Science & Technology Facilities Council

Experiment proposal

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Shinji Machida

Motivation

- We observed coherent dipole oscillations in the longitudinal phase space after injection.
- The oscillation damp after some turns due to smearing and leads to large longitudinal emittance.
- From transverse point of view, a large momentum oscillation of a single particle causes repeated resonance crossing because the chromaticity is not zero.
- Can we reduce the beam loss at resonances if the coherent oscillations are eliminated right after injection?

Main ring:

1. ADS experiment using KUCA is ending tomorrow.
2. Aerosol experiments and MERIT beam studies are planned in March.
3. The second cavity will be installed in April.
4. An rf pattern with phi_s = 35 degree has been tested aiming to 60 Hz operation.

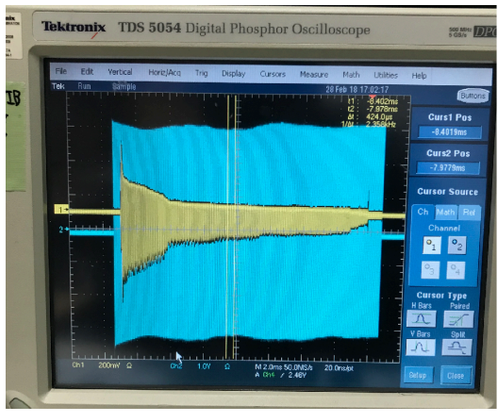


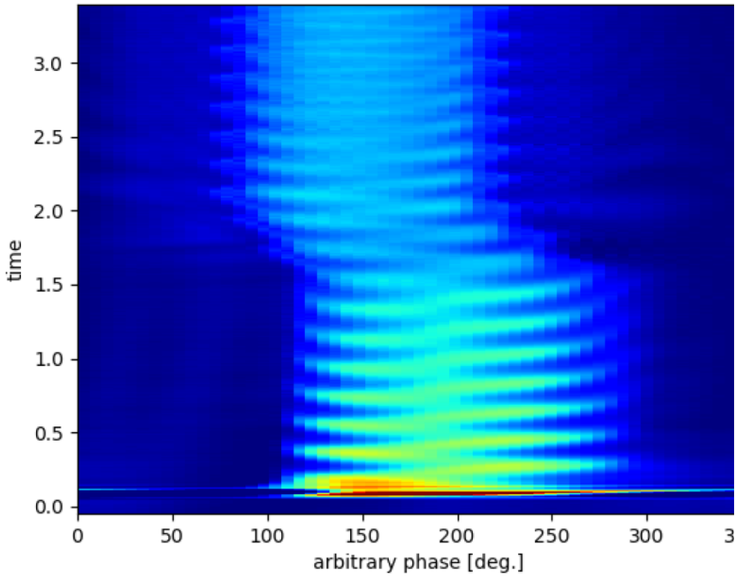
Fig.1 main ring bunch monitor signal
2018.2.28

Procedure

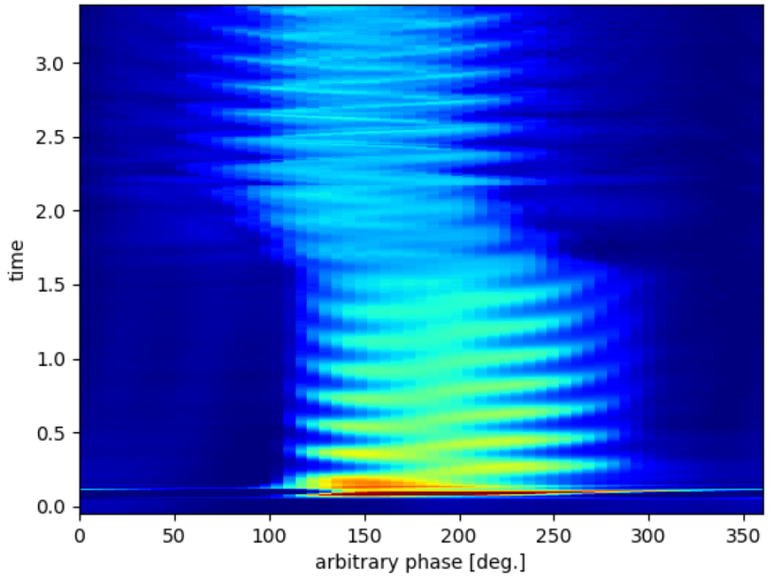
- As a reference: nominal operation with phis=20 degree acceleration to the top energy.
  - Record beam current and identify the beam loss at resonances.
  - Record bunch monitor signal around the injection (~5 ms) until coherent oscillations damp.
- Introduce RF phase jump right after the beams get out of the foil (~1 ms?)
  - Record the same above.
  - Timing of the RF jump should be searched because it should be applied when the oscillation phase is min or max.
  - Amplitude of phase jump should be searched. 10 degree steps up to +/- 90 degrees.
- RF script to apply phase jump will be ready by the experiment.

Previous experiment
by David Kelliher

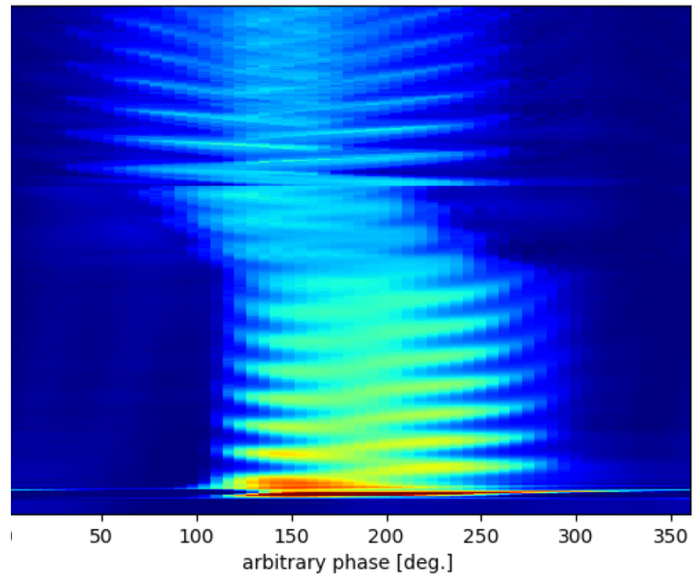
27/3/2019 - First 6000 turns (0 – 40 deg)



0 deg



20 deg



40 deg