Turn-by-turn optics measurements at EBS

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OMC3 codes

- Frequency analysis needs tbt data
- Optics analysis requires
  - Model - a twiss file without and with shaker turned on (natural and driven optics)
    - Nice to have an option to create a model with different tunes on-the-fly
  - Definition of an “Accelerator class”
- Corrections are entirely based on MAD-X
  - for pyat workaround would be needed (providing a response matrix)
  - Definition of correction knobs needed

Tbt prerequisities

- Simulation
  - Find the optimal oscillation amplitude balancing S/N and artificial beta-beating from non-linearities
  - Smearing of tbt data from bunch train
  - Excitation of synchrotron side-bands?
- Measurement
  - Measure the BPMs response to a single bunch (READADCDATA/V_[ABCD])
    - Check BPM synchronisation and available “space” to run without MAF filters
  - Verify the sine wave excitation (frequency spectra of any pickup)
  - Natural tunes visible in tbt data of driven motion?
    - If not – tune measurement followed by driven excitation
  - Inject 20-30 bunches in the “space” determined

Tbt optics measurement

- Based on 2D excitation
  - Measure the obvious parameters
  - No chromaticity from directly from tbt
  - Dispersion, W-function and Chromatic coupling when measured of momentum
  - Off-momentum measurements are simplest when keeping the same natural and driven tunes, i.e. tune correction between the sets
- If the natural tune is visible in the spectra (amplitude detuning)
  - Else a single kick
- Any effect from high chromaticity and SR?
  - (scan chroma and potentially the difference between natural and driven frequencies)