ACCELERATOR SEMINAR

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Thursday, 3. September 2020 at 4 pm

Ort: KBW Hörsaal and Zoom-Meeting Room
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Simulation of intense beams in synchrotrons

This introduction on collective beam dynamics focuses on high-intensity effects in synchrotrons like SIS18 or SIS100.
The charged particles in the beam interact (a.) with the beam self-fields they produce and (b.) with the induced currents in the vacuum pipe. This interaction leads to corresponding collective effects, such as "space charge" (self-field interaction) or "beam coupling impedance" (interaction with the surroundings). The beam can become resonantly excited or is even driven into exponential instabilities over many revolutions in the circular accelerator. These effects potentially limit the performance, they scale with the number of particles in the beam: their understanding (and mitigation) is crucial to safely operate synchrotrons like SIS100 at highest beam intensities.
We dive into the world of these collective effects in beam physics, exploring their mechanisms and how they can lead to beam loss. During the talk, we also look behind the scenes on how to numerically model such long-term effects, in particular employing high-performance techniques such as GPU computing.

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