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## Daily performance variations of the LCLS-II superconducting accelerator

*Thursday 5 June 2025 15:30 (2 hours)*

Starting with user delivery it was noticed that the FEL intensity performance varied by up to a factor of two during the day. Three injector RF phases for the laser, the gun, and the buncher were not stabilized with a forward and reversed reference signals like the rest of the RF feeding the Cryo-Modules, making them the prime candidates for daily phase drifts. Combining the signals in hardware, firmware and software and temperature stabilizing critical RF cables improved the situation. Additionally, how downstream beam parameters like energy, bunch length, and orbits respond to phase changes of laser, gun, and buncher were quantified, so that the observed daily changes could be attributed to the most likely combination of still uncorrected phase drifts. A feed-forward system similar to the RF of the copper linac using the local temperature was developed to compensate for the remaining changes. Longitudinal feedbacks should see minimal amounts for intervention.

### Footnotes

### Paper preparation format

Word

### Region represented

America

### Funding Agency

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