Contribution ID: **871** Contribution code: **THPA090** Type: **Poster Presentation**

A MTCA.4-based resonance controller for superconducting cavities

Thursday, 11 May 2023 16:30 (2 hours)

The growing interest in upgrading European XFEL to high duty cycle operation requires an adaptation of the current low-level RF system to the new machine specifications. In the current upgrade scenario, the principal change in the RF parameters will be the loaded quality factor (QL) of the superconducting cavities, which will increase from the current value of 4.6e6 to more than 5.3e7 to reduce the required RF power. As a result, the accelerating system will be an order of magnitude more sensitive to detuning disturbances, such as Lorentz force detuning or external microphonic vibrations. Therefore an MTCA.4-based chain to precisely measure the cavity RF signals, calculate the detuning error, generate a control signal and drive the piezoelectric tuner was developed both for single cavity and Vector Sum mode of operation. While the detuning measurement chain is implemented in programmable logic, the control algorithms are implemented on embedded processing systems of FPGA-enabled devices like DAMC-FMC25, DAMC-FMC1Z7IO, and DAMC-FMC2ZUP MTCA AMCs. This provides a flexible platform to develop resonance control algorithms. In this proceeding, the implemented architecture is discussed.

Funding Agency

Helmholtz-Gemeinschaft, European XFEL

Footnotes

I have read and accept the Privacy Policy Statement

Yes

Primary author: BELLANDI, Andrea (Deutsches Elektronen-Synchrotron)

Co-authors: BUECHLER, Michael (Deutsches Elektronen-Synchrotron); BUTKOWSKI, Lukasz (Deutsches Elektronen-Synchrotron); DURSUN, Burak (Deutsches Elektronen-Synchrotron); GUMUS, Cagil (Deutsches Elektronen-Synchrotron); BRANLARD, Julien (Deutsches Elektronen-Synchrotron)

Presenter: BELLANDI, Andrea (Deutsches Elektronen-Synchrotron)

Session Classification: Thursday Poster Session

Track Classification: MC6: Beam Instrumentation, Controls, Feedback and Operational Aspects: MC6.T27: Low Level RF