Contribution ID: **1848** Contribution code: **WEPM099** Type: **Poster Presentation**

Investigation of the microwave instability at MAX IV laboratory in combination with intra-beam scattering

Wednesday 4 June 2025 16:00 (2 hours)

With the increasingly challenging parameters in 4th generation synchrotron light sources, collective effects causing instabilities are putting even stronger limitations on the area of stable operation. The microwave instability (MWI) is a longitudinal single-bunch instability driven by the geometric and the resistive-wall impedances. While the instability typically does not result in a beam loss, the resulting turbulent dynamics are accompanied by an increased energy spread and therefore deteriorate the light source performance. The threshold current depends on different beam parameters and can, without mitigation, for recently upgraded or currently under design light sources, be as low as or lower than intended design current per bunch. At the same time, the instability threshold is also influenced by other collective effects such as the intra-beam scattering (IBS). The influence of the IBS on the microwave instability has been studied for the 3 GeV storage ring at the MAX IV laboratory.
The presented experimental results at the 3 GeV ring show the MWI threshold influenced by the coupling strength due to the resulting changes in the IBS.

Footnotes

Paper preparation format

LaTeX

Region represented

Europe

Funding Agency

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Session Classification: Wednesday Poster Session

Track Classification: MC5: Beam Dynamics and EM Fields: MC5.D06 Coherent and Incoherent Instabilities Measurements and Countermeasures