

# HiRadMat Updates for PS/SPS Meeting (up to Week 41)

Fiona Harden (on behalf of HiRadMat Team)

5<sup>th</sup> September 2018

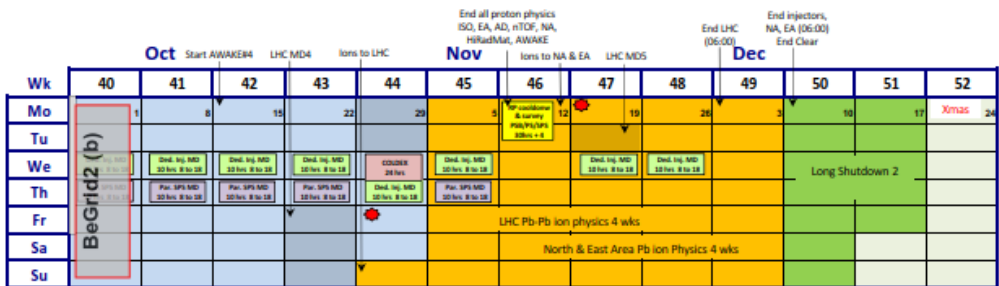
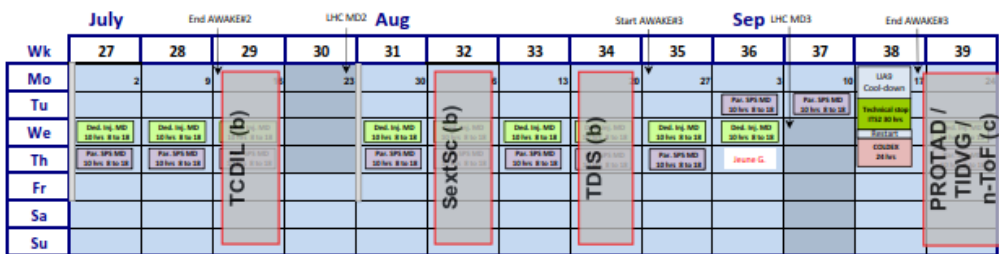
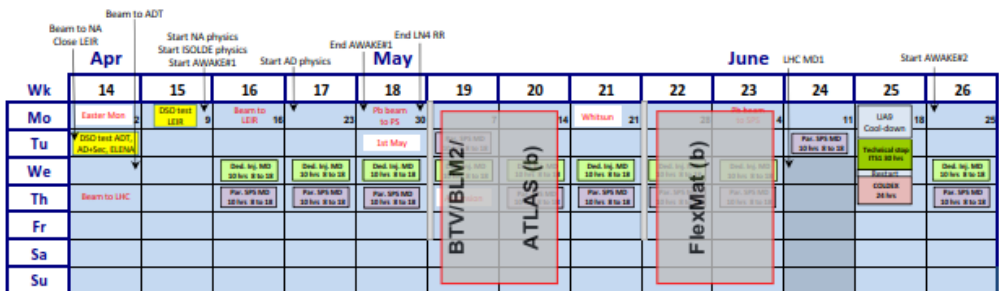
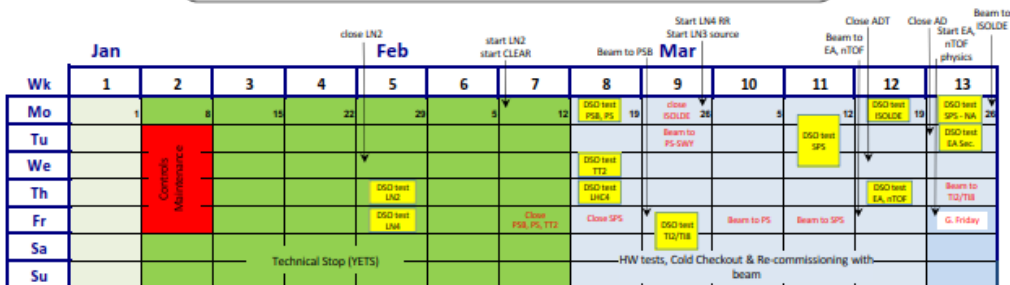


# HiRadMat Experimental Updates

- Ongoing situation:
  - Week 37: Installation of equipment & experiment in TJ7/TNC. Team flexible and access will be taken when slots available.
  - Week 38: Installation of HRMT43 during TS week due to radioactive samples installed in the experimental tank in BA7 (sample installation & experimental installation in TNC to occur consecutively) – access guaranteed during this time.
- Week 39: Multi-Tank beam-time.
- Week 40: HRMT43 beam-time.
- Week 41: standby.

# Injector Accelerator Schedule 2018

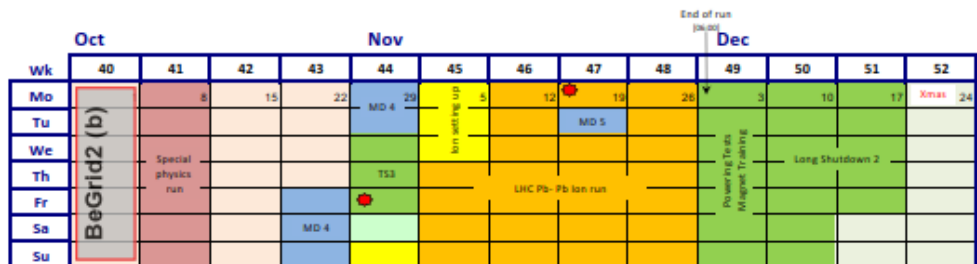
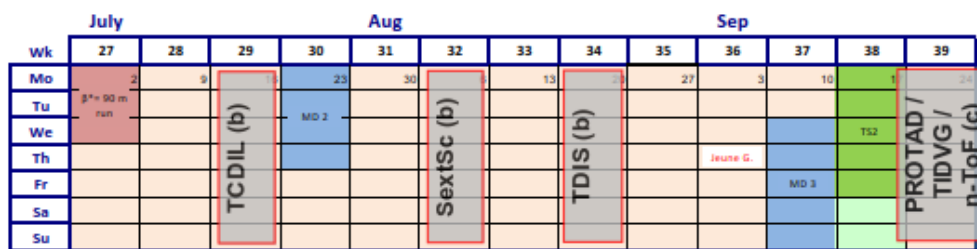
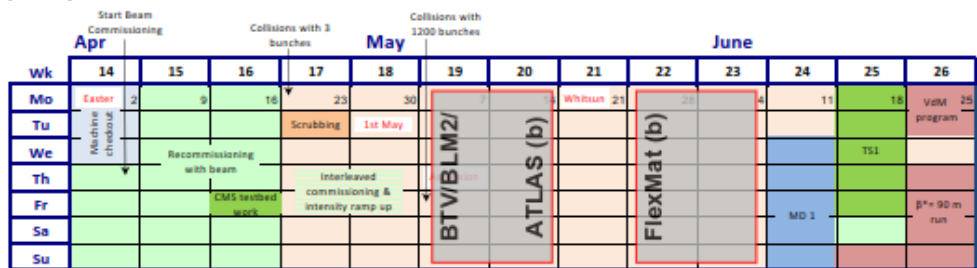
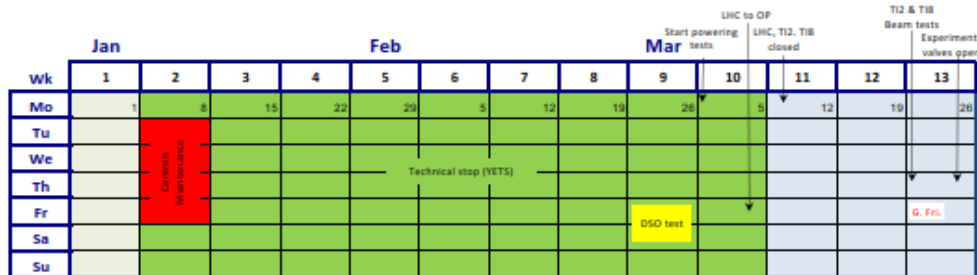
Approved by Research board on 06.12.2017



- Injector Complex MD Block
- Technical stop for the Injector Chain
- Indication of LHC MD blocks proton period
- Special (physics) runs
- LINAC 3 Pb oven re-fill
- HiRadMat: possible beam request
- Ions to NA and/or LHC
- Indication of LHC MD blocks ion period
- Parallel SPS MD, reduced duty cycle for NA

# LHC Schedule 2018

Approved by Research board on 06.12.2017



- Technical Stop
- Powering tests
- Machine check out
- Recommissioning with beam
- Interleaved commissioning & intensity ramp up
- Proton physics run
- Special physics runs (indicative - schedule to be established)
- Machine development
- Scrubbing (indicative - dates to be established)
- Pb - Pb Ion physics run
- Pb ion Setting up
- LINAC 3 Pb oven re-fill

# HRMT48 Pulse List (Week 39)

## Beam Pulse List Template

Beam time estimate  $\cong$  15 hours.

Will use HRM long cycle.

Beam Pulse List							
No	Intensity			Beam spot [mm]		Bunch spacing [ns]	Pulse length [us]
	# bunches	p/bunch	Total	Sigma_x	Sigma_y		
1 to 100	1	1.20E+11	1.20E+11	0.7	0.7	25	2.50E-02
100 to 400	18**	4.45E+10	8.00E+11	0.7	0.7	25	0.45
<b>Total</b>			<b>2.52E+14</b>				

\*\* A pulse as close as possible to 18 bunches is necessary. 16 or 20 b would be also acceptable

# HRMT49 Pulse List (Week 39)

<b>Beam Pulse List Template</b>							
Created: 26-Jun-18							
<b>Beam Pulse List</b>							
No	Intensity			Beam spot [mm]		Bunch spacing [ns]	Pulse length [us]
	# bunches	p/bunch	Total	Sigma_x	Sigma_y		
<b>1 to 3</b>	12	1.20E+11	1.44E+12	1	1	25	0,3
<b>3 to 6</b>	24	1.20E+11	2.88E+12	1	1	25	0,6
<b>6 to 9</b>	36	1.20E+11	4.32E+12	1	1	25	0,9
<b>9 to 12</b>	72	1.20E+11	8.64E+12	1	1	25	1,8
	<b>Total</b>		<b>5.18E+13</b>				

Beam time estimate  $\cong$  4 hours.

Will use HRM long cycle.

Same optics as HRMT49.

# HRMT46 Pulse List (Week 39/40 (41))

Beam time estimate  $\cong$  26 hours.

Will use HRM short cycle, Pulse period = 22.8 s.

<b>Beam Pulse List Template</b>							
reated: 27-Jun-18							
<b>Beam Pulse List</b>							
No	Intensity			Beam spot [mm]		Bunch spacing [ns]	Pulse length [us]
	# bunches	p/bunch	Total	Sigma_x	Sigma_y		
50	1	[0.1e11-1e11]	[0.1e11-1e11]	4	4	Any	Any
1450	1	[0.1e11-1e11]	[0.1e11-1e11]	4	4	Any	Any
20	12	[0.5e11-1e11]	[6e11-12e11]	4	4	Any	Any
20	24	[0.5e11-1e11]	[12e11-24e11]	4	4	Any	Any
20	36	[0.7e11-1e11]	[25.2e11-36e11]	4	4	Any	Any
940	36	[0.7e11-1e11]	[25.2e11-36e11]	4	4	Any	Any
<b>Total</b>			<b>3.75E+15</b>				

# HRMT43 Pulse List (Week 40)

## Beam Pulse List Template

Created: 08-Aug-18

Beam Pulse List								
No	Intensity			Beam spot [mm]		Bunch spacing [ns]	Pulse length [us]	Target
	# bunches	p/bunch	Total	Sigma_x	Sigma_y			
1	144	8.50E+10	1.22E+13	0.25	0.25	25	3.6	Array 4
2	144	8.50E+10	1.22E+13	0.25	0.25	25	3.6	Array 4
3	144	8.50E+10	1.22E+13	0.25	0.25	25	3.6	Array 4
4	144	8.50E+10	1.22E+13	0.25	0.25	25	3.6	Array 4
5	144	8.50E+10	1.22E+13	0.25	0.25	25	3.6	Array 4
6	144	8.50E+10	1.22E+13	0.25	0.25	25	3.6	Array 3
7	216	1.30E+11	2.81E+13	0.25	0.25	25	5.4	Array 2
8	288	1.30E+11	3.74E+13	0.25	0.25	25	7.2	Array 1

Total 1.39E+14

Note: Pulse list does not include pilot beam pulses (1.3e11 protons) for beam alignment purposes

Beam time estimate  $\cong$  5 hours.

Will use HRM long cycle.

One 288 bunch pulse.

# Thanks & Questions

## Acknowledgements:

- ARIES is co-funded by the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement no. 730871.
- BE/BI, BE/OP, EN/EA, EN/HE, EN/MME, EN/SMM, EN/STI, HSE/RP



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# Back-Up Slides



# HiRadMat Super Cycle Information

- HiRadMat ‘Long’ Super Cycle:
  - HRM\_LS = 22.8 s, SFTPRO = 10.8 s, MD cycle = 7.2 s (3.6 s potentially depending on planning).
  - TOTAL = 40.8 s (or 37.2 s).
- HiRadMat ‘Short’ Super Cycle:
  - HRM\_SS = 8.4 s, SFTPRO = 10.8 s, MD cycle = 7.2 s (3.6 s potentially depending on planning).
  - TOTAL = 26.4 s (or 22.8 s).