PITZ Run Coordination 2022 (Week 48/49)

THz / FLASH RT Run

M. Krasilnikov 24.11.2022





Run weeks 48/49 planning

Status 22.11.2022

Week	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
48	Nov-28	Nov-29	Nov-30	Dec-01	Dec-02	Dec-03	Dec-04	49	Dec-05	Dec-06	Dec-07	Dec-08	Dec-09	Dec-10	Dec-11
Morn.	mirror56							Morn.							
7:00	Vashchenko	Vashchenko	Vasnenenko	Richard	Richard	Vashchenko	Vashchenko	7:00	Richard	Richard	Aftab	Li	Hoffmann	Hoffmann	Richard
to	VisitT	Setups	Oppelt	THz (3nC)	GUEST	Liebel	Richard	to	Aftab	Grebinyk	Grebinyk	Grebinyk	Oppelt	Liebel	Mohanty
15:30	science	/	Cathode exchange			THz (see	ding, GG)	15:30						Gun5.1	
Late	Startup	tests	to #695.1	or / and	PC			Late						Cond.	
15:00	Krasilnikov	for TUV	Hoffmann	Hoffmann	Krasılnikov	Li	Li	15:00	Vashchenko	Krasilnikov	Gross	Gross	Krasilnikov	Krasilnikov	Krasilnikov
to	Dark	Mohanty	Condition.	Beaïn		Lotfi or /	andeorgiev	to	Lotfi	Liebel	H-RI Lotfi	Lotfi	Lotfi	Lotfi	Kongmon
23:30	OFmap		dark current,	preparation	(EN+AL)			23:30							
Night	#693.1		QE,	&		Beam pr	eparation	Night							
23:00	Li	Li	QE-∄mhap	Dosimetry	Aftab	Hoffmann	& Hoffmann	23:00	Li	Vashchenko	Richard	Richard	Gross		Gross
to	Seupts for	Dmitriiev	⊺#695 ielv	Dmitriiev	Dmitriiev	Amirkha	m etry khanyan	to	Dmitriiev	Dmitriiev	Vashchenko	Vashchenko	Grebinyk	Grebinyk	Grebinyk
7:30	TUV					mod laser		7:30							

Startup:

- 1. Check list
- 2. QE-map (cath, VM) after mirror56 check (GV)
- 3. E-meter \rightarrow OK
- 4. Photodiode at trolley \rightarrow ?
- 5. ...

FLASH-RT:

- 1. Charite (Sarcoma organoids)→Jan
- 2. HZDR (Zebrafish)→?
- 3. Chemistry/Biology/Biochemistry (AG)
- 4. Dosimetry (gafchromic films) (FR)
- 5. Water phantom from Daresbury

THz:

- 1. 3nC fine tuning (XKL, MK)
- 2. Seeded FEL (GG)
- 3. BC commissioning (EK+AL)

Other studies:

- 1. Gun5 conditioning status check, mini-BDR studies, gamma-detectors in the coupler (MK)
- 2. LPS?
- 3. Emittance methodic?
- 4. New BPM calibration (DD, MK)
- 5. New FC calibration \rightarrow done?
- 6. Chicane.BPM1 tuning/calibration (MK, DD)
- 7. Beam trajectory (DD)

Seeded FEL by modulated beam

G. Georgiev

The time plan is iterative – points 1 and 2 will repeat for any settings with spikes, point 0 is intended at program start, but can be returned to.

0. Electron beam shaping (search for spikes) – 1 to 3 shifts

- a. After at least one case with spikes found, move to point 1
- 1. Manual beam transport (round beam, steering free quads) 1 shift or less
- 2. Optimization and THz measurement 1 shift per point
 - a. Over 200 optimizer iterations (100 iteration ~ 1 hour)
 - b. Include booster/solenoid tuning and 200+ iterations
 - c. Measure gain curve (1 hour)
 - d. Save results, transport
- 3. Return to point 1 for next settings or point 0 to search.
 - Or continue with SASE baseline
 - Or finish program

Run weeks 48/49 planning

Status 24.11.2022

Mon	Tue	Wed	Thu	Fri	Sat	Sun	Week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Nov-28	Nov-29	Nov-30	Dec-01	Dec-02	Dec-03	Dec-04	49	Dec-05	Dec-06	Dec-07	Dec-08	Dec-09	Dec-10	Dec-11
mirror56				T U-			Morn.							
Vashchenko	Vashchenko	Vasnenenko	Richard	Richard	Vashchenko	Vashchenko	7:00	Richard	Richard	Aftab	Li	Hoffmann	Hoffmann	Richard
Visit _T	Setups	Oppelt	GUEST	BC comm.	Liebel	Richard	to	Aftab	Grebinvk	Grebinvk	Grebinvk	Oppelt	Liebel	Mohanty
Ministry of		Cathode		(EK+AL)		(seeding.	15:30					Gun5.1		
Startup		to #695.1	mod laser			(0000a),	Late		FLAS	H-RT		Cond	C	pr
Krasilnikov		Hoffmann	Hoffmann	Krasilnikov	Li	Li	15:00	Vashchenko	Krasilnikov	Gross	Gross	Krasilnikov	Krasilnikov	Krasilnikov.
Dark	for IUV	Coldifion	Lotfi	Lotfi	Lotfi	Georgiev	to	Lotfi	Liebel	Lotfi	Lotfi	Lotfi	Gun5.1 cor	ditioning?
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QEmap				z (Security, C	30)		23.30				Cathode	to #695 1		
#693.1		QE,				unmod laser	Night				exchange?	10 #033.1	ļ	
Li	Li	QE. ∄m hap	Aftab	Aftab	Hoffmann	Hoffmann	23:00	Li	Vashchenko	Richard	Gun5:1	Gross		Gross
Setups for	Dmitriiev	⊺#695 i.etv	Dmitriiev	Dmitriiev	Amirkhanyan	Beamaforn	to	Dmitriiev	Dinitriiev	Vashchenko	\Cond?∞	Grebinyk	Grebinyk	Grebinyk
TUV						Dosimetry	7:30							
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Startup:

- 1. Check list
- 2. QE-map (cath, VM) after mirror56 check (GV)
- 3. E-meter \rightarrow OK
- 4. Photodiode at trolley \rightarrow ?
- 5. ...

FLASH-RT:

- 1. Charite (Sarcoma organoids)→Jan
- 2. HZDR (Zebrafish)→?
- 3. Chemistry/Biology/Biochemistry (AG)
- 4. Dosimetry (gafchromic films) (FR)
- 5. Water phantom from Daresbury

THz:

- 1. 3nC fine tuning (XKL, MK)
- 2. Seeded FEL (GG)
- 3. BC commissioning (EK+AL)

Other studies:

- 1. Gun5 conditioning status check, mini-BDR studies, gamma-detectors in the coupler (MK)
- 2. LPS?
- 3. Emittance methodic?
- 4. New BPM calibration (DD, MK)
- 5. New FC calibration \rightarrow done?
- 6. Chicane.BPM1 tuning/calibration (MK, DD)
- 7. Beam trajectory (DD)

Setups for TUV

1. 1nC \rightarrow THz (undulator through), 17MeV

2. 1nC (same) \rightarrow tunnel 1 dump,

Preparatory run for TÜV

Radiation stress test

- 1. Test-1: Tunnel #1
 - Gun:
 - 650us (1ms?)
 - 6.3MWg? (or highest stable),
 - MMMG
 - Laser:
 - 600 pulses (see next slide)
 - BSA~3.5mm(?)
 - CDC-booster:
 - 650us
 - 3MW (or highest stable)
 - MMMG
 - E-beam:
 - 1nC (4nC?)
 - focusing
 - transport to the beam dump (tunnel #1)
 - Record / monitoring:
 - BPMs
 - Screens
 - Measure radiation vs NoP
- 2. Test-2: Tunnel #2 with 100pC (transport/matching from THz?)
- 3. Test-3: Tunnel #2 with 2nC (1nC?) (transport/matching from THz?)

Pre-conditions:

- HV pulse length (RF1, RF2) adjusted
- RF2: FB start: now at 99us \rightarrow put back to the beginning?
- Enable long pulse trains with MBI laser

19.05.2021 06:37, T. Weilbach, Radiation tests after wall installation

- 1) Set beam energy to ~22MeV/c (GUN SP 58.5, Booster SP 18.5)
- 2) Set bunch charge to 1nC
- 3) Transport beam to beam dump, use BPMs to measure charge along the beam line, focus beam with Q9/10 into PST section (e.g. PST.Scr2) use PST.Quads to focus beam at HIGH2.Scr2.
- 4) Center beam on beam dump using HIGH2.BPM1
- 5) Monitor beam charge with Low.ICT signal
- 6) Measure radiation vs NoP
- 7) Insert slits at EMSY1/2/3 and measure radiation (?)

FLASH RT wish list to beam adjustments (run weeks 48/49

A.Grebinyk

- Boundary condition: Anna, Felix, Matthias, Frank, Xiangkun mostly not available in KW48 (attending FRPT conference)
- Beam scattering and dark current test until nothing to see on films: with films only at conventional: 5 x 10⁻² Gy/s with 75 Gy UHDR: 10⁶ Gy/s with 75 Gy; 10¹¹ Gy/s with 1.5 Gy

 \rightarrow 2 to 6 shifts (best during day, when engineers are available)

• Preparation for irradiation of Charité samples in Jan 2023 (2 mL tube, the holder height is adjusted):

Beam transport? \rightarrow 1 shift test with films and tubes with water \rightarrow 3 to 5 shifts if ok, test with cells \rightarrow 1 to 2 shifts (in KW49)

- Dose deposition measurements with the Daresbury water phantom:
 with big dosimetry films only. Setup has to be built and commissioned before
- Biological effects of PITZ beam with HZDR (preparation of exp. with zebrafish embryos): beam transport and dosimetry → 1 to 2 shifts

Biological effects of PITZ beam

Cell survival after irradiation (A. Grebinyk)

3 samples: 2 sarcoma (S1 and S2) and fibroblasts (F1) **Dose:** 0, 2, 4, 8, 16 Gy **Dose rate:** for conventional 5 x 10⁻² Gy/s for UHDR: 70 and 10⁶ Gy/s



h: 11 mm w: 10.5 mm

for 20th and 21st of January

i aay													
	1	2	3	4	5	6	7	8	9				
1	10 Gy S1	10 Gy S2	8 Gy S1	8 Gy S2	4 Gy S1	4 Gy S2	2 Gy S2	2 Gy S1	0 Gy S1+2				
	5 x 10 ⁻² Gy/s												
2	10 Gy S1	10 Gy S2	8 Gy S1	8 Gy S2	4 Gy S1	4 Gy S2	2 Gy S2	2 Gy S1	0 Gy S1+2				
	70 Gy/s												
3	10 Gy S1	10 Gy S2	8 Gy S1	8 Gy S2	4 Gy S1	4 Gy S2	2 Gy S2	2 Gy S1	0 Gy S1+2				
	10 ⁶ Gy/s												

2 day:

1 dav

	1	2	3	4	5	6	7	8	9		
1	10 Gy F1	8 Gy F1	4 Gy F1	2 Gy F1	0 Gy F1						
	5 x 10 ⁻² Gy/s										
2	10 Gy F1	8 Gy F1	4 Gy F1	2 Gy F1	0 Gy F1						
	70 Gy/s										
3	10 Gy F1	8 Gy F1	4 Gy F1	2 Gy F1	0 Gy F1						
	10 ⁶ Gy/s										

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