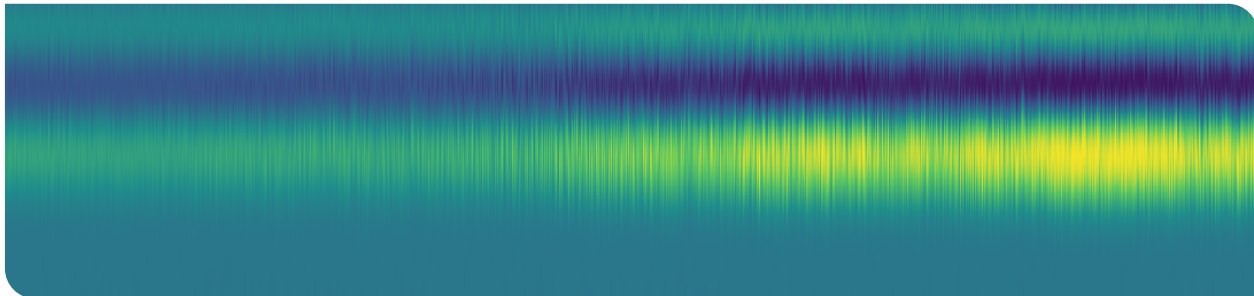


Observations of Effects on Beam Dynamics at Negative Momentum Compaction Factors

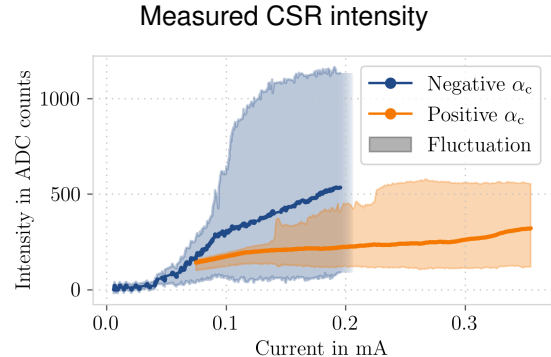
Patrick Schreiber, M. Brosi, B. Haerer, A. Mochihashi, A. Papash, R. Ruprecht, M. Schuh, A.-S. Müller | MT ARD ST3 2022



Negative Momentum Compaction

Longitudinal Instability

- Longitudinal instability at short bunch length
- Emission of Coherent Synchrotron Radiation (CSR)
- Fluctuating intensity during instability
- Higher intensity at $\alpha_c < 0$
 - Higher mean intensity
 - Higher max intensity
- Potential benefit for CSR applications



Negative Momentum Compaction

Transverse Stability

- Negative chromaticity ζ
 - ⇒ Head-Tail instability
- Measurement of beam position after kick
- Instable beam at $\alpha_c > 0$ and $\zeta < 0$
- Stable beam at $\alpha_c < 0$ and $\zeta < 0$
- ⇒ Instability avoided with $\alpha_c < 0$
- ⇒ $\alpha_c < 0$ allows sextupole reduction and increased dynamic aperture
- ⇒ Beneficial for future synchrotron light sources

Measured Beam Position after Kick

