ESRF | The European Synchrotron

High Single Bunch Current

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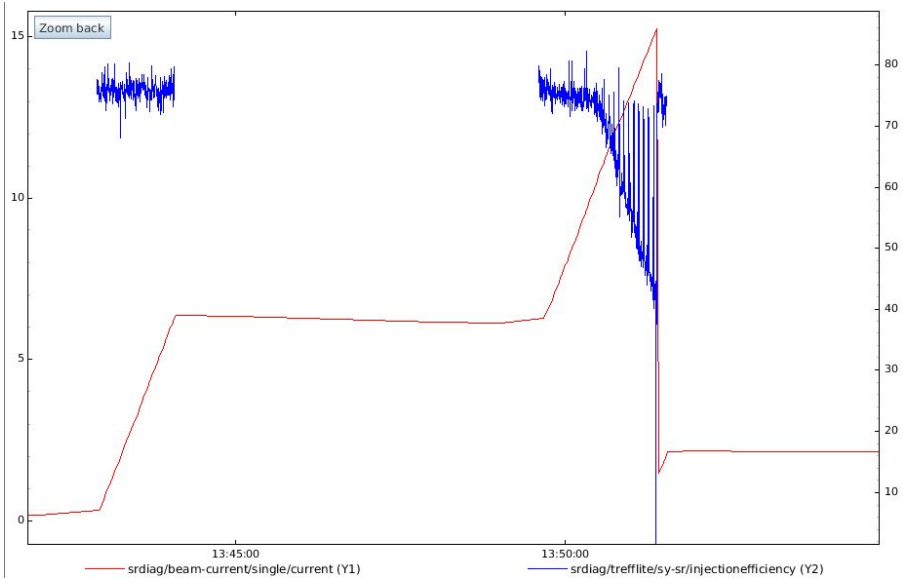
OBJECTIVES

- Go to 15mA in a single bunch and optimize machine performance.
- Understand beam behaviour at injection for high single bunch current.
- Establish good machine parameters to run overnight with single bunch at 15mA.

PREVIOUS EXPERIENCE

- Excluding during commissioning, we have reached 15mA once before. On 15/02/2021 (by mistake).
- Chromaticity at this point was Q'H=11, Q'V=7. Kickers were the old fast kickers so cannot conclude on anything re bump amplitude.
- Instability seen at 15mA, inj efficiency reduced to 40%.



PLAN OF MDT

Pre MDT: setup instability trigger to try and capture an instability at injection. I have been interested in trying to understand exactly what is happening here.

Plan of MDT

1. Slowly ramp to 15mA in the single bunch. Use whatever bump parameters or chromaticity is necessary to achieve it. Set the blowup to 40pm and observe the lifetime. Close the gaps and verify performance.
2. Stay at 15mA with a few topups for about 1 hour or so to allow the kicker temperatures to stabilise and any outgassing effects to pass. During this time, find good attenuator settings for BPMs and tune monitor. Once things are stabilised move on.
3. For operational chromaticity, look at injection efficiency and saturation current as a function of bump amplitude and tunes.
4. Scan point 3 for a few different vertical chromaticity settings.
5. For lower chromaticities, consider trying the BBB feedback to see if a change in performance can be seen (saturation at higher currents).
6. When some good settings have been found. Test injection with gaps closed.