



Contribution ID: 1345 Contribution code: MOPM016

Type: **Poster Presentation**

Machine impedance calculation and impedance optimization of vacuum components in SLS 2.0

Monday, 8 May 2023 16:30 (2 hours)

For a reliable determination of the single bunch stability threshold, the broadband impedance budget needs to be analyzed for all resistive and inductive contributions. The completely new design of the arc vacuum chamber of SLS 2.0 with respect to SLS - now with a reduced beam pipe diameter, and coated with layers of copper and NEG - requires special focus on the resistive wall impedance.

Higher Order Modes (HOMs) of vacuum components were also investigated. Since they stay trapped in specific positions of the ring, they can be the source of power heating and related mechanical stress, as well as the cause of Coupled Bunch Instabilities (CBI). The impact of the HOM impedance spectrum can become very important, notably if the device responsible of the resonance recurs several times in the ring or if it is located at positions with high beta values. We show some examples of HOM analysis and their related optimization, which were adopted for cavities appearing also in valves, bellows and diagnostic components.

Funding Agency

Footnotes

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Yes

Primary author: CITTERIO, Alessandro (Paul Scherrer Institut)

Co-authors: BRASCHOSS IV, Peter (Paul Scherrer Institut); DEHLER, Micha (Paul Scherrer Institut); DORDEVIC, Sladana (Paul Scherrer Institut); STEPHAN, David (Paul Scherrer Institut); STINGELIN, Lukas (Paul Scherrer Institut)

Presenter: CITTERIO, Alessandro (Paul Scherrer Institut)

Session Classification: Monday Poster Session

Track Classification: MC2: Photon Sources and Electron Accelerators: MC2.A05: Synchrotron Radiation Facilities