

# Low Level RF Workshop 2022



9-13 Oct 2022, Brugg-Windisch, Switzerland



Contribution ID: 91

Type: Poster

## Narrow Bandwidth Active Noise Control for microphonics rejection in superconducting cavities at LCLS-II

Wednesday, 12 October 2022 15:13 (1 minute)

LCLS-II is an X-Ray Free Electron Laser (XFEL) commissioned in 2022, being the first Continuous Wave (CW) hard XFEL in the world to come into operation. To accelerate the electron beam to an energy of 4 GeV, 280 TESLA type superconducting RF (SRF) cavities are used. A Loaded  $Q$  ( $Q_L$ ) of  $4 \times 10^7$  is used to drive the cavities at a power level of a few kilowatts. For this  $Q_L$ , the RF cavity bandwidth is 32 Hz. Therefore, keeping the cavity resonance frequency within such bandwidth is imperative to avoid a significant increase in the required drive power. In superconducting accelerators, resonance frequency variations are produced by mechanical microphonic vibrations of the cavities. One source of microphonics noise is rotary machinery such as vacuum pumps or HVAC equipment. A possible method to reject these disturbances is to use Narrowband Active Noise Control (NANC) techniques. Such a technique was already tested at DESY/CMTB and Cornell/CBETA. This proceeding presents the implementation of a NANC controller using the LCLS-II Low Level RF (LLRF) control system. Tests on the rejection of LCLS-II microphonics disturbances are also presented.

**Primary authors:** BELLANDI, Andrea (Deutsches Elektronen-Synchrotron); Mr DIAZ CRUZ, Jorge (Stanford Linear Accelerator Center)

**Co-authors:** Dr HOUBLER, Sonya (Stanford Linear Accelerator Center); Dr BRANLARD, Julien (Deutsches Elektronen-Synchrotron); Dr RATTI, Alessandro (Stanford Linear Accelerator Center); Dr ADERHOLD, Sebastian (Stanford Linear Accelerator Center); Dr BENWELL, Andy (Stanford Linear Accelerator Center); Dr BRACHMAN, Axel (Stanford Linear Accelerator Center); Dr GONNELLA, Dan (Stanford Linear Accelerator Center); Dr NELSON, Janice (Stanford Linear Accelerator Center); Dr PORTER, Ryan Douglas (Stanford Linear Accelerator Center); Ms ZACARIAS, Lisa (Stanford Linear Accelerator Center)

**Presenter:** BELLANDI, Andrea (Deutsches Elektronen-Synchrotron)

**Session Classification:** Poster Session

**Track Classification:** Low Level RF Workshop 2022