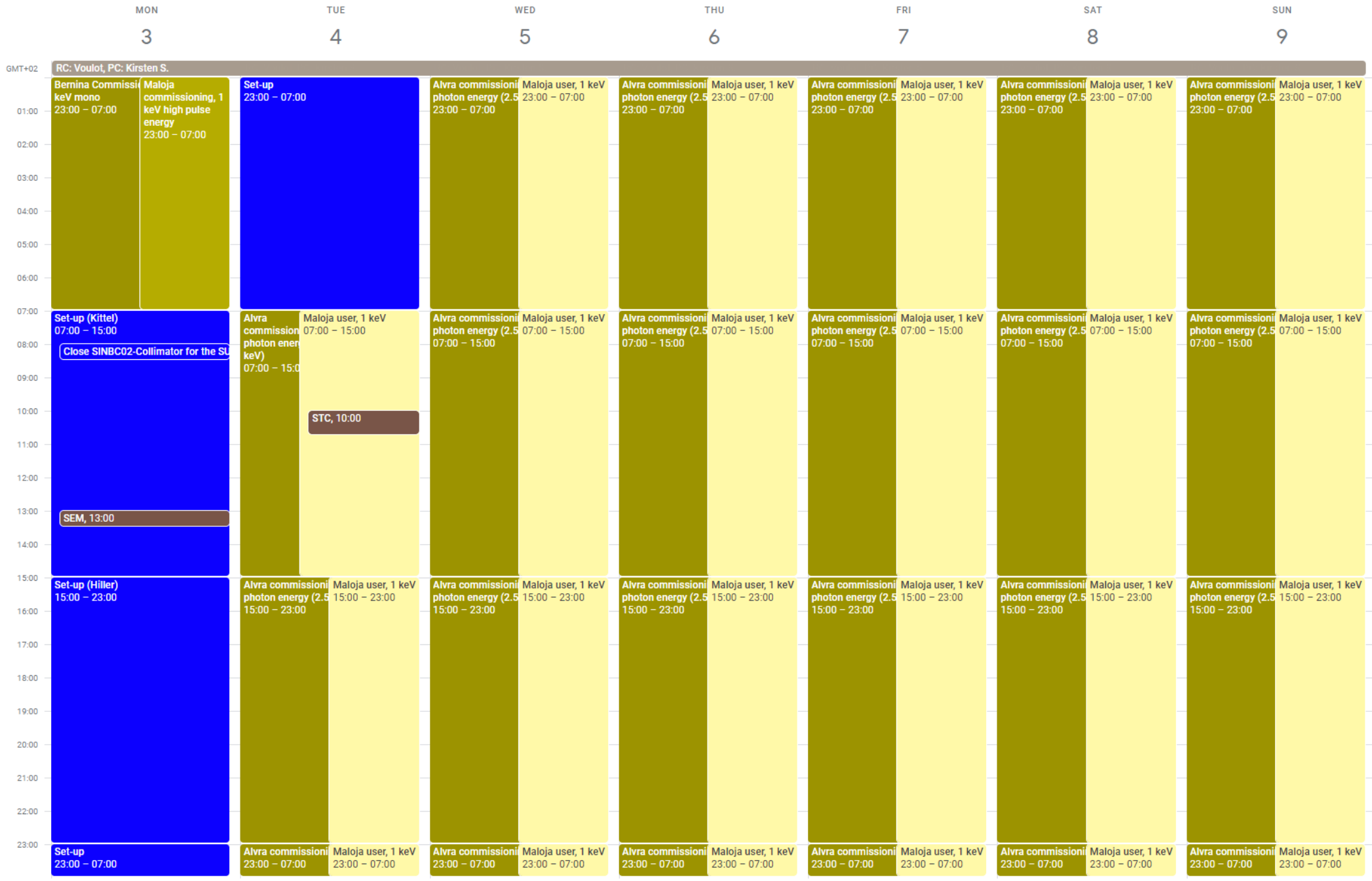
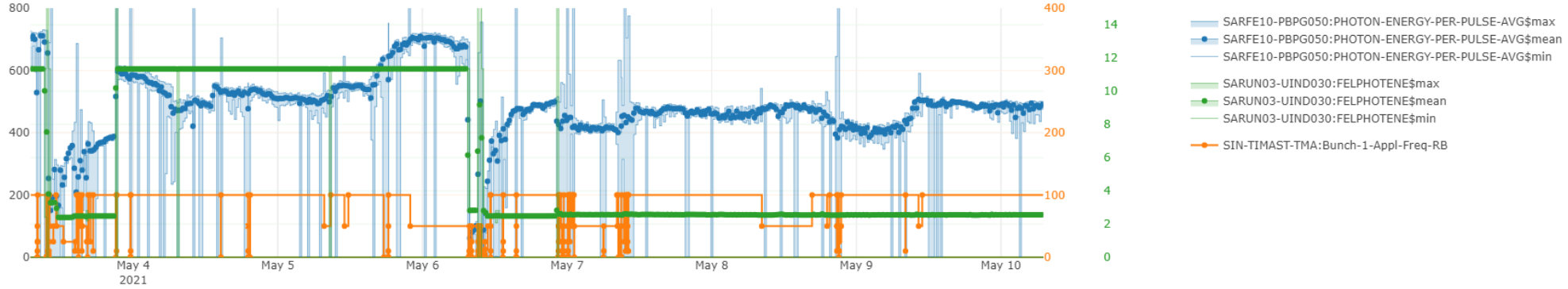
SwissFEL Exchange Meeting
Machine report
Week 18/2021

Didier Voulot, SEM, 10 May 2021

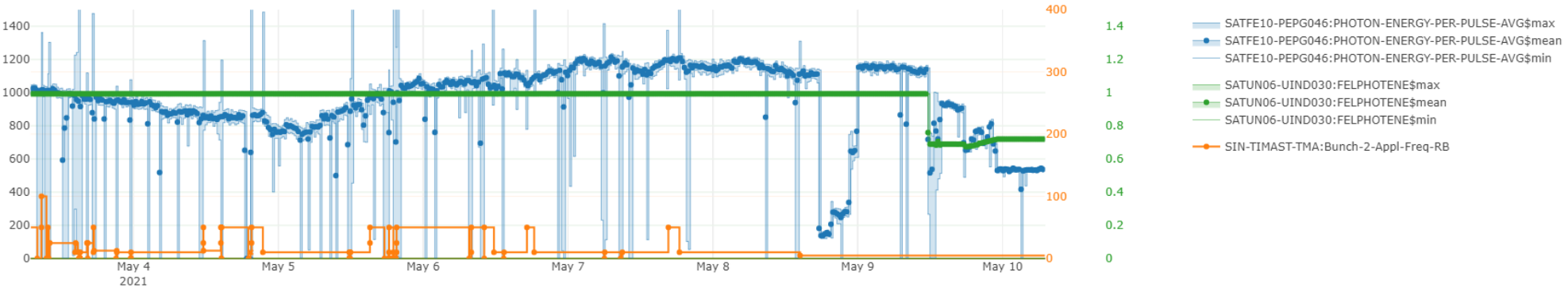
Week overview



Aramis



Athos

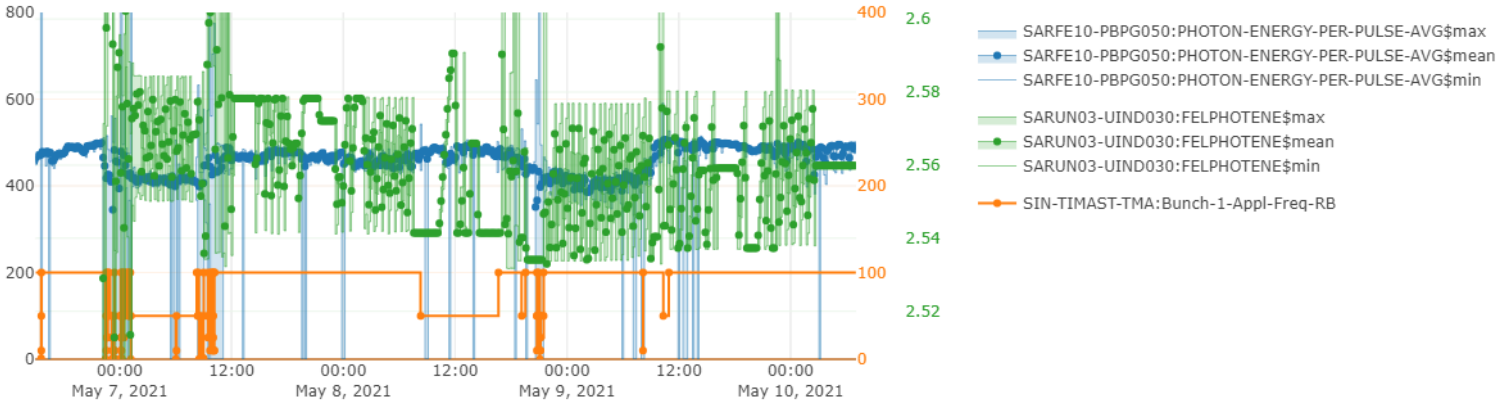


Set-up

- Started from well set-up machine: Aramis 700 uJ at 11.2 keV, Athos 1 mJ at 1 keV
- Beam dynamics support: Simona
- Scale Aramis from 11.2 to 2.5 keV (linac3 in deceleration mode, change K from 1.41 to 1.59). Got 400 uJ after tuning. Not as good as expected.
- Saved settings and restore 11.2 keV beam for the first part of the week.
- Athos left unchanged. But enabled all bunch2 feedbacks (longitudinal feedbacks were left out last week.)
- Instability/drift on both lines on Tuesday. Could not identify the cause. Was cured by retuning gun and laser on Wednesday (Simona). Then running Psico: 700 uJ at 11.2 keV on Aramis and 1.2 mJ at 1.0 keV on Athos.
- Reloading the 2.5 keV settings on Aramis on Thursday was not successful (losses, low pulse energy). The machine was essentially retuned (5h). Very sensitive on optics errors at this low energy.
- Aramis was running at 100 Hz most of the week. Athos was running at a reduced rate 5-10 Hz (Maloja's request)

Energy change Aramis

- Many energy scans around 2.5 keV (+/-25 eV). Depending on the range and speed of the scan, large transient losses were generated. Mostly downstream the undulators.
- There is a coupling between the obit feedback in E-col and the optics feedback. This can lead to large optics error during energy scans. This is particularly sensitive at low energy.
- Large dispersion downstream the E-col. Could not be fully corrected.
- Optics re-optimize for the middle of the scan range. Making sure losses remain acceptable at both end of the scan.
- Alvra could perform many scans during the week.



Energy change Athos

- Energy change (with varying undulator K) on Sunday from 1 keV to 700 eV. Only 900 uJ after retuning.
- Then change energy in steps from 675 to 720 eV.
- The pulse energy is strongly dependent on photon energy, the CHIC delays (gaps) need to be re-optimized for each energy.
- Saved a serie of setting files for different energies on Sunday morning. With a minimum of 600 uJ (Eduard). Settings successfully reloaded by the shift crew.
- Used short pulses with SATMA01 dechirper offset on Saturday. Higher losses on SATUN DRMs. (Though we did not need any resets.)

Technical difficulties

- Vacuum trip in GD Athos area. IOC/controls problem. Was fixed by piquet (Gaiffi). Gas set-up redone by Pavle. (Now very fast thanks to automatic procedure.)
- Kicker feedbacks stopped on a software problem. Was quickly restarted by Martin Paraliev.

Lessons learnt

- We need to improve energy scalability on both lines.
- Should improve low energy set-up for Aramis. Expect much higher pulse energy at this wavelength.