cryostat at The Canadian Light Source

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**Abstract** - The Canadian Light Source (CLS) is a third-generation synchrotron located in Saskatoon, Canada. A superconducting radio frequency (SRF) cavity contained in a 4.43 K liquid helium I cryostat is used at the CLS to replenish energy loss in the electron beam. A dynamic simulation of this cryostat has been generated to examine pressure and level fluctuations due to variations in heat loading or other system parameters. This simulator has led to some interesting observations in system behavior, which have been shown to occur in the actual system as well. For example, mass rates of vaporization appear to drop as heat loading increases under certain conditions. Also, the relationship between pressure and SRF tuning characteristics is examined, and the abilities and limitations of the simulator are presented.

**Keywords:** Cryostat, Helium I, Process Control

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