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Implementing bunch-by-bunch diagnostics at the KARA booster synchrotron

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In the upcoming compact Storage ring for Accelerator Research and Technology (cSTART), LPA-like electron bunches are only stored for about 100 ms, in which the equilibrium emittance will not be reached. Therefore, to measure parameters such as bunch profiles, arrival times and bunch current losses, bunch-resolved diagnostics are needed.

The booster synchrotron of the KARA accelerator accepts pre-accelerated bunches from a racetrack microtron and accelerates them further over a 500 ms long energy ramp. As the KARA booster synchrotron has a similar circumference and injection energy as the cSTART storage ring, new bunch-by-bunch diagnostics developed there can be transferred to the cSTART project with minimal effort. Currently the diagnostic system of the booster is not designed for bunch-by-bunch diagnostics, thus after using the booster as a testbed for cSTART, such a system could be used permanently.

At the booster synchrotron we use the picosecond sampling system KAPTURE-II to read-out a button beam position monitor and an avalanche photo diode at the synchrotron light port and compare the results with a commercial bunch-by-bunch system.

Footnotes

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