

# Run coordinator report for Week 41/2020 @ SEM

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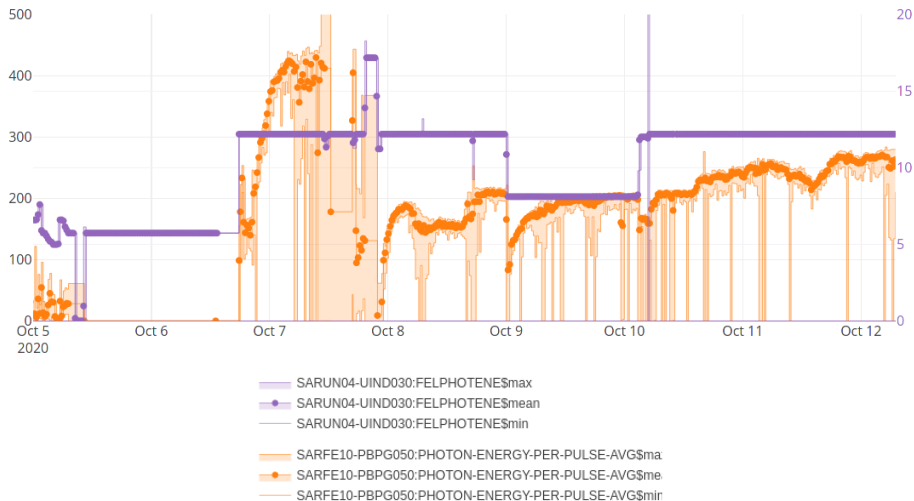
# Overview

- 1 Schedule Week 41
- 2 Lasing plots
- 3 Rundown of the week
- 4 Issues
- 5 Jitter fluctuations
- 6 Aramis high photon energy test

# Summary of week 41 - Schedule



# Summary of week 41 - Lasing in Aramis



# Summary of week 41 - Set up days

## Monday:

- Service day (Installation of SATUN11).

## Tuesday: [elog:16465](#)

- Service day. Tunnel closing time changed to 2 pm. Set-up shift on short notice.
- Phasing RF stations.
- Restoring of lasing in Aramis at 12 keV from file, reaching over night  $\approx 440 \mu\text{J}$ .
- Characterization of beam.

## Wednesday: [elog:16494](#)

- Short pulses done twice before with little optimization. (1) 3 weeks ago: 100 pC, 80 uJ @ 12 keV and (2) last weekend: 200 pC, 200 uJ @ 6.5 keV.
- Lasing set-up: 10 fs with 200 pC, but strong fluctuations (60-160  $\mu\text{J}$ ) & problem with CDR linearity, close to full compression  $\rightarrow$  no BC2 compression FB.
- Halving Alcor pulse length & set-up lasing now with 100 pC, reaching 150  $\mu\text{J}$ .  
 $\rightarrow$  Set-up probably incompatible with Athos, due to low X-band voltage.
- PSICO ramping up to 190  $\mu\text{J}$  over night.

# Summary of week 41 - Photon delivery days

## Thursday (Photon diagnostics):

- Morning: PSSS studies. Lasing signal down to  $150 \mu J$  (with PSICO).
- Afternoon: Manual improvements of lasing up to  $210 \mu J$ .
- Evening: Battling with orbit jitter in machine. Correlated with gun orbit.
- Night: Set-up and optimization of lasing in Aramis at  $8.0 \text{ keV}$  ( $180 \mu J$ ) for Bernina.

## Friday (Bernina):

- Reaching  $200 \mu J$  with short pulse and around 0.19% bandwidth.
- Photon delivery.

## Weekend (Alvra):

- Saturday: (3 am) Energy change by shift crew, reaching  $160 \mu J @ 11.8 \text{ keV}$ .  
(5 - 7 am) Increasing energy further and optimizing, reaching  $210 \mu J @ 12 \text{ keV}$ .  
Photon delivery and PSICO ramping up to  $230 \mu J$  during the day.
- Sunday: Photon delivery, with up to  $270 \mu J$ .

# Summary of week 41 - Issues

- Wednesday: DRPS alarm due to high losses around energy collimator.  
→ Four hours downtime.
- Soft-MPS bug discovered (related to DRPS alarm). Fixed during the day.
- Aramis HAMP found to have one (of four) channels broken (ADC card). Preliminary fixed, but increased noise until shutdown.
- Jumps in lasing caused by bad camera position fit in capillary In feedback. Fixed.
- CDR linearity problem at 200 pC with short pulse (10 fs rms, close to full compression).
- Correct gun phase after halving Alcor pulse length, though machine off by 4.2 deg!
- All working days: Jitter fluctuations during certain times of the day.
- Saturday: PSSS not reacting to energy change. Seems to work now.

# Jitter fluctuations

- All working days during morning (5 - 9 am) and evening (4 - 7 pm) hours.
- Many things tested:
  - Beam feedbacks: no correlation.
  - Beam elements like Athos kicker and gun solenoid: some correlation claims.
  - Laser feedbacks: charge seems stable, thus UV energy feedback and everything before the iris less likely to be the cause (they should induce a charge jitter).
  - Orbit feedbacks: gun orbit correlation, mostly in X. Though feedback itself not the culprit. →

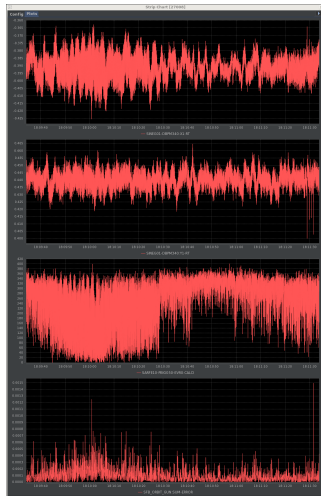
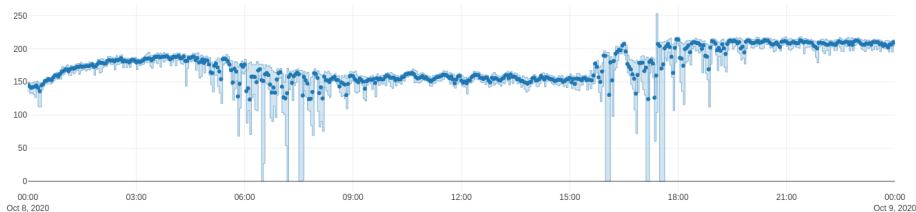
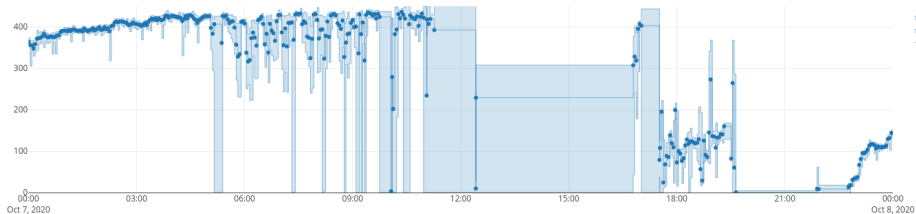


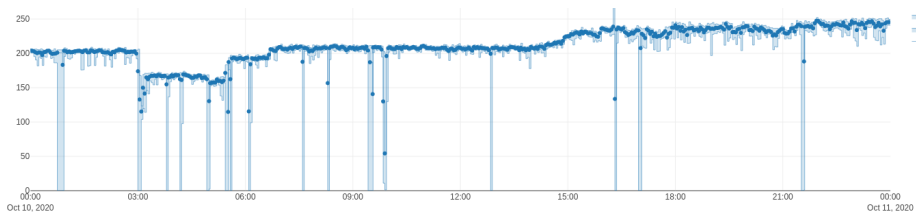
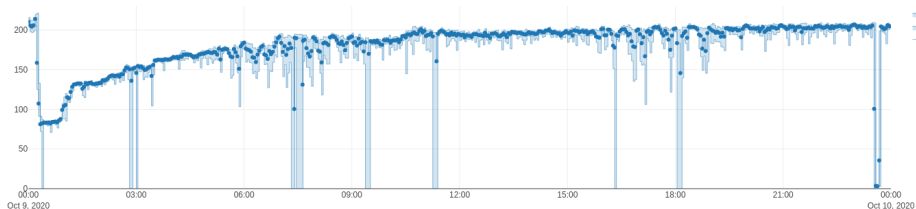
Fig.: X-pos, Y-pos, HAMP, FB error



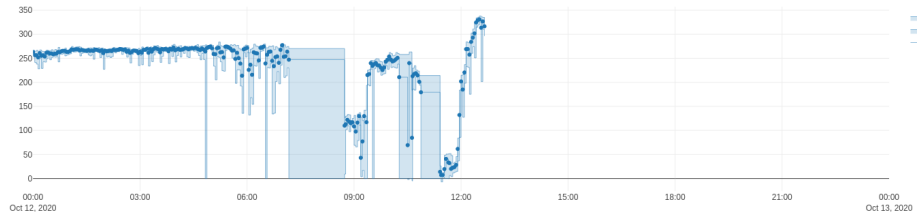
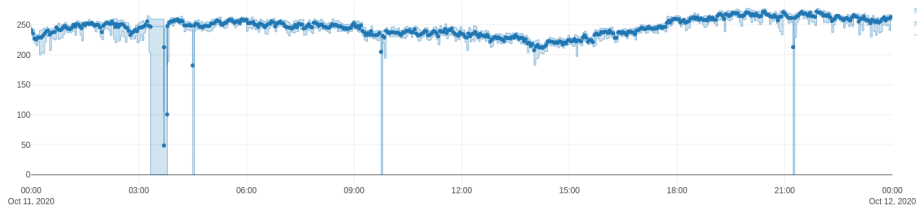
# Jitter fluctuation plots # 1



# Jitter fluctuation plots # 2



# Jitter fluctuation plots # 3



# Aramis high photon energy test

- Good lasing ( $\approx 5$  min) set-up ( $450 \mu J @ 12$  keV, 6.1 GeV,  $K = 1.395$ ).
- Quick check at higher K values in steps.
- Dedicated MD shift already requested.

$K = 1.4$   
12 keV  
 $350 \mu J$

$K = 1.2$   
14 keV  
 $55 \mu J$

$K = 1.0$   
16 keV  
 $1 \mu J$

$K = 0.9$   
17 keV  
 $\ll 1 \mu J$

