TUPC16

Bunch-By-Bunch Feedback and Diagnostics at BESSY II

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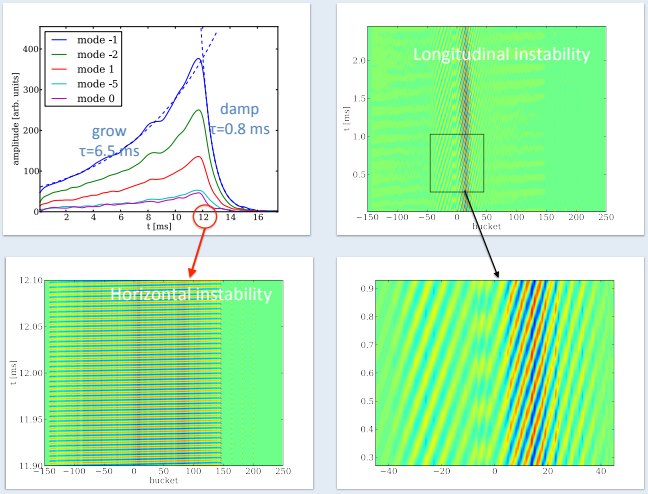
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Abstract

At the light source BESSY II new digital bunch-by-bunch feedback systems have been put into operation in January 2013, replacing the existing analog as well as the obsolete digital systems. From the first days of operation the new system successfully suppresses transverse and longitudinal beam instabilities in wide range of machine parameters. The system offers also many new diagnostics opportunities. In this contribution first operational experience, the developed data analysis techniques and experimental data will be presented.

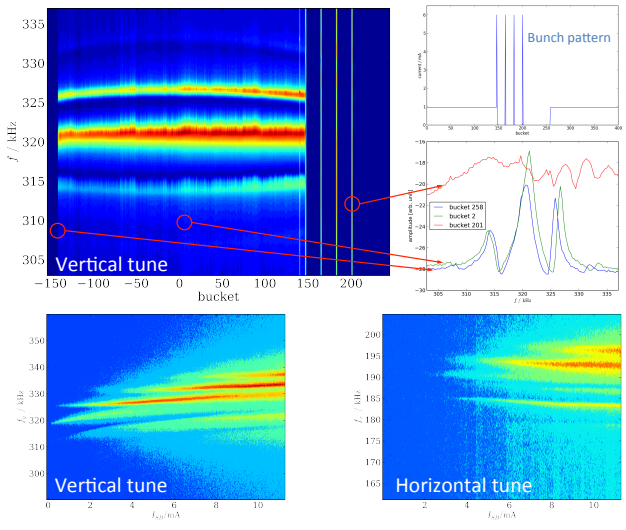
Feedback operation

The feedback strength via grow/damp measurements; instabilities can be studied in time or frequency domain. Mode analysis can give information about possible cause of instabilities.



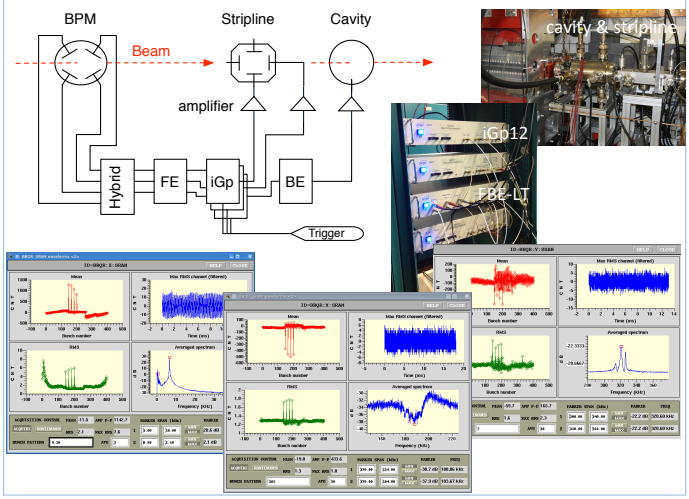
Tune spectra

With a digital system it is possible to store and analyze the feedback input data; it offers the possibility to passively measure the tune spectra of the complete beam and also of a single buckets.



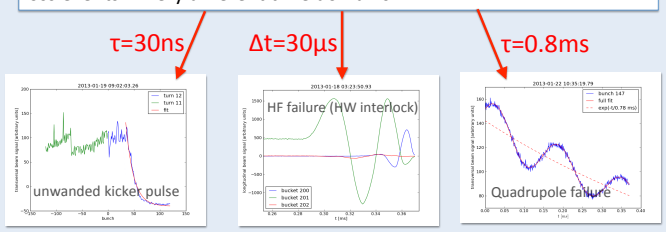
Commissioning

Main components: beam position monitor(BPM), Hybrid network, front-end receiver (FE), 12-bit integrated giga-sample processor (iGp12) [1], back-end electronics (BE), HF power amplifier, kicker stripeline/cavity [2].



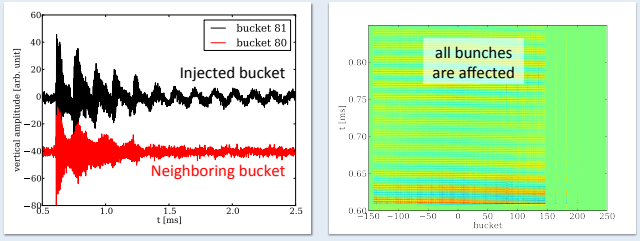
Post mortem data analysis

A dedicated memory region on the *iGp12* is used to store 480 turns (ca. 0.4ms) prior to beam-loss events. Allows characterization of beam-loss events in very different time domains.



Injection studies

Topup injections induce beam disturbances; The observed orbit jitter at BESSY is quite large (also in the vertical plane); The aim is to use the data from the feedback system to reduced the impact on the stored beam while keeping the injection efficiency above 90%.



References:

[1] Dimtel Inc. http://www.dimtel.com

[2] S.Khan and T.Knuth, PAC 2001, Chicago, USA (TPPH087) 1871.

[3] S.Heifets and D.Teytelman Phys.Rev. ST AB 8 (2005) 064402.

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