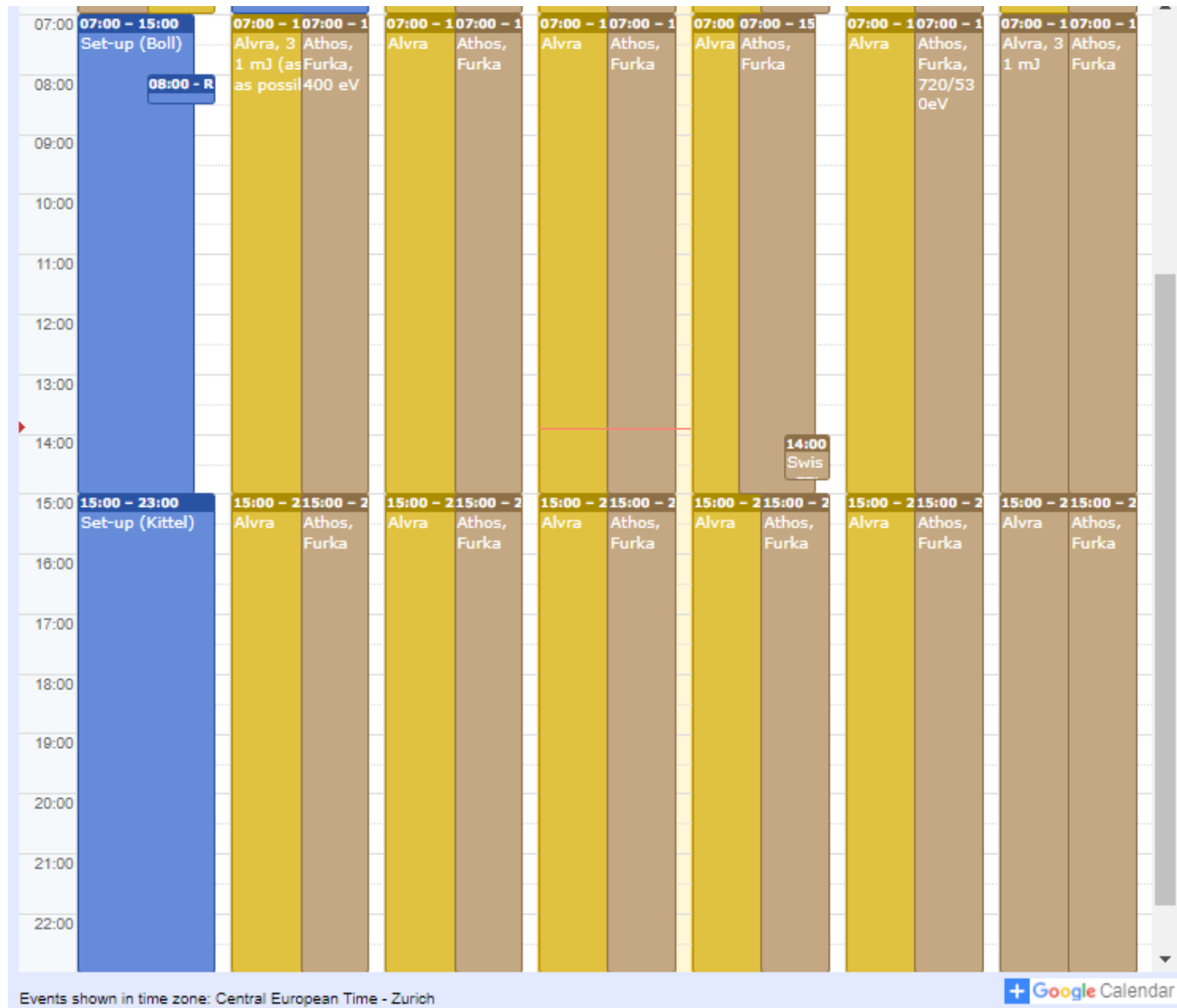


# SwissFEL week 48

- **Schedule**
- **Photon delivery**
- **Setup**
- **Issues**
- **Considerations**
- **Conclusions**

# Schedule



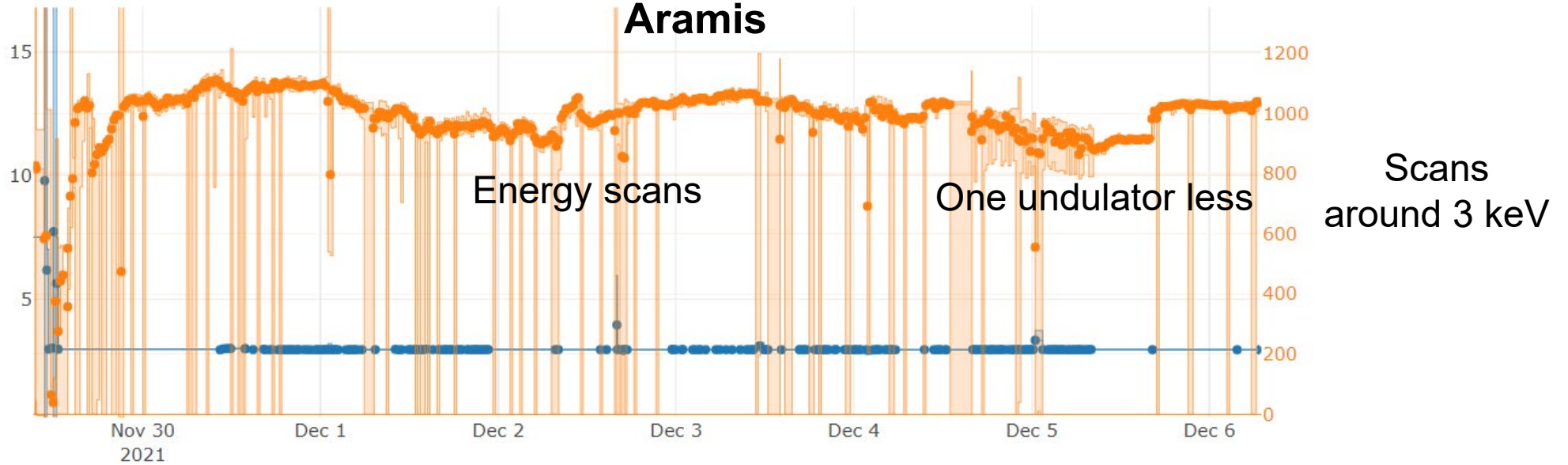
## Changes in the schedule:

- ◆ Delay in the beginning of the startup from 6 AM to about 9:30 due to RF intervention (already reported)

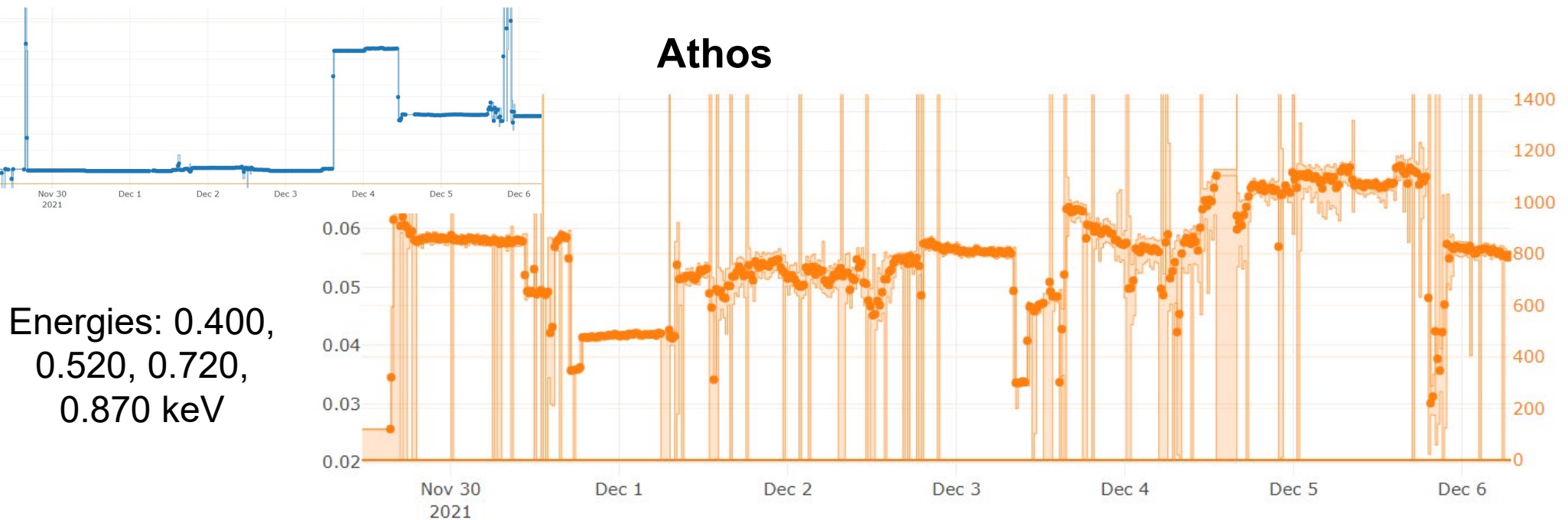
# Lasing plots

Pulse energy (uJ)  
Photon energy (keV)

## Aramis



## Athos



# Setup

M. Boll: early shift  
C. Kittel: late shift  
BD support: E. Prat

## ARAMIS

- **Followed procedure:** relying from a previous setup
  - RF phasing
  - Dispersion in Aramis corrected
  - Electron beam energy scaled
  - Optimized tapering and tuning of other parameters along the machine looking at the lasing signal
  - Bandwidth optimized
  - PSICO running

## ATHOS

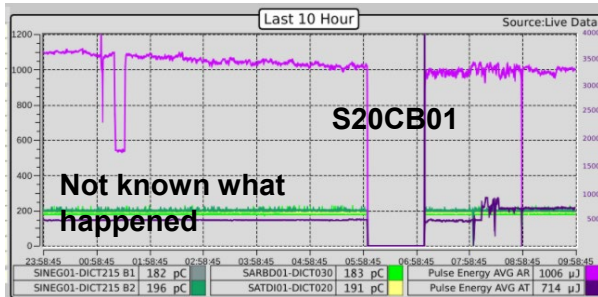
- **Followed procedure:**
  - Single color mode re-setup at 400 eV
  - Saved snapshots for the initial required energies (520 and 720 eV)

## Noticeable (also for the future):

- BW optimization:
  - First tried with the mono scan by Alvra people: good but time consuming (several minutes per scan)
  - After Chris (Arrell) setup the PSSS in 3<sup>rd</sup> harmonic, and this worked very well (10 spectra average at 100 Hz, so optimization at 10 Hz possible)

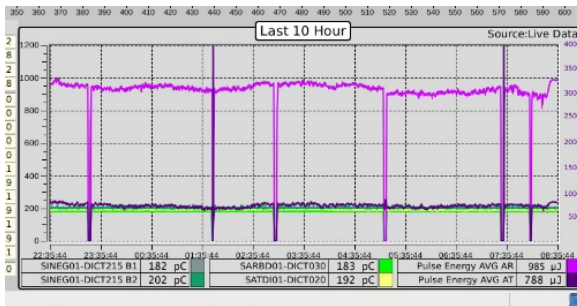
# Days following the setup day

- On Tuesday night the Aramis lasing started to drift down and the stability degraded

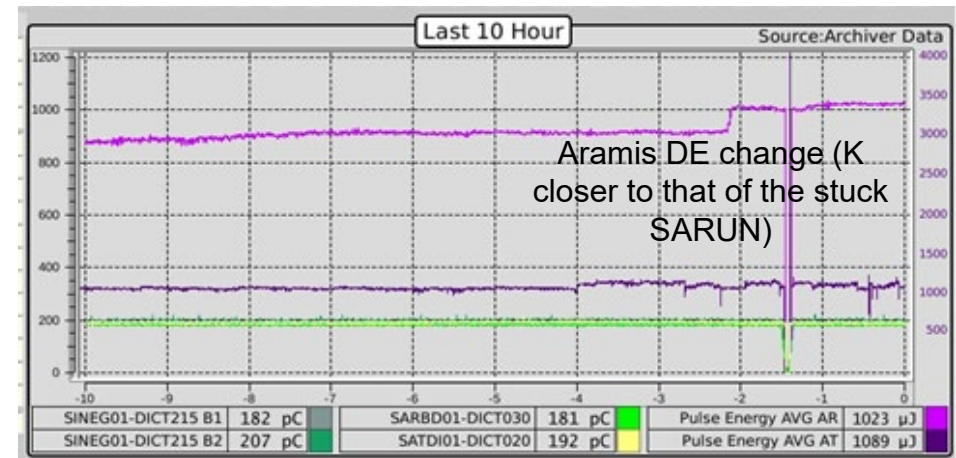
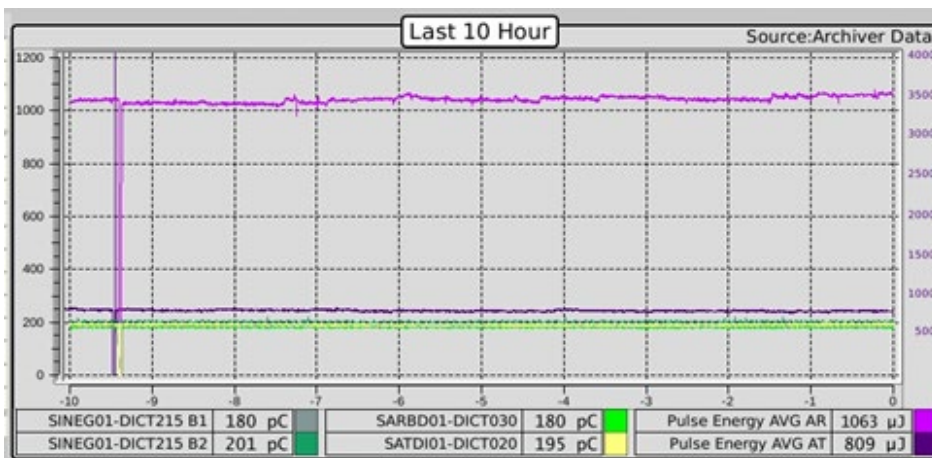


Some settings checked, and necessary to increase the SINSB03 energy gain (RF pikett).

- After that the machine (Aramis and Athos) started to oscillate



- After all this, the machine became more stable, and with quite a good lasing in both lines



# Issues

## Contacted pikett and other support:

- RF p.: L. Stingelin
- Laser p.: M. Huppert
- Controls p.: T. Zamofing
- Timing & synchronization p.: C. Sydlo
- Vacuum p.: N. Gaiffi
- BD support: E. Prat
- Undulator support: M. Bruegger

## Causing photon delivery interruption:

- 3 h 30 m: Delay in the beginning of the startup from 6 AM to about 9:30 due to RF intervention, which solved an issue happening during the night (last week report)
- 1 h: S20CB01 on Wednesday morning (6-7 AM): RF pikett
- 1 h: Machine unstable on Wednesday: RF and machine optimization: RF pikett and RC
- 11 h: Vacuum issue in Alvra (from 1:30 AM to about noon on Thursday): CR, Vacuum pikett and RC called
- 0.5 h (around 1 AM): RC was called because impossible to make beam in Athos
- 1 h: Vacuum issue in SARUN15: Vacuum pikett
- 2 h: Vacuum-controls issue in Furka. Same issue on Friday and Saturday: controls pikett.
- 3 h: SINXB issue on Saturday afternoon: RF pikett

## Not causing photon delivery interruption:

- A certain instability observed in Aramis: laser and timing & synchronization pikett
- SATUN07 stuck on Friday at noon: fixed in the afternoon.
- Energy margin in Linac 2 went down (reason unknown). Saturday morning adjusted: RC.
- SARUN13 stuck from Friday night. Sent an e-mail, but no pikett available. To be considered.

# Conclusion

## In general:

- Setup went well, also relying on the previous weeks settings
- Many drifts and jitter increase periods observed. Actions taken to not let the machine “go away”
- Lasing up to more than 1.1 mJ at 3 keV in Aramis and in the  $< 1$  keV region in Athos

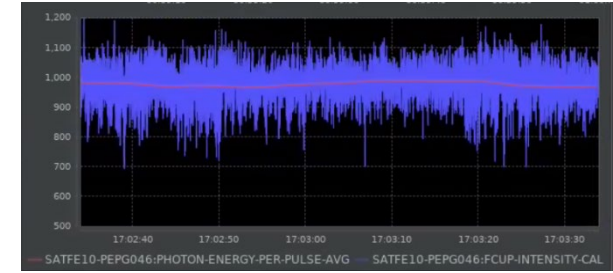
## Comments for the future:

- PSSS worked reliable in third harmonic to tune the BW at 3 keV
- Some actions for the possible stuck undulators
- Check on the two states. Informed RF (Paolo).

## To conclude the conclusions:

- Many thanks to all the people in pikett, who were contacted several times
  - RF: L. Stingelin
  - Laser: M. Huppert
  - Controls: T. Zamofing
  - Timing & synchronization: C. Sydlo
  - Vacuum: N. Gaiffi
  - Undulator support (no pikett): M. Bruegger

# Comments



**SwissFEL Overview** AT Beamline development **B1 On B2 On** Maschine Mode 03.12.2021 15:53:27  
AR User operation UND Aramis and Athos

<p>SF-CR <b>A</b> 03.12.2021 14:52:10 Photon delivery</p> <p>Alvra <b>A</b> 02.12.2021 06:51:39 Alvra attended</p> <p>Bernina <b>P</b> Mon 29-Nov-2021 11:08:24 Bernina setting up</p> <p>Maloja <b>A</b> 01.12.2021 13:55:40 Maloja unattended</p> <p>Furka <b>A</b> 01.12.2021 20:24:36 Furka unattended.</p>	<p><b>Laser</b></p> <table border="1"> <tr><th>Active</th><th>Both</th></tr> <tr><td>Alcor</td><td>Mizar</td></tr> <tr><td>18.5 deg</td><td>28.2 deg</td></tr> <tr><td>2.0 mm</td><td>2.0 mm</td></tr> <tr><td>90.0 nJ</td><td>123.3 nJ</td></tr> </table>	Active	Both	Alcor	Mizar	18.5 deg	28.2 deg	2.0 mm	2.0 mm	90.0 nJ	123.3 nJ	<p><b>Vacuum</b></p> <table border="1"> <tr><th>MA</th><th>AR</th><th>AT</th></tr> <tr><td><b>GUN</b></td><td><b>LIN</b></td><td><b>LIN</b></td></tr> <tr><td><b>BC1</b></td><td><b>UND</b></td><td><b>UND</b></td></tr> <tr><td><b>BC2</b></td><td><b>FRO</b></td><td><b>FRO</b></td></tr> </table>	MA	AR	AT	<b>GUN</b>	<b>LIN</b>	<b>LIN</b>	<b>BC1</b>	<b>UND</b>	<b>UND</b>	<b>BC2</b>	<b>FRO</b>	<b>FRO</b>	<p><b>MPS</b></p> <table border="1"> <tr><td>MA L1:</td><td>BLM</td><td>MAG</td><td>ICT</td><td>RF</td><td>ALA</td><td>CDR</td><td>SCR</td><td>Virt RF</td></tr> <tr><td>AR L1:</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>AT L1:</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>MA L2:</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>	MA L1:	BLM	MAG	ICT	RF	ALA	CDR	SCR	Virt RF	AR L1:									AT L1:									MA L2:									<p><b>MPS out</b></p> <table border="1"> <tr><td>LO:</td><td>Main</td><td>Aramis</td><td>Athos</td></tr> <tr><td>L1:</td><td></td><td></td><td></td></tr> <tr><td>L2:</td><td></td><td></td><td></td></tr> </table>	LO:	Main	Aramis	Athos	L1:				L2:				<p><b>Photon AR</b></p> <table border="1"> <tr><th>Aperture</th><th>Beamline</th></tr> <tr><td>3.0 x 3.0</td><td>Alvra</td></tr> <tr><td>SARFE10</td><td>SARUN03</td></tr> <tr><td>1051 μJ</td><td>2.979 keV</td></tr> <tr><td>3461 MeV/c</td><td>0.416 nm</td></tr> </table>	Aperture	Beamline	3.0 x 3.0	Alvra	SARFE10	SARUN03	1051 μJ	2.979 keV	3461 MeV/c	0.416 nm	<p><b>FB</b></p> <table border="1"> <tr><td>Pointing</td><td>AR</td><td>AT</td></tr> <tr><td>PSICO</td><td>AR</td><td>AT</td></tr> </table>	Pointing	AR	AT	PSICO	AR	AT	<p><b>Rep Rate</b></p> <table border="1"> <tr><td>B1</td><td>100.0 Hz</td></tr> <tr><td colspan="2">Aramis</td></tr> <tr><td>B2</td><td>100.0 Hz</td></tr> <tr><td colspan="2">Athos</td></tr> </table>	B1	100.0 Hz	Aramis		B2	100.0 Hz	Athos	
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Station	MV	deg	Station	MV	deg		
SINEG01	RF on beam	7.2	90.0	S20CB01	RF on beam	242.0	78.6
SINSB01	RF on beam	72.0	90.0	S20CB02	RF on beam	242.0	101.4
SINSB02	RF on beam	75.0	90.0	S20CB03	RF on beam	220.0	78.6
SINSB03	RF on beam	89.3	68.6	S20CB04	RF on beam	232.0	101.5
SINSB04	RF on beam	89.3	68.6	S30CB01	RF on beam	240.0	90.0
SINXB01	RF on beam	21.2	270.0	S30CB02	RF on beam	245.0	90.0
SINDI01	RF on delay	1.7	35.1	S30CB03	RF on beam	240.0	90.0
S10CB01	RF on beam	230.0	50.7	S30CB04	RF on beam	230.0	90.0
S10CB02	RF on beam	240.0	86.5	S30CB05	RF on beam	230.0	90.1
S10CB03	RF on beam	260.0	50.8	S30CB06	RF on beam	230.0	90.0
S10CB04	RF on beam	250.0	86.5	S30CB07	RF on beam	235.0	291.3
S10CB05	RF on beam	250.0	50.8	S30CB08	RF on beam	235.0	248.7
S10CB06	RF on beam	245.0	86.5	S30CB09	RF on beam	230.0	291.3
S10CB07	RF on beam	240.0	50.8	S30CB10	RF on beam	230.0	248.7
S10CB08	RF on beam	235.0	86.5	S30CB11	RF on beam	240.0	291.3
S10CB09	RF on beam	230.0	68.6	S30CB12	RF on beam	230.0	248.7
SATCB01	Conditioning	193.5	5.5	S30CB13	RF on beam	210.0	90.0
SATMA02	Wait						

Station	Value	Station	Value
SINEG01-DICT215 B1	183 pC	SARBD01-DICT030	180 pC
SINEG01-DICT215 B2	199 pC	SATDI01-DICT020	193 pC
		Pulse Energy AVG AR	1051 μJ
		Pulse Energy AVG AT	996 μJ