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Time-resolved measurement and simulation of a longitudinal single-bunch instability at the MAX IV 3 GeV ring

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The study and understanding of collective effects plays a vital role for fourth-generation light sources. These effects mostly need to be mitigated and controlled to achieve the design operational parameters. However, they can also be utilized to gain insights into the properties of the machine.

While the 3 GeV storage ring at the MAX IV light source is running in multi-bunch mode during user operation. Single-bunch operation is available in dedicated machine study shifts, providing the possibility to study collective effects at higher bunch currents. In such a current range an instability has been observed in the longitudinal plane. Above the threshold current of the instability a dynamic deformation of the bunch profile and a strong increase in energy spread occurs.

Dedicated measurements were conducted with multiple diagnostic tools such as time-resolved bunch profile measurements. First simulations of the observed effects were performed with a Vlasov-Fokker-Planck solver. This contribution presents measurement results and draws a comparison to the simulations.

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Footnotes

I have read and accept the Privacy Policy Statement

Yes

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