

Low Level RF Workshop 2022



9-13 Oct 2022, Brugg-Windisch, Switzerland



Contribution ID: 29

Type: **Poster**

Performance and Design of a Precision RF Signal Chassis at Los Alamos Neutron Science Center

Wednesday, October 12, 2022 2:44 PM (1 minute)

Accelerator low-level RF (LLRF) systems have demanding requirements on signal distribution circuitry. The RF feedback control paths from the cavity are not corrected for error and demand a high level of attention to performance. This chassis allows the frequency dependent (805 MHz or 201.25 MHz) circuits to be separated from the modular frequency independent digital low level RF system. The same digital system hardware is used throughout the linear accelerator (LINAC) with RF cavity type dependent software. The prototype of this chassis suffered from too much RF crosstalk between the cavity and reference signals. This paper reviews the challenges associated with this chassis, the updates that were made from the prototype to the production version, and the decision for one chassis to contain the frequency dependent circuits. We also review the requirements for temperature stability of the chassis, cavity, and reference signals. Performance testing of the chassis is reviewed including the design process for automating the test procedures which allows for quick and efficient testing of the chassis, resulting in significant time savings throughout the process.

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Session Classification: Poster Session

Track Classification: Low Level RF Workshop 2022