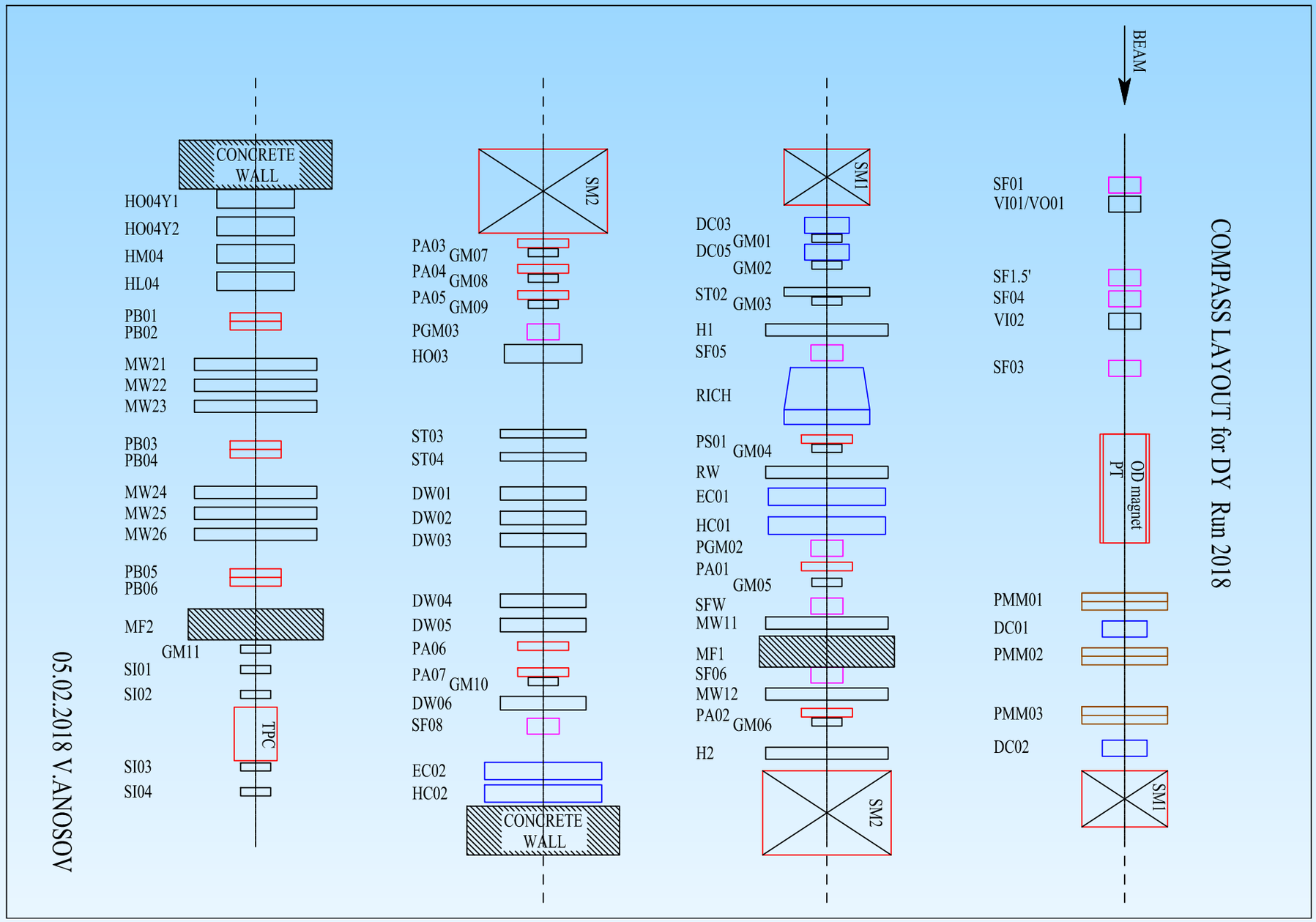
Technical Board Meeting:

News, communications & planning



ILLINOIS

April 10, 2018

Caroline Riedl

CERN

Communications

- Minutes of TB meeting February 20, 2018:
  https://indico.cern.ch/event/704820/attachments/1614921/2574535/TB-Minutes-2018-02-20_v2.pdf

- Caroline will leave CERN June 30, 2018. The search for a new TC should be initiated.

- 2018 TB meetings:
  June 5
  September 3
  November 6

Status of installations (Vladimir Anosov)

- All detectors, excluding beam telescope (SF1.5, SF03, SF04, VI02) and VetoUp&Down, installed in beam position and surveyed (see EDMS: 1961540 "COMPASS - DY RUN 2018)
- All 3 test setups (Proton Radius, Straw NA-64, MUonE) installed and surveyed - 3 separate surveyors reports available
- Modification of concrete shielding (according to RP requirements) done
- Coupling of SF04 with new frame done
- Concrete platform for beam telescope with SF04 and VI02 on top of it has been installed week before Bonn meeting and dismantled to let PT loading platform installation

done

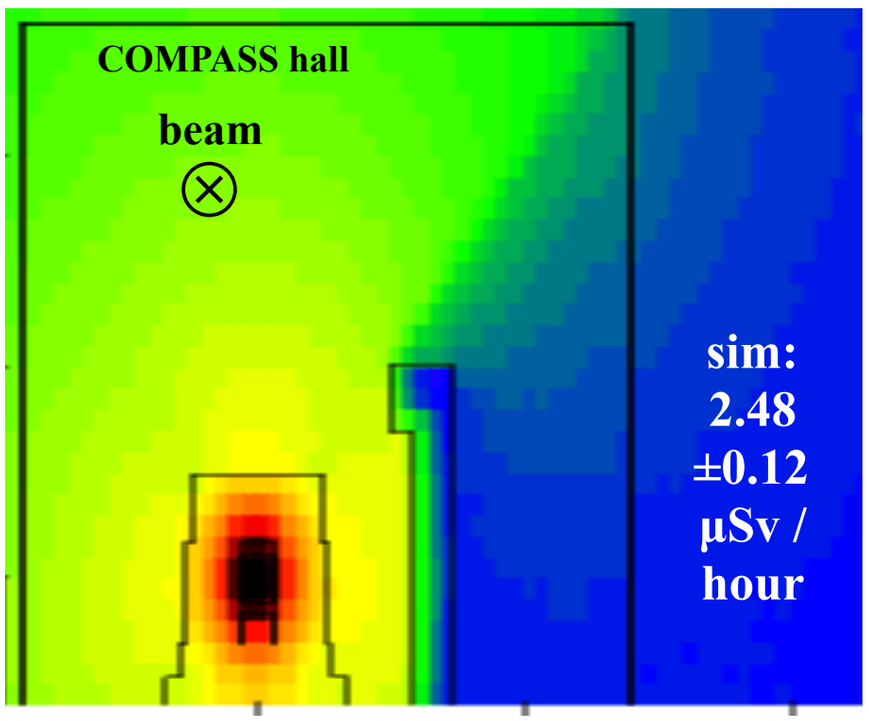
- 2 slabs of HO03 missing; to be installed by next MD.

to be done

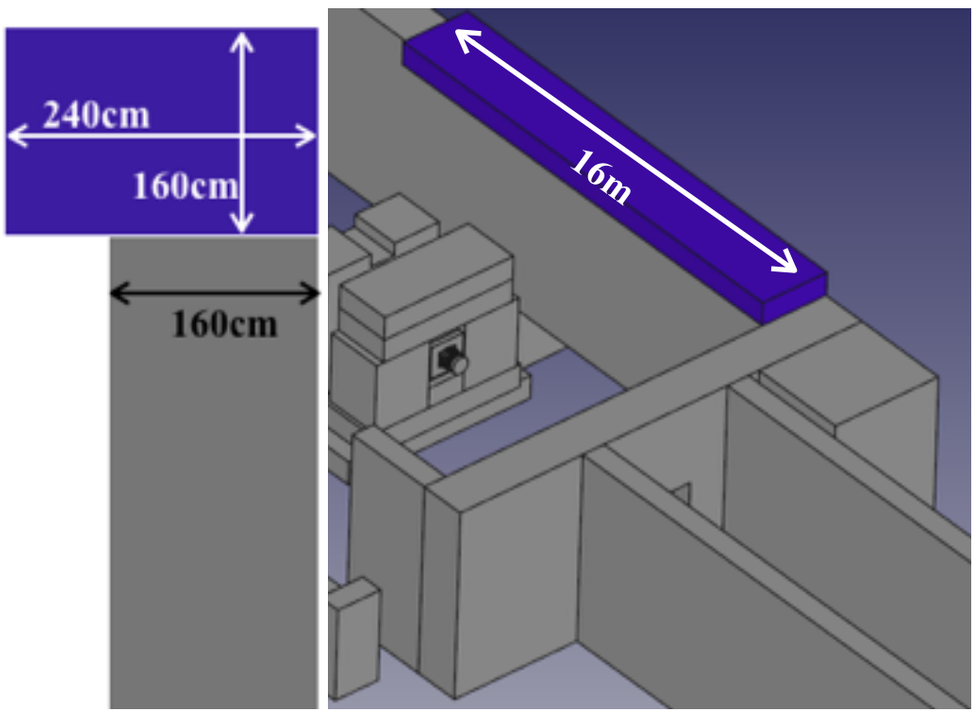
- Concrete platform for beam telescope will be installed on 24.04.18
- Installation of SF03 to be done first (25.04.18)
- SF03 survey with pos. adjustment (25.04.18)
- Installation of VI02, SF04, SF1.5 (26.-28.04.18)
- Survey of VI02, SF04, SF1.5 with pos. adjustment (26.-28.04.18)
- Installation of Veto Up&Down (26.-28.04.18)

Beam in 888

- Balcony shielding completed Friday April 5
- Beam permit: received Sunday night.



new balcony shielding



BLUE WATERS

Delay in target magnet commissioning

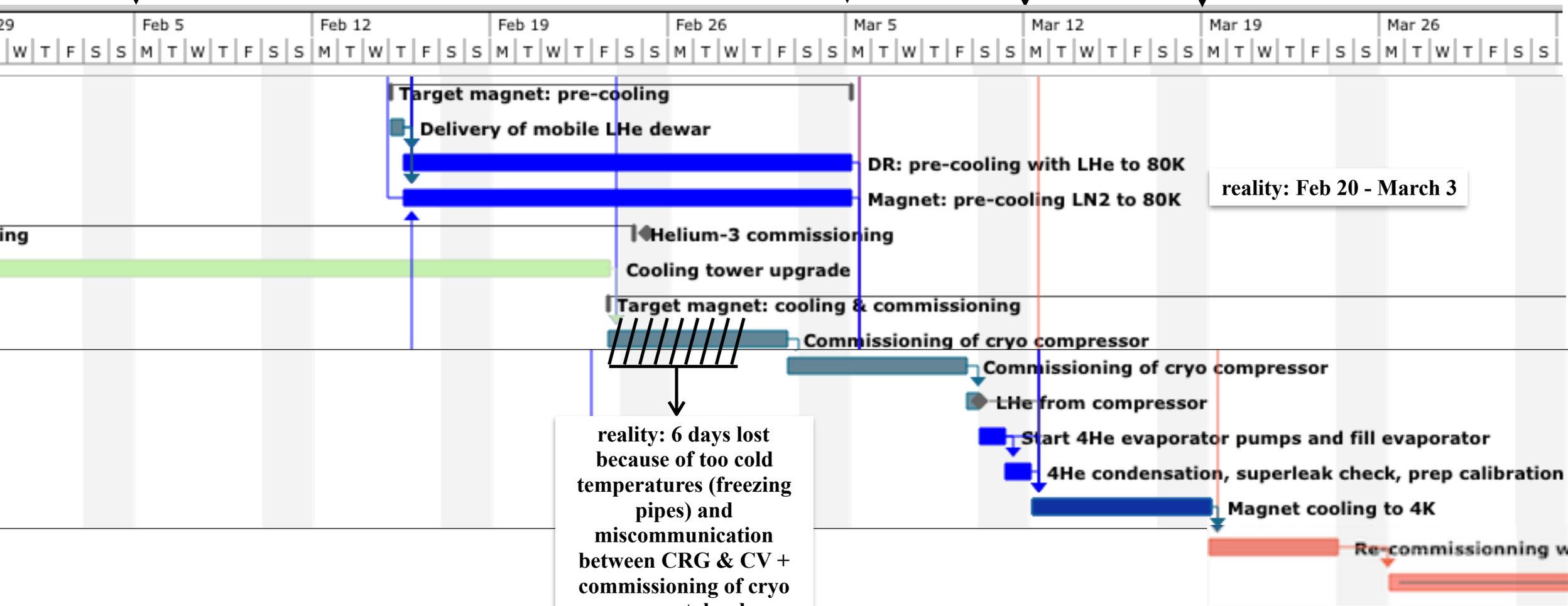
Original start of 4K-cooling

Actual start of 4K-cooling

6 weeks of delay due to cooling tower

gain 2 weeks (mobile dewars)

temperature & communication



reality: Feb 20 - March 3

reality: 6 days lost because of too cold temperatures (freezing pipes) and miscommunication between CRG & CV + commissioning of cryo compressor takes longer than 1 week

Magnet commissioning ~~5 weeks~~
4 weeks until ~~April 22~~ April 13

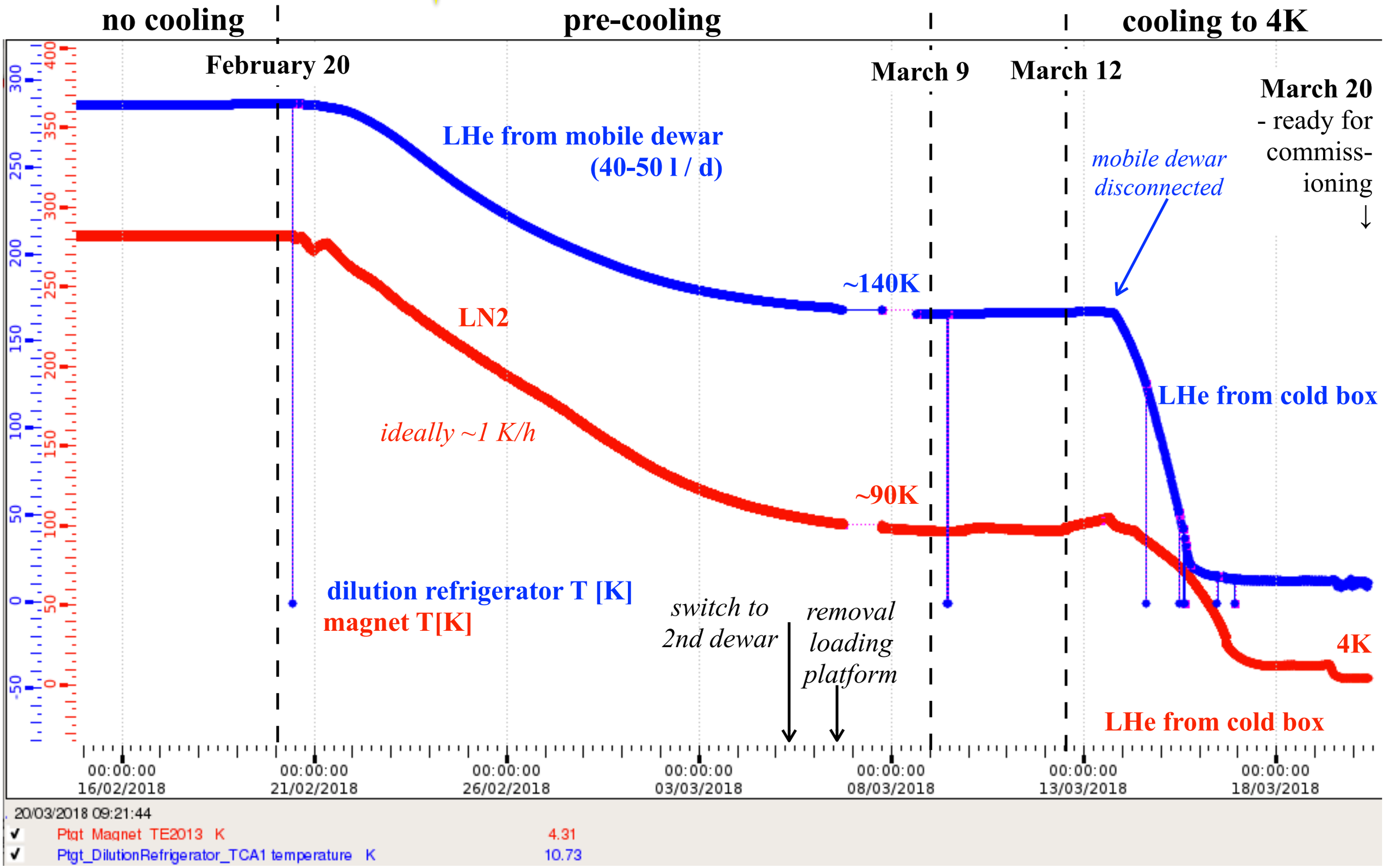
1 week is gained later by skipping the empty-target TE calibration.
- This means that online polarization values might be underestimated, as in 2015.
- Will be done after end of run.

⇒ ~~**total 3 weeks of delay**~~

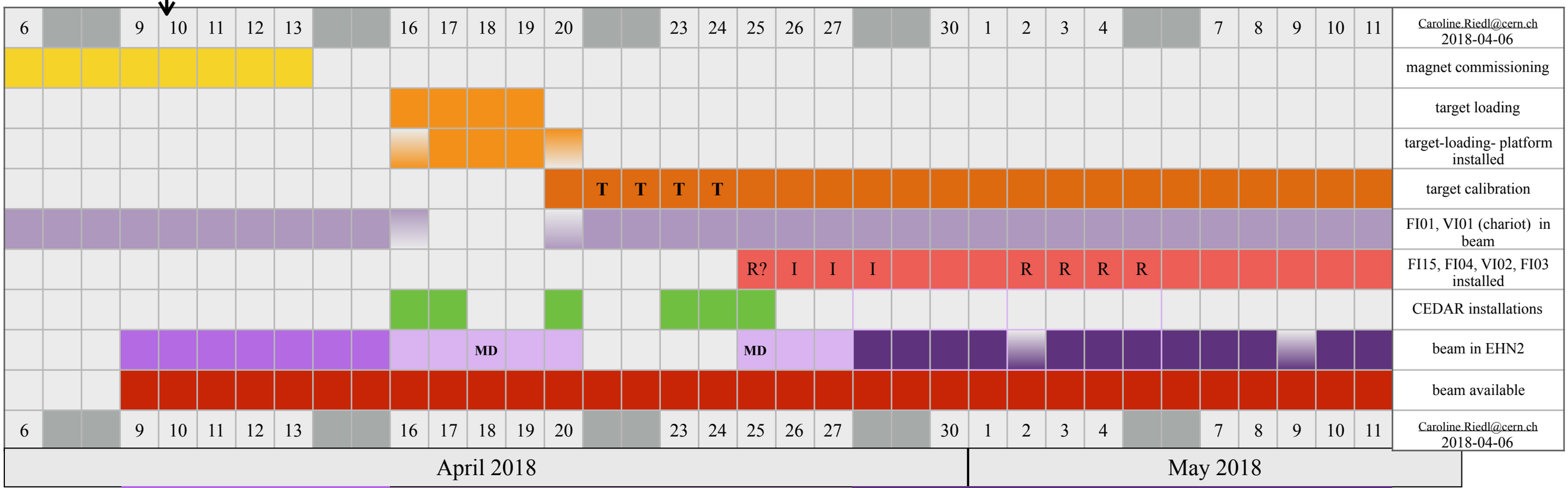
Total 4 weeks of delay & no empty TE calibration (which would have taken ~ 1 week)

But then magnet commissioning was shorter by 1 week (4 instead of 5 weeks)

Target cooling 2018



Preparation of COMPASS 2018 DY run



April 9-15: muon beam day & night

April 16-20 & 25-27: muon beam with multiple interruptions due to target loading & COMPASS installations; beam in the night

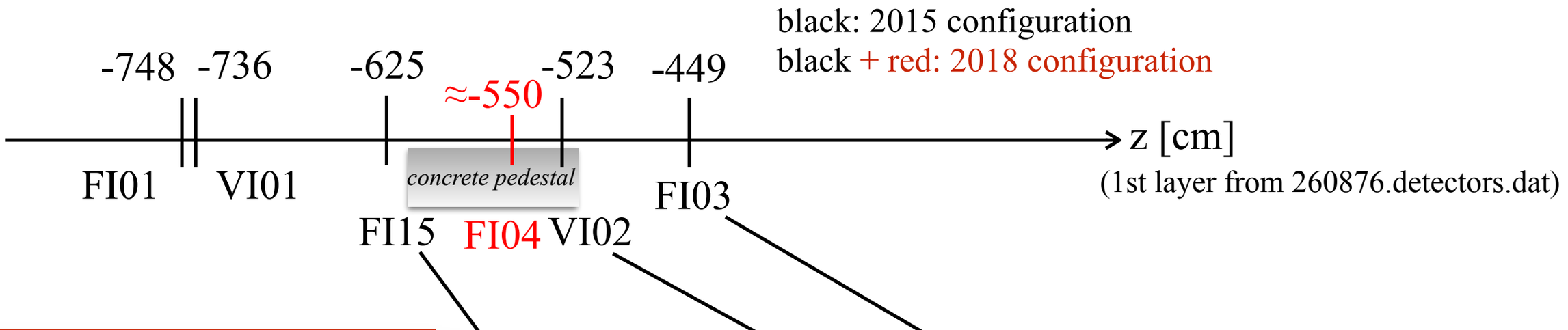
April 28++ hadron beam day & night with increasing intensity + muon beam at certain times

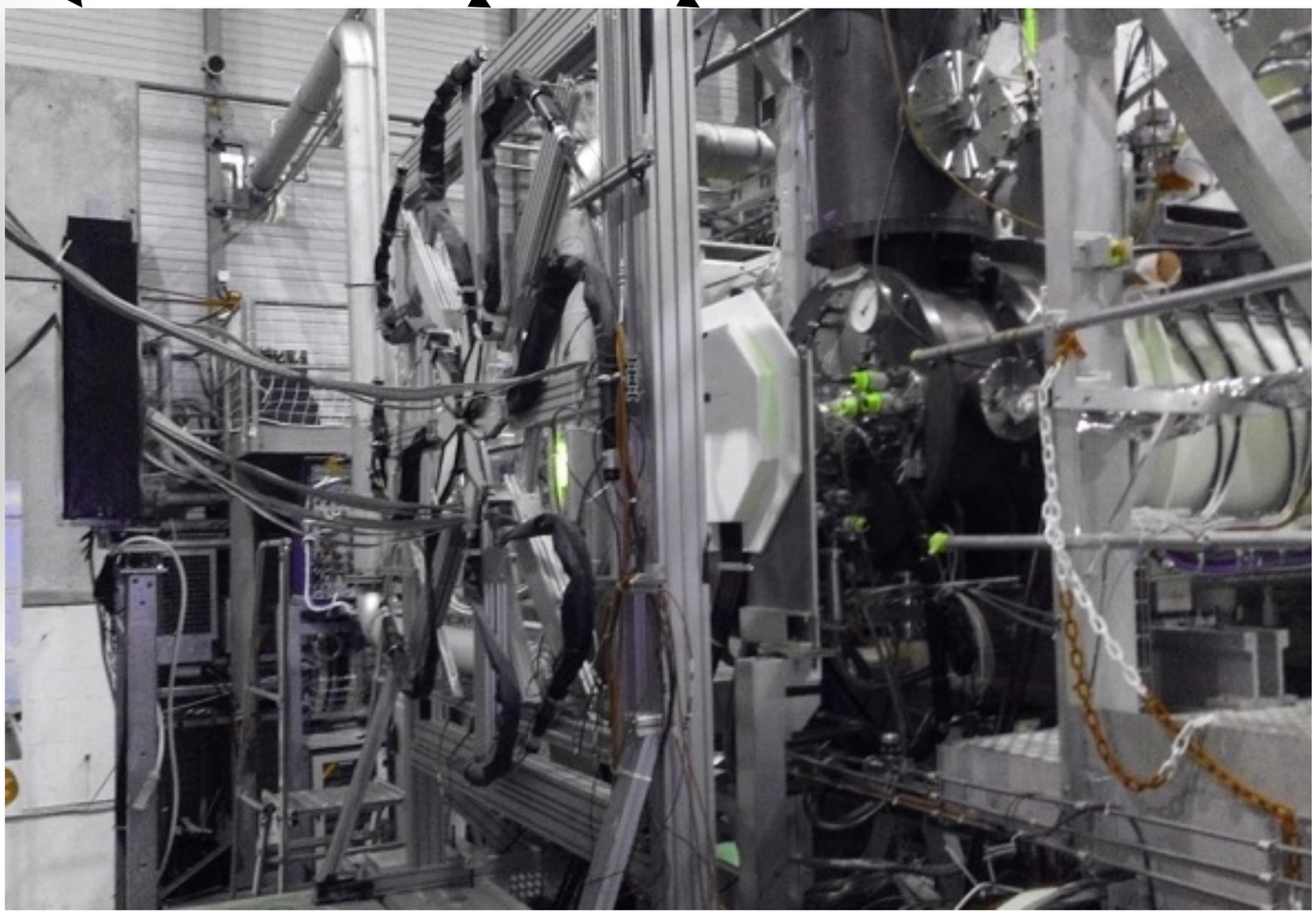
CEDAR installations in the period April 16-25 with access to the beam tunnel:
6 work days 8h during the day

Planning as of April 6, 2018

April 16 (Monday): uncable FI01 & VI01 & move out of beam, install target-loading platform 10:00
April 17 (Tuesday): load target
April 20 (Friday): remove target-loading platform 9:00, move chariot with FI01 & VI01 in beam & cable 10:00
April 21-24 (Saturday - Tuesday morning): TE calibration (2 temperature points) without beam
April 24 (Tuesday) afternoon: install concrete blocks for SciFis
April 25-27 (Wednesday - Friday): install FI15, FI04, VI02, FI03 + new plane FI15U for beam monitoring

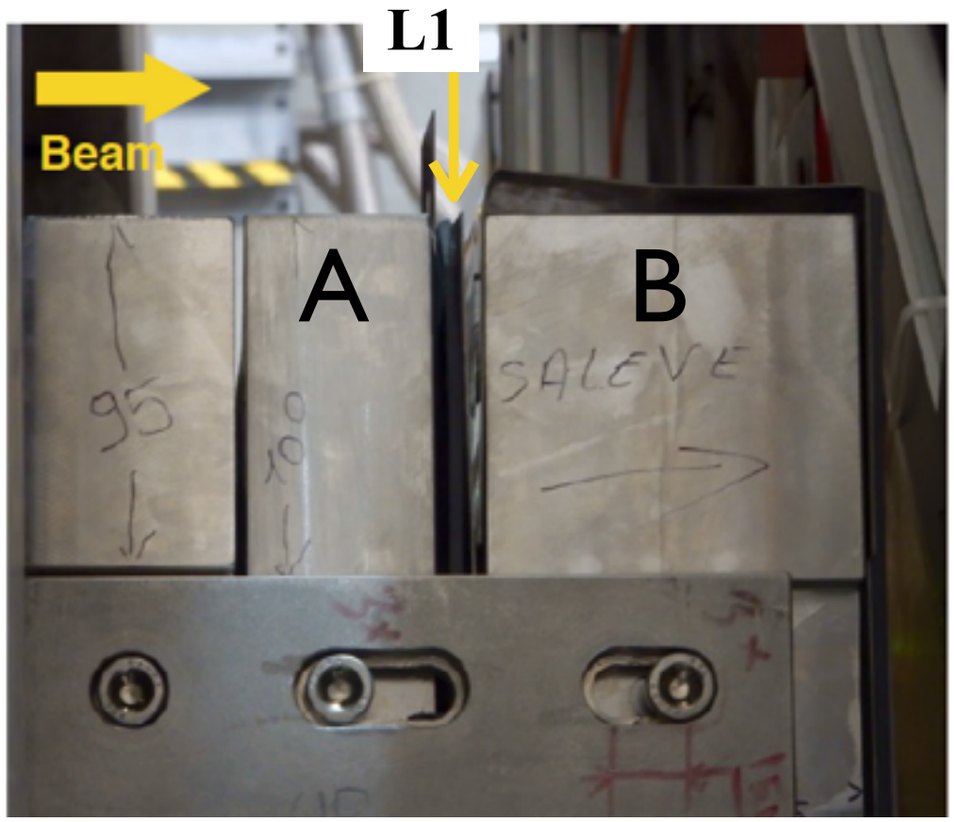
Beam Telescope: 2018 configuration



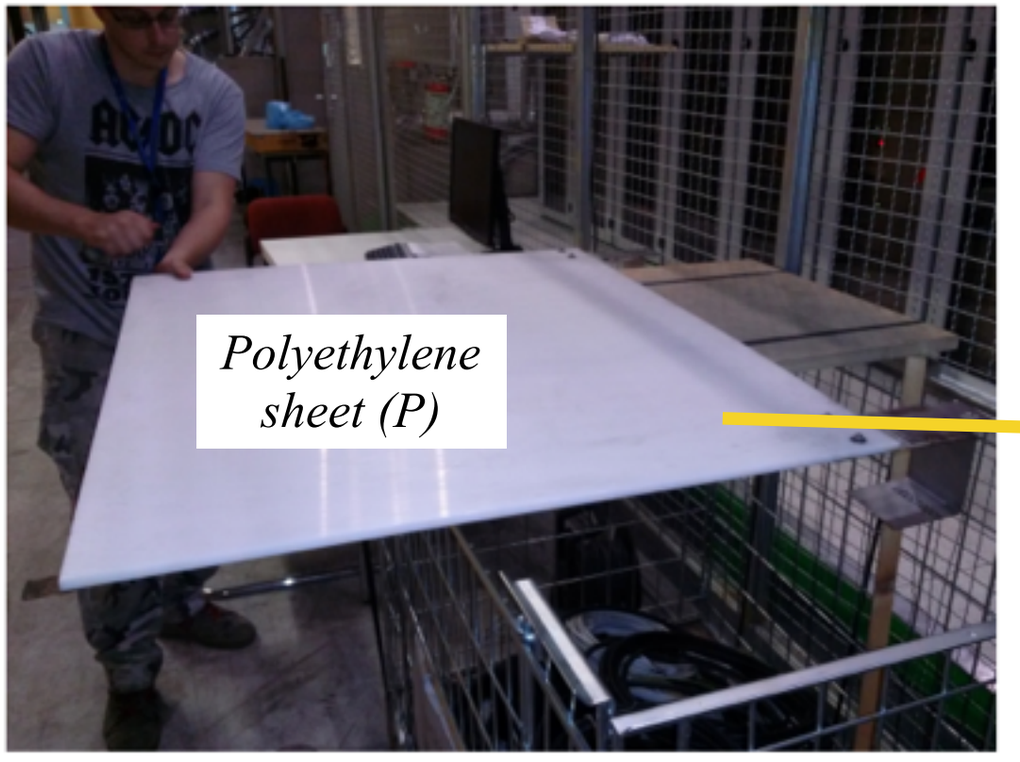


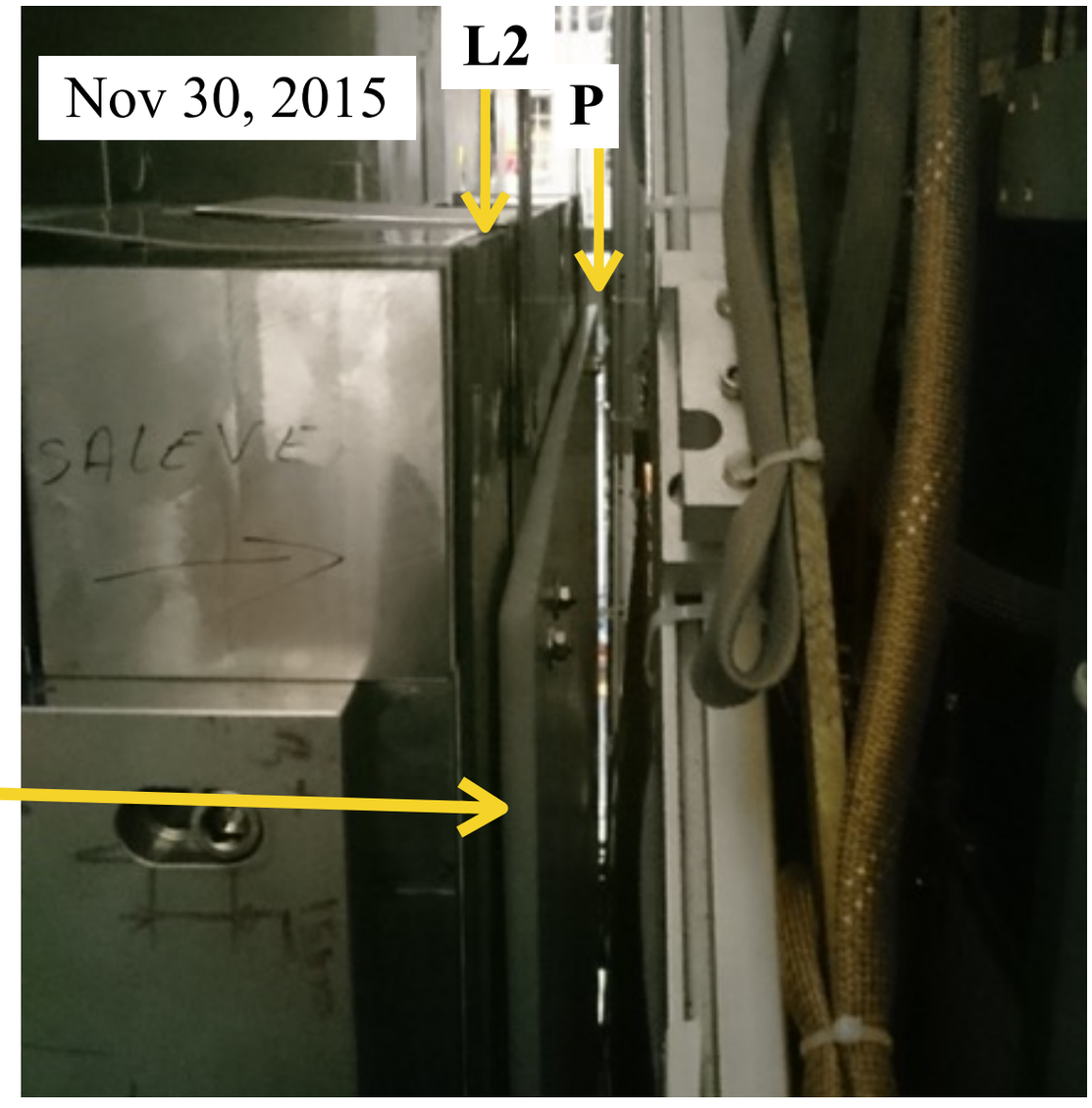
6Li absorber for 2018 run

photos: from 2015!



- Shipped from Illinois to France, currently clearing customs in Lyon, expected arrival at CERN Prevessin this week.
- Then installation in COMPASS.
- More info: CR's talk at 2018-01-18 DY meeting, https://twiki.cern.ch/twiki/pub/Compass/Drell_Yan/WeeklyDYmeeting/Li6-Absorber-2015_2018-01-18.pdf





EHN2 2018 test measurements

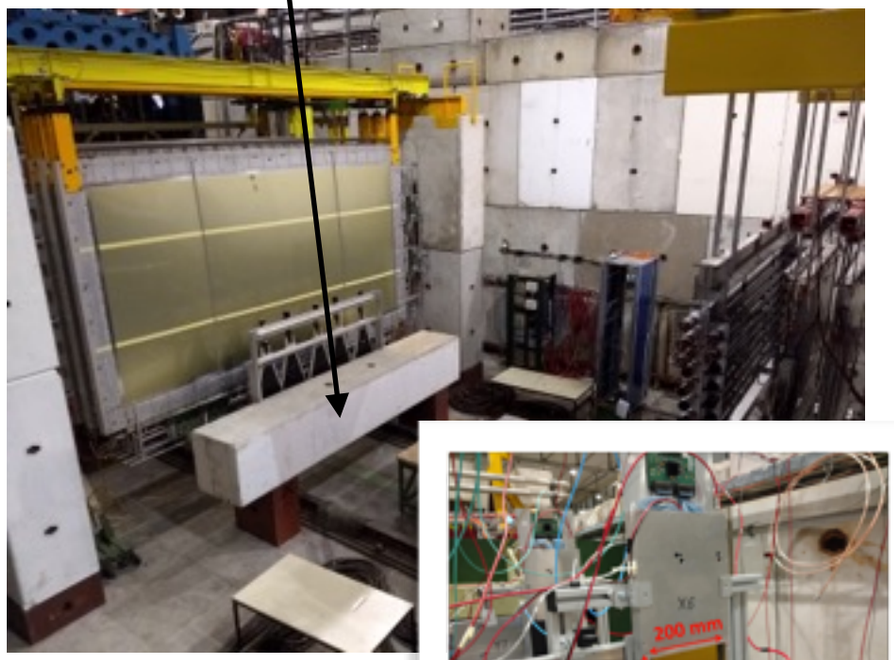
mu-on-e **proton radius (COMPASS++)**

beam

Proton Radius:
- March 21: TPC delivery
- 2-3 days installation
- then calibration

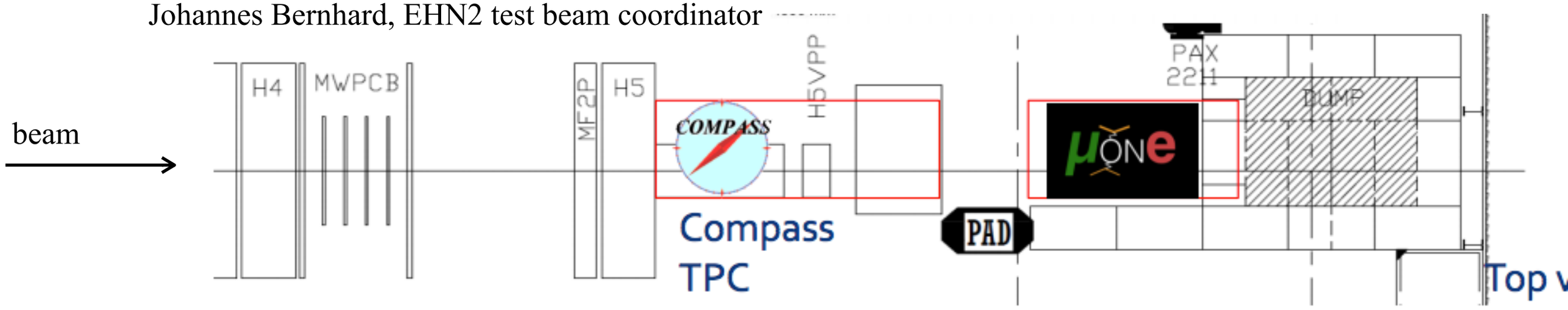
Muone:
- Plan to be ready for beam April 9

straw detector with iFTDC (NA64)



NA64 straws:
- concrete blocks installation <March 25
- technician: installation in beam line > March 25
  < April 9
- 1 week of beam time

Johannes Bernhard, EHN2 test beam coordinator



News from the EATM (Annika Vauth)

96th @ March 13, 2018

- North area cooling tower consolidation was done on time, all the works completed and the towers have been restarted

- SUSI installation: waiting for the IT connection

- Cryo operation: UNICOS control migration from CPC5 to CPC6 ((CPC = Continuous Process Control package ; UNICOS = CERN's Unified Industrial Control System framework)) done for coldbox, nitrogen circuit, dewars, tbd for compressors ; LN2 Tanks purchasing planned for 2019 to replace the currently rented tanks

- CEDAR active thermal insulation upgrade: the thermal housing has been completed (CV installation was ongoing and planned to be finished before the end of March 2018)

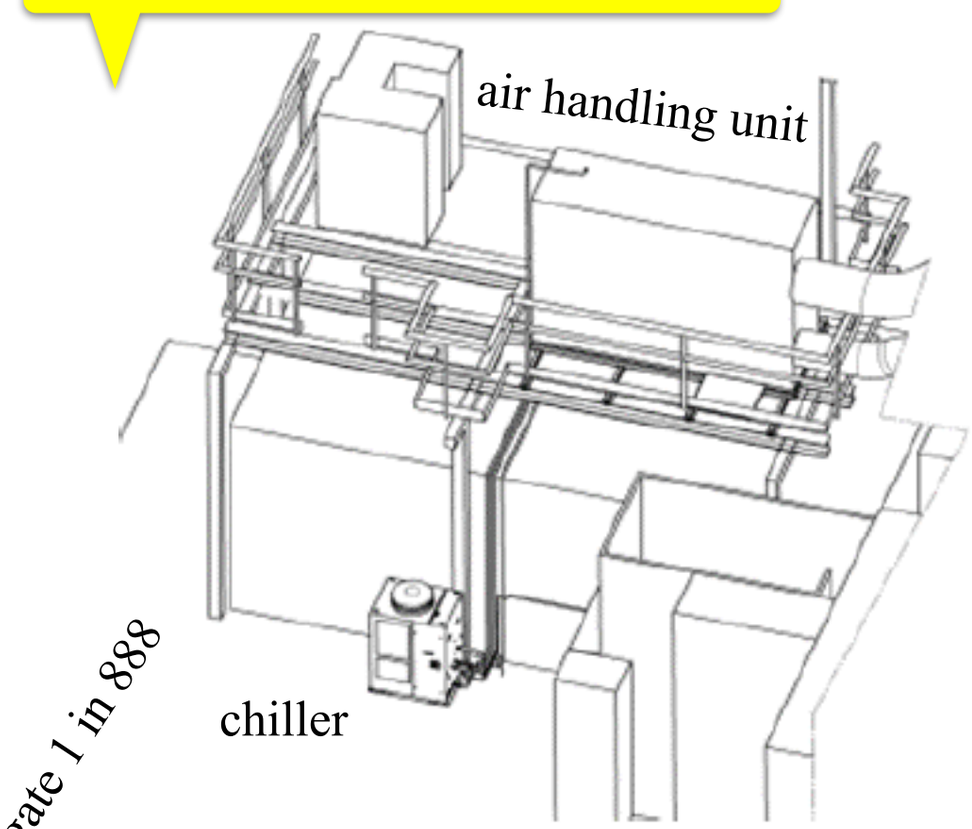
- TE/MSC: short, power-on test of the beam-line magnets in North Area (EHN1/EHN2) at the 19-20th of March.

- TE/EPC: power Converter tests for the spectrometer magnets SM1/SM2 on 28-29/03.

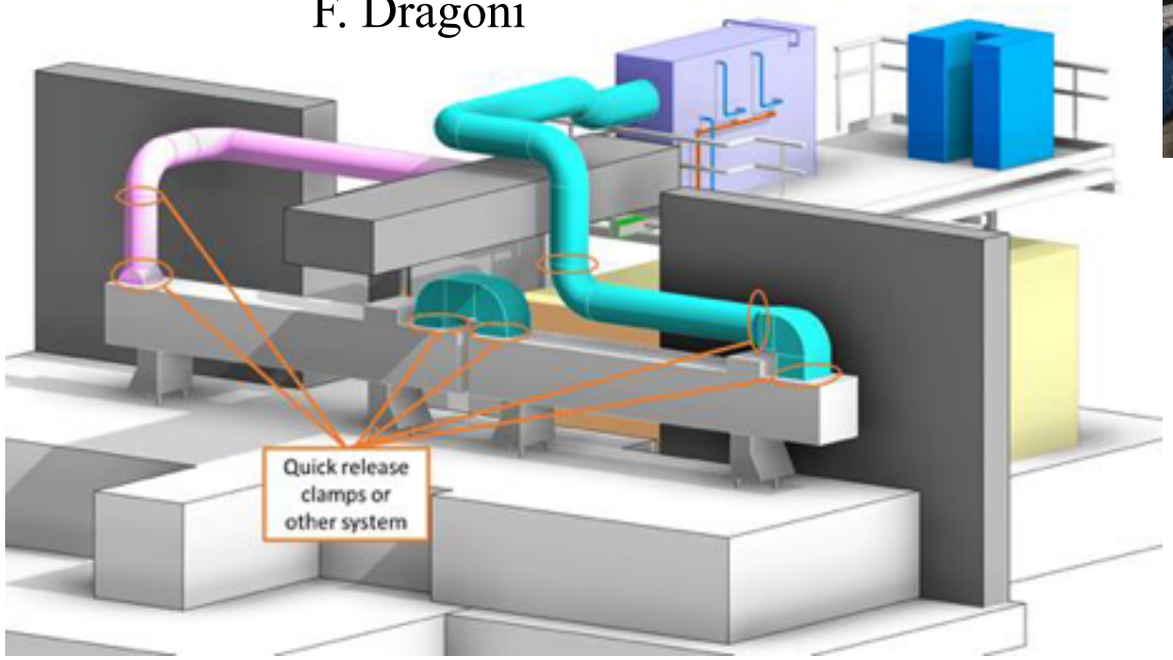
CEDAR upgrade - CERN

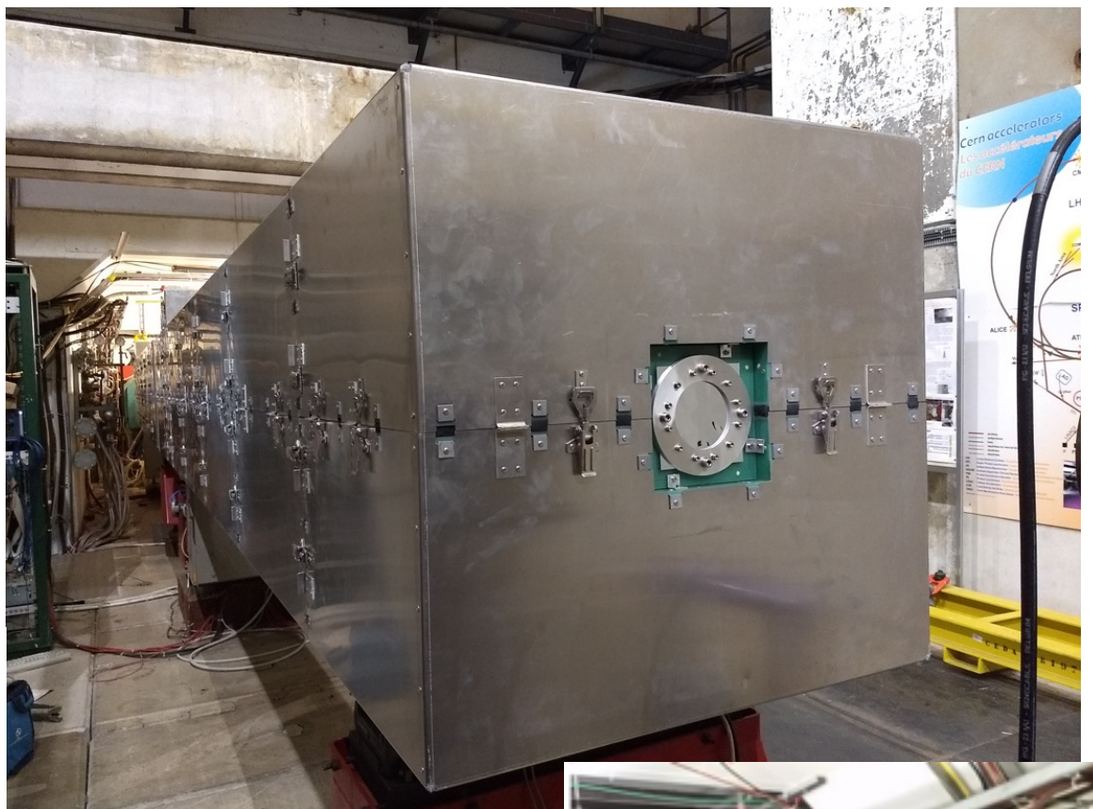
(Serge Mathot, EN-MME) EATM 96 March 13, 2018

- Thermal housing construction and installation finished
- Air ducts and water connections finished (last week)



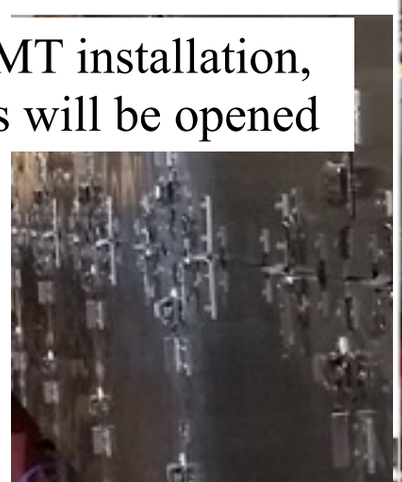
F. Dragoni





new b**eam window** on thermal housing: 125µm mylar

For PMT installation, clamps will be opened



Planning for LS2 (request of input by EATM)

- Changeover target area from DY to SIDIS right after the run. Work might leak into 2019.
  - EN/HE removal of absorber, displacement of the target platform
  - EN/EL disconnection and connection of PT magnet power lines
  - TE/CRG removal of pump lines and re-installation of old or modified pump lines. Disconnection and reconnection of LHe line.

communication by COMPASS (so far)

EATM table of last week, to be rediscussed at EATM this afternoon:

Experimental Area	Experiment	Requirements	Main constraints	Readiness Status	Special Needs - Impacted Equipment / Service Groups Needed: Yes/No, Available/Schedule: ok/tbc Resources: financial and/or personel								
					EN/CV	EN/EL	EN/HE	EN/STI	TE/CRG	BE/ICS	BE/CO	HSE/RP	EN/EA
EA	**CLOUD**	requested operation in 2019, 2020, 2021	no operation possible during 2020 (EL/CV works)	ok for 2019 option for an early run in 2021	X	X							X
NA	**NP02 & NP04**	requested operation during LS2	no operation possible when chilled water is not available	operation possible between May and September	X	X			X	X	?		
	COMPASS	early commissioning likely required (e.g, for cryo target)	cooling water and cryogenics	to investigate if special solution like in 2018 is needed	X				X				X
	NA64	new experimental area	no particular show-stopper	ECR final draft available		X				X			X
	GIF++	operation during LS2 extension of bunker	gas consolidation and cooling/heating (minor)	ECR final draft available	X		X			X			X
	NA62	IKr must be maintained RP needs to access EA to be clarified	backup services must be tested (recent issue identified)	all ok (verification requierd) access to EA in discussion with RP	X	X			X	X	?	X	X

Today's agenda

09:00 → 09:55 **News from the 2018 preparations** — 55m

Speakers: Annika Vauth (CERN), Caroline Kathrin Riedl (Univ. Illinois at Urbana Champaign (US)), Vladimir Anosov (Joint Institute for Nuclear Research (RU))

09:55 → 10:25 **Polarized Target** — 30m

Speaker: Norihiro Doshita (Yamagata University (JP))

10:25 → 10:55 **Coffee** — 30m

10:55 → 11:15 **Status of proton radius setup** — 20m

Speaker: Mr Christian Dreisbach (Technische Universitaet Muenchen (DE))

11:15 → 11:45 **CEDARs** — 30m

Speaker: Marcin Ziembicki (Warsaw University of Technology (PL))

11:45 → 12:05 **MWPCs and RW 2018** — 20m

Speakers: Daniele Panzieri (Universita e INFN Torino (IT)), Maxim Alexeev (Universita e INFN Torino (IT))

12:05 → 14:00 **Lunch** — 1h 55m

14:00 → 14:30 **Round table** — 30m

FEE spares

Speakers: Caroline Kathrin Riedl (Univ. Illinois at Urbana Champaign (US)), Maxim Alexeev (Universita e INFN Torino (IT))

14:30 → 14:50 **DAQ 2018** — 20m

Speaker: Vladimir Frolov (Joint Institute for Nuclear Research (RU))

14:50 → 15:20 **DAQFEET 2020++** ¶ — 30m

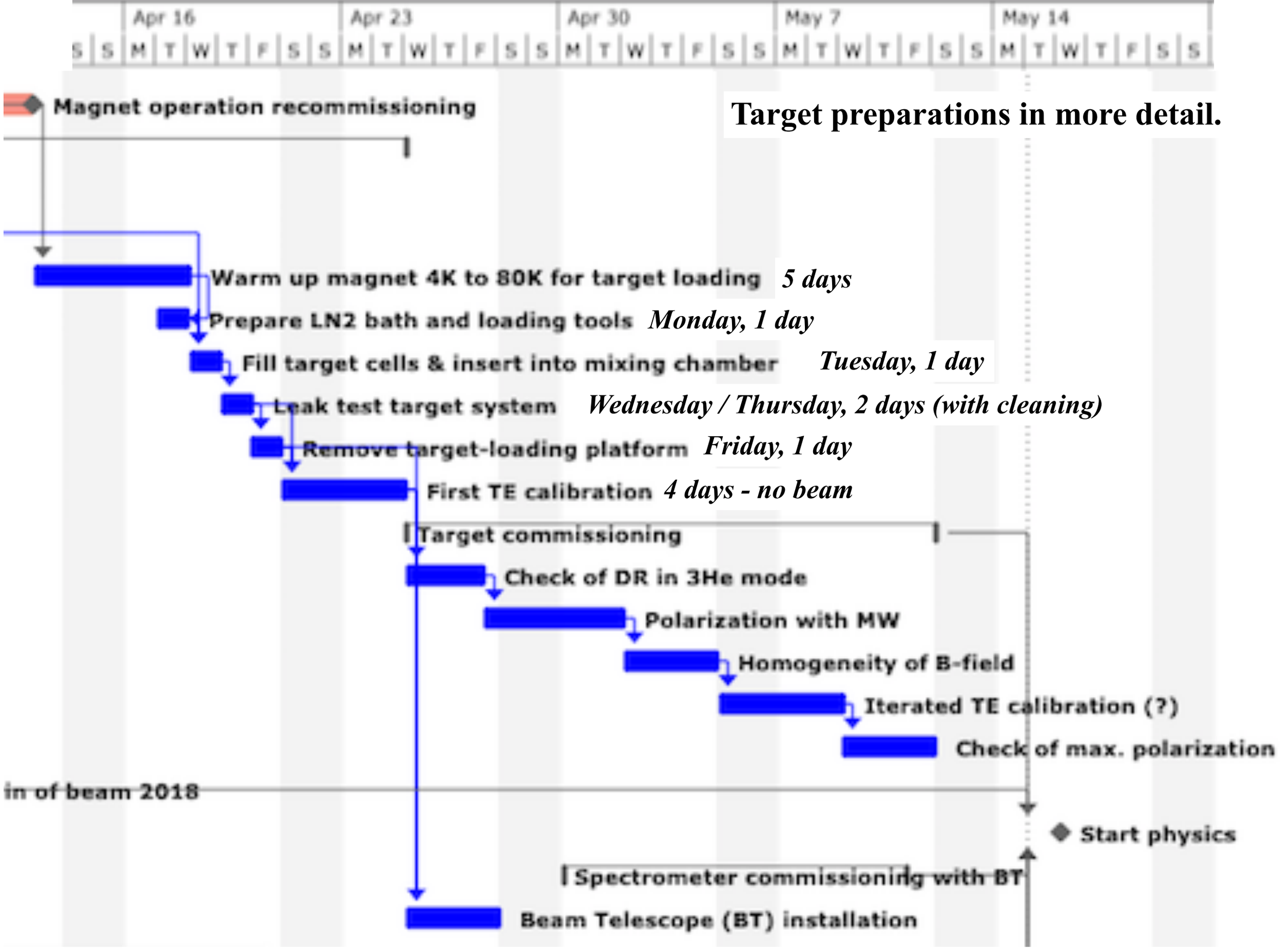
Speaker: Igor Konorov (Technische Universitaet Muenchen (DE))

15:20 → 15:40 **Trigger preparations 2018** — 20m

Speaker: Benjamin Moritz Veit (Johannes Gutenberg Universitaet Mainz (DE))

extra slides

Target preparations in more detail.



Jan 15 | Jan 22 | Jan 29 | Feb 5 | Feb 12 | Feb 19 | Feb 26 | Mar 5 | Mar 12 | Mar 19 | Mar 26 | Apr 2 | Apr 9

Target magnet 2018 before LHe
Power converter rack: transfer
Power converter: reconnect
Power converter: testing
Magnet test (signal test)
Pumping & connect He gas line on panel
Test heater system on helium line
Inspection of safety valves and re-installation
Leak check 4He pump & gas lines
Install LN2 precooling line
Connect Nitrogen gas exhaust line
Reconnect cryo compressor
Other cooling preps
Install DR heater cables
Connect air ducts to DR air heaters
Test mixing chamber rotary pumps
Produce fixture for microwave cavity motor
Test pressure gauges
Target magnet: pre-cooling
Delivery of mobile LHe dewar
DR: pre-cooling with LHe to 80K
Magnet: pre-cooling LN2 to 80K
Helium-3 commissioning
Change pump oil
Prepare & install helium-3 thermometer
Purge 3He system with dry nitrogen
Leak check 3He pipes
Helium-3 commissioning
Reconnect and test water cooling of 3He system
Cooling tower upgrade
Target magnet: cooling & commissioning
Commissioning of cryo compressor
Commissioning of cryo compressor
LHe from compressor
Start 4He evaporator pumps and fill evaporator
4He condensation, superleak check, prep calibration
Magnet cooling to 4K
Re-commissionning with safety system
Target: loading and calibration
Test insertion of target holder to mixing chamber

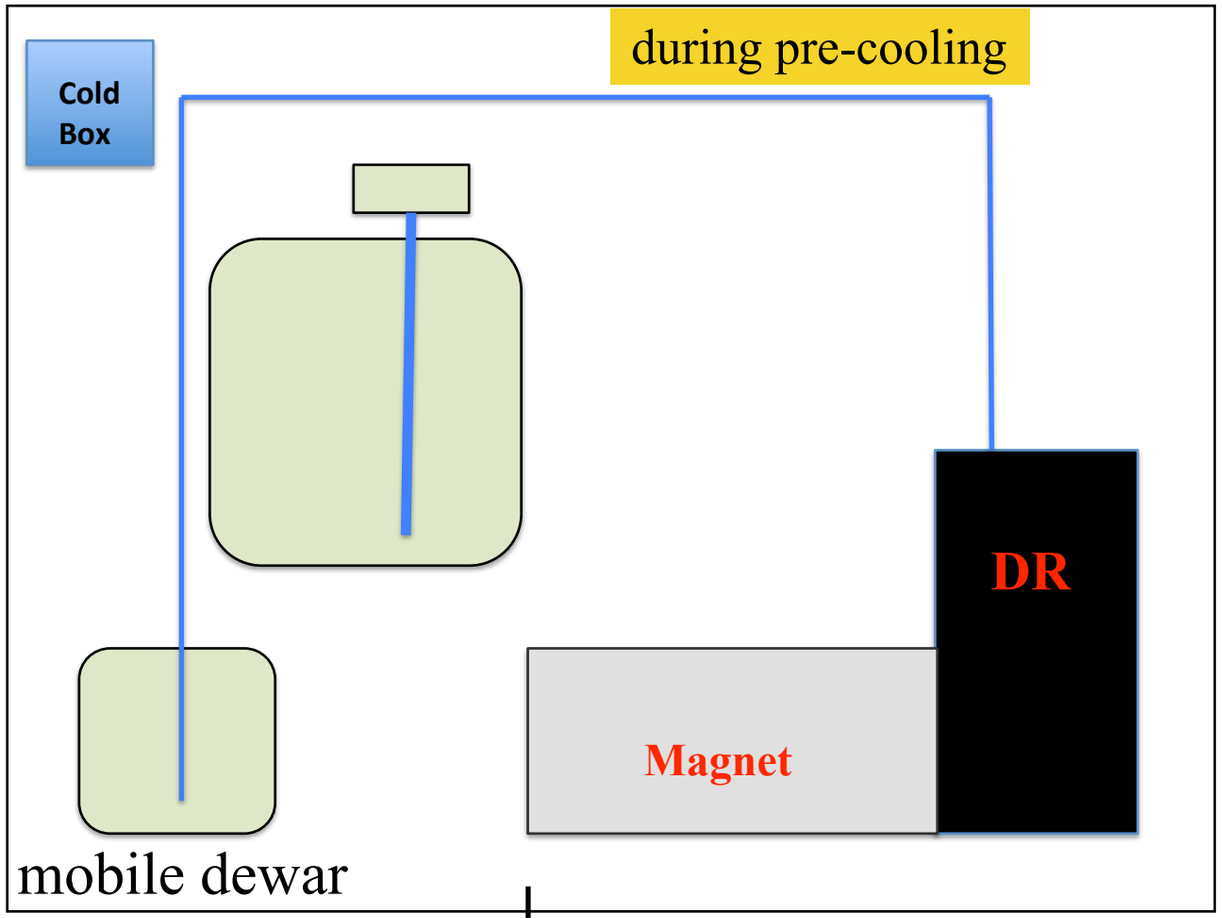
COMPASS
TE-CRG
EP-DT
TE-EPC
EN-CV

today

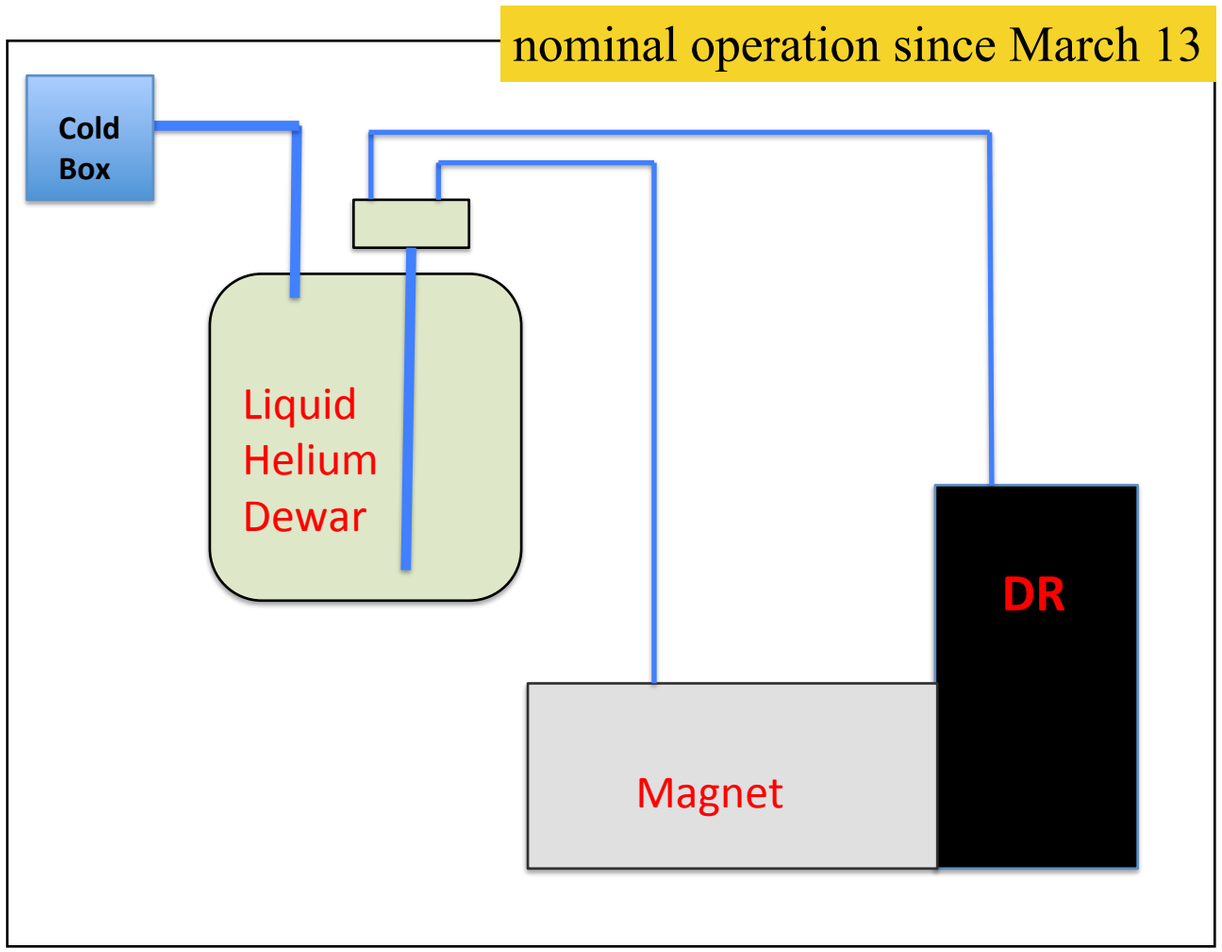
Magnet commissioning with
- new power converter
- new MSS2 input cards
- software upgrades
- new operation sequence

As kindly agreed upon with **Markus Brugger (EP-DT), Fabrice Gautheron** will <u>support the recommissioning of the magnet safety & operation</u>:
10 working days during 12 March - 13 April 2018, tasks to be performed:
- Verification of safety system and actual operation procedure
- Supervision of modification of the new "field rotation" procedure

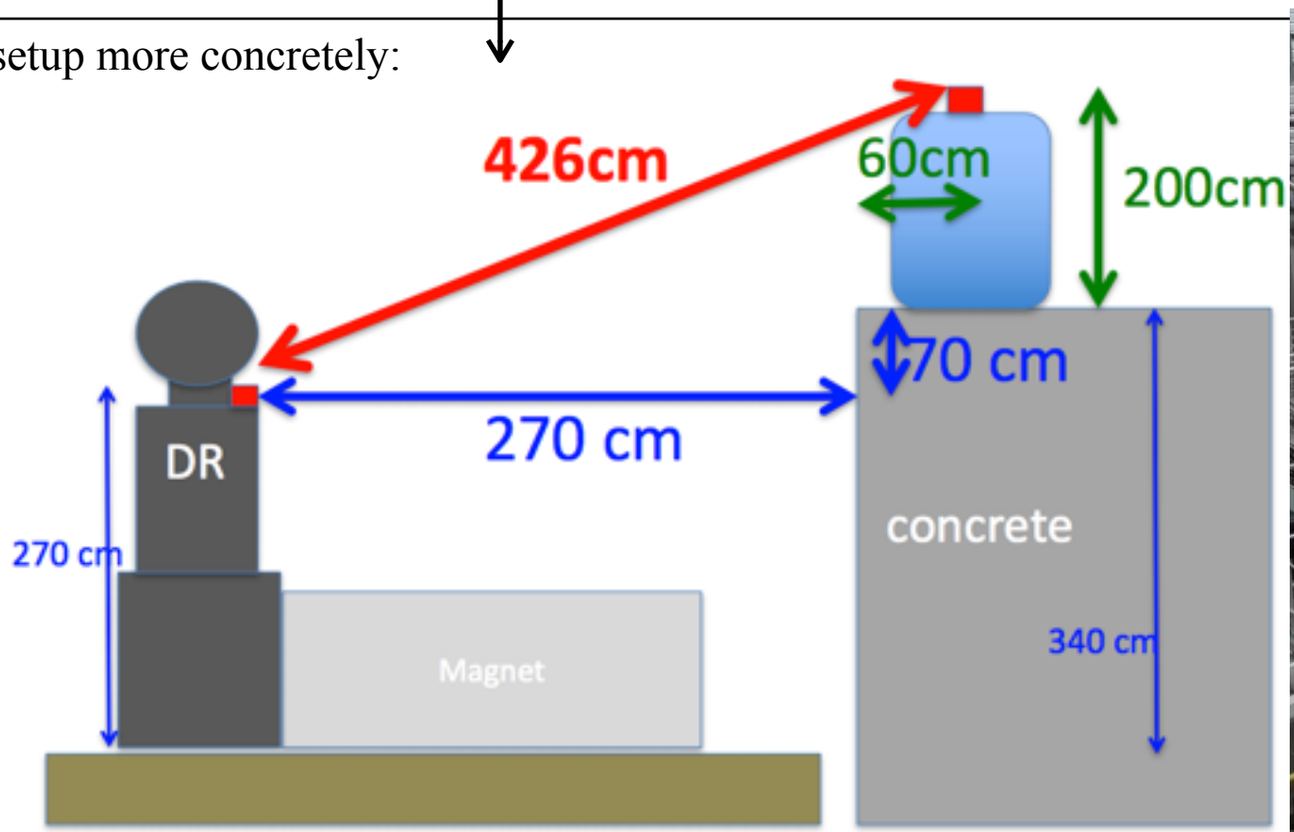
*During **pre-cooling to 80K**, the magnet is cooled with LN2, and the DR is cooled simultaneously with LHe to avoid mechanical stresses.*



*During **cooling to & at 4K**, magnet and DR are cooled with LHe.*



setup more concretely:



Planning in EHN2 April 9-30

beam: yes!

muon low-intensity April 9-22

MWPC FEE
(Maxim Alexeev <Maxim.Alekseev@cern.ch >)

Proton Radius
(Christian Dreisbach <christian.dreisbach@cern.ch>)

MuOne
(Clara Matteuzzi <Clara.Matteuzzi@cern.ch >)

NA64 Straw
(< April 1: Temur Enik <temur.enik@cern.ch>
April 1-30: Viktor Kramarenko <Viktor.Kramarenko@cern.ch>)

beam: no!

Target loading & TE calibration
(Nori Doshita <Norihiro.Doshita@cern.ch >)

April 23 - May 1

Beam Telescope installation

May 2-5

CEDARs
(Marcin Ziembicki <marcin.ziembicki@cern.ch >, Serge Mathot <Serge.Mathot@cern.ch >)

Period April 9-27
PMT installation 4-5 days
FEE installation 7-10 days

Run Coordinator: Vincent Andrieux <vincent.andrieux@cern.ch>
Technical Coordinator: Caroline Riedl <caroline.riedl@cern.ch>
Safety & Beam Coordinator: Annika Vauth <annika.vauth@cern.ch>
Change-over Co-Coordinator: Jens Barth <jens.barth@cern.ch>
Deputy Run Coordinator: Michael Pesek <michael.pesek@cern.ch>

Hall engineer: Vladimir Anosov <Vladimir.Anosov@cern.ch>
DCS coordinator: Christophe Pires <christophe.menezes.pires@cern.ch >
DAQ coordinator: Vladimir Frolov <vladimir.frolov@cern.ch >

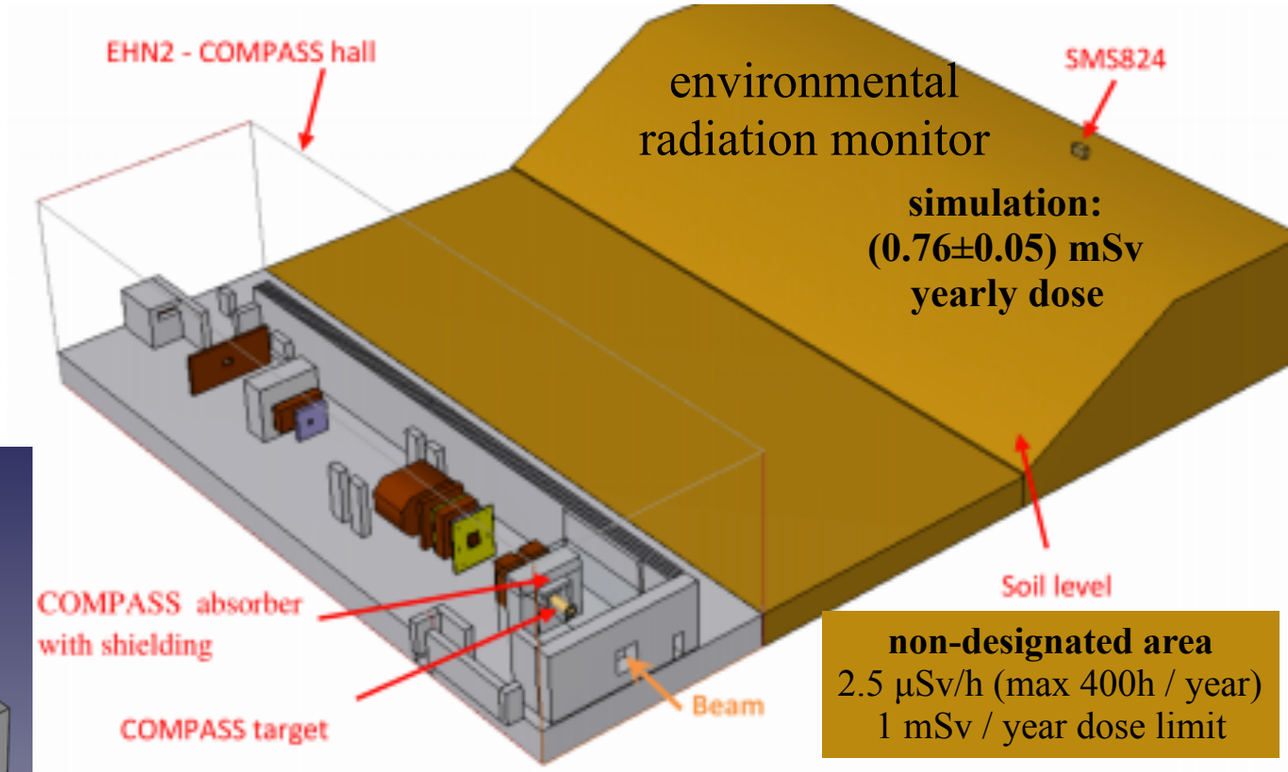
Proton Radius:
- March 21: TPC delivery
- 2-3 days installation
- then calibration

NA64 straws:
- concrete blocks installation <March 25
- installation in beam line done March 29

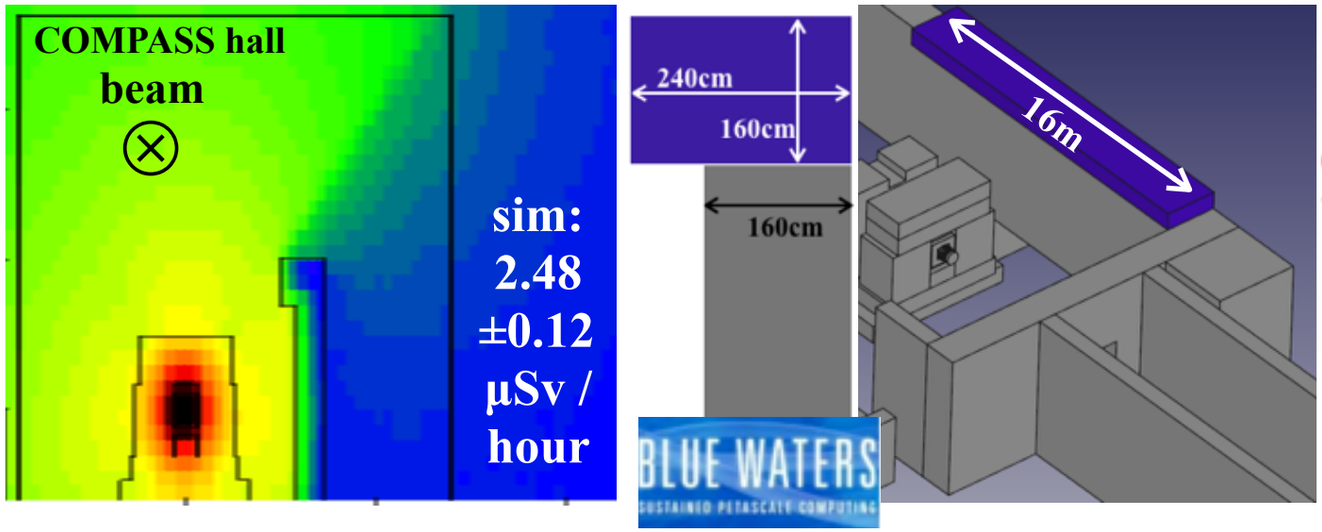
Muone:
- Plan to be ready for beam April 9

Improved shielding for COMPASS 2018 run

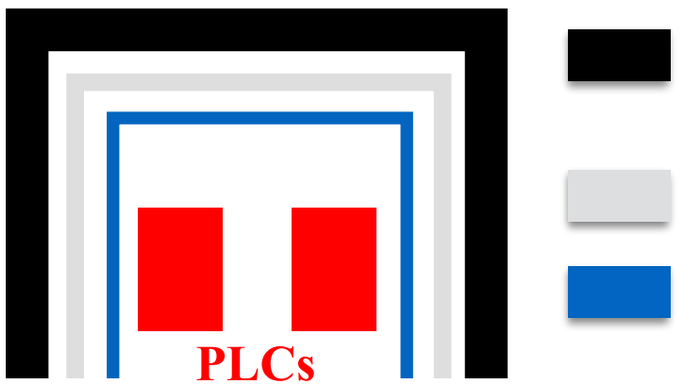
- **Improvement of shielding for better radio protection** at intensity 10^8 pions / second
- Simulation with FLUKA (A. Maggiora)
- Exploiting massive parallel computing resources of Blue Waters.



new balcony shielding



- **Improvement of PLC shielding to reduce the risk of SEEs** (Single Event Effects).
  2015: 9 SEEs during magnet operation, each causing ~48h loss



concrete 80cm = factor 10 reduction in (high-energy) neutron flux, factor 3 thermal neutrons

polyethylene ~2cm to thermalize neutrons

boron-carbid sheet to absorb thermal neutrons (measured to be main source of radiation at PLC location)

Shielding of target PLCs

of target PLCs

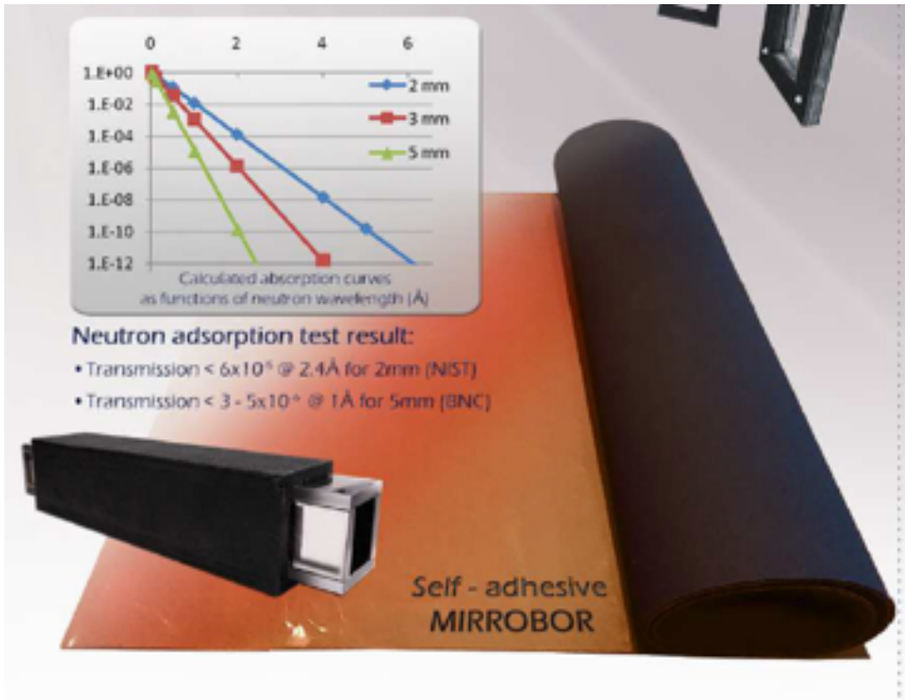
concrete 80cm = factor 10 reduction in (high-energy) neutron flux, factor 3 thermal neutrons

polyethylene ~2cm to thermalize neutrons

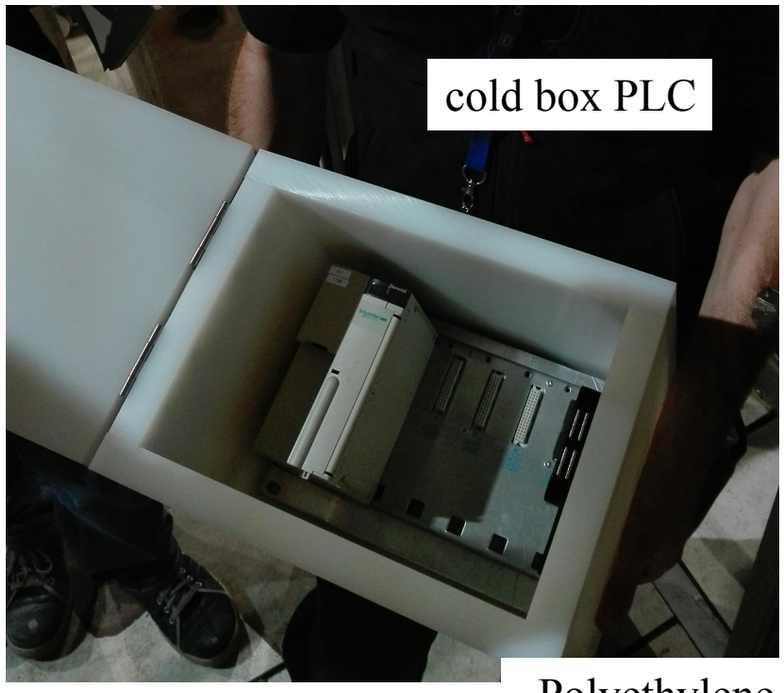
boron-carbid sheet to absorb thermal neutrons

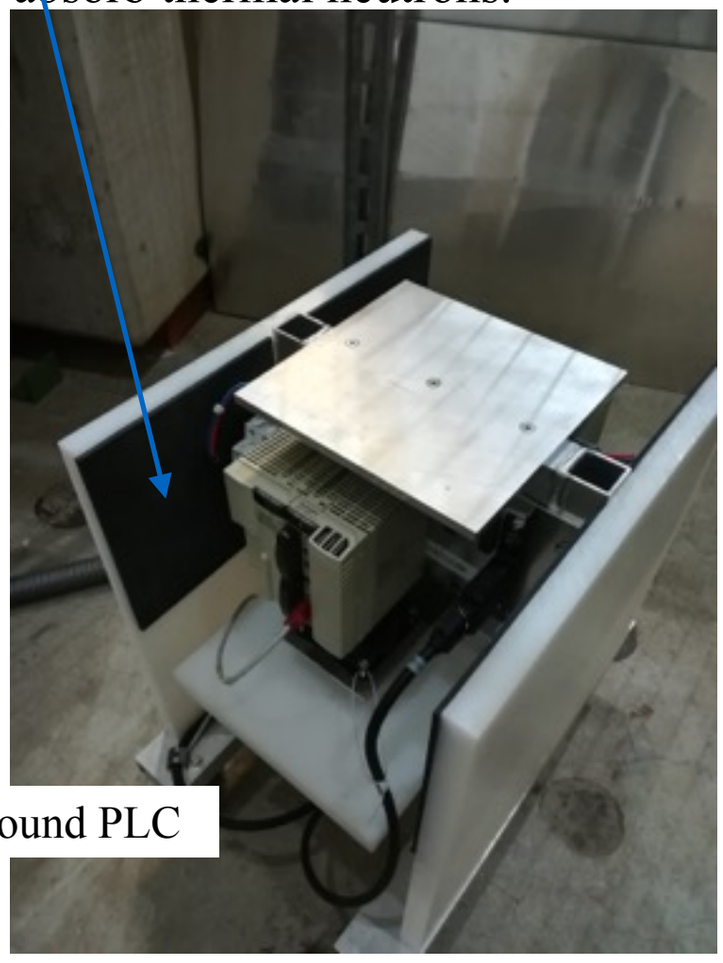
ıylene ~2cm to thermalize neutrons

- boron-carbide 5mm to absorb thermal neutrons.

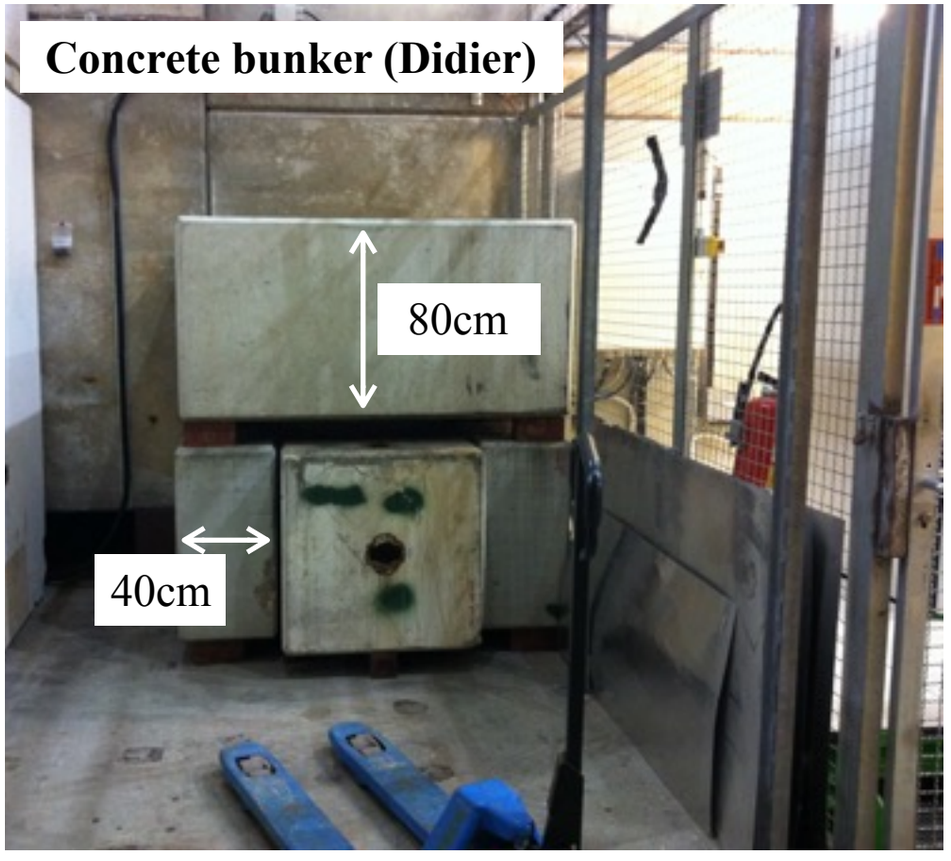


MIRROTRON Ltd. H-1121 Budapest, Konkoly-Thege út 29-33, Hungary
☎(36-1) 3922642 *Fax:* (36-1) 3922282, *E-Mail:* neutron@mirrotron.hu





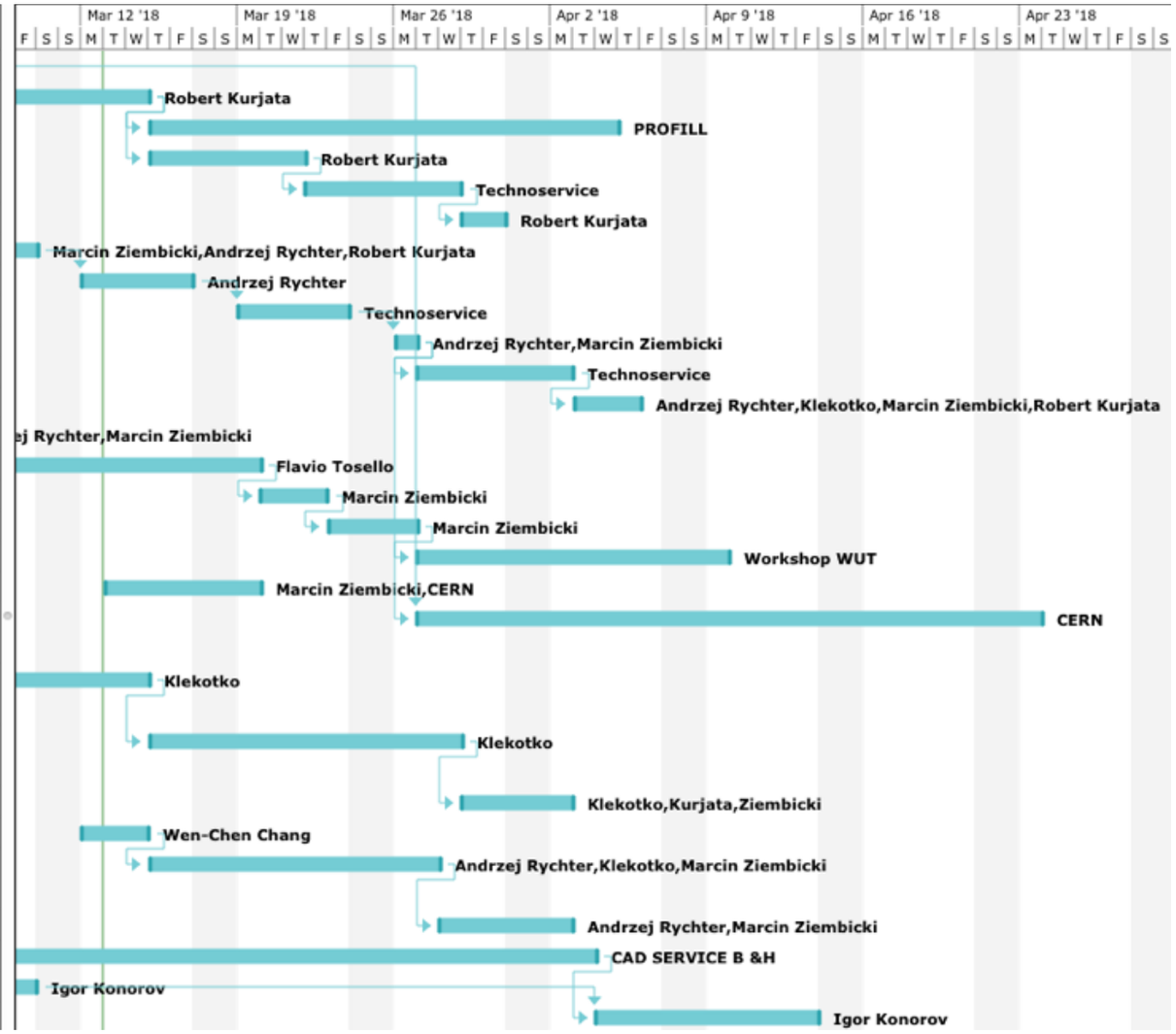
Polyethylene around PLC



CEDAR upgrade - COMPASS

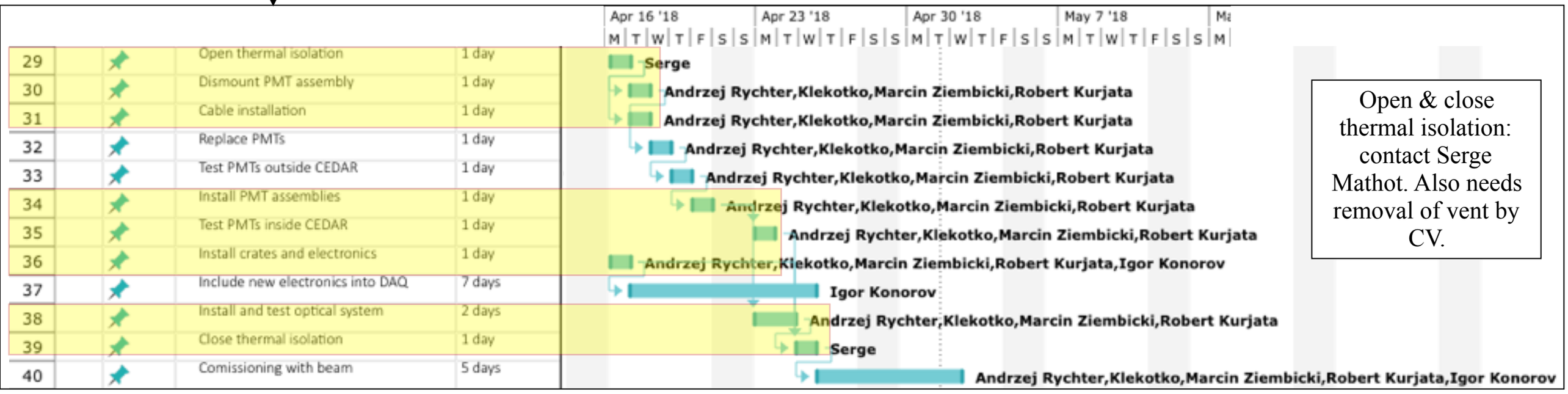
Preparations (Marcin Ziembicki)

	Task Mode	Task Name	Duration
1		Discriminator tests	5 days
2		Discriminator design (16 ch)	13 days
3		Discriminator production	15 days
4		Carrier card design	5 days
5		Carrier card production	5 days
6		Carrier card assembly	2 days
7		PMT rate test (40 MHz)	3 days
8		Divider design	5 days
9		Divider prototype PCB production	5 days
10		Divider prototype assembly + test	1 day
11		Divider production	5 days
12		Divider assembly	3 days
13		PMT characterization	30 days
14		Simulations of PMT position	10 days
15		Mechanics design	3 days
16		Mechanics prototype	2 days
17		Mechanics manufacturing	10 days
18		Cable purchase	5 days
19		Evaluation of compatibility of new electronics with CERN equipment	20 days
20		Optical system for gain monitoring - design	8 days
21		Optical system for gain monitoring - purchase	10 days
22		Optical system for gain monitoring - tests	3 days
23		PMT delivery to WUT for characterization	3 days
24		PMT characterization - all units (automatic measurements)	9 days
25		PMT delivery to CERN	4 days
26		TDC production	22 days
27		TDC firmware	25 days
28		TDC tests prior to installation	8 days



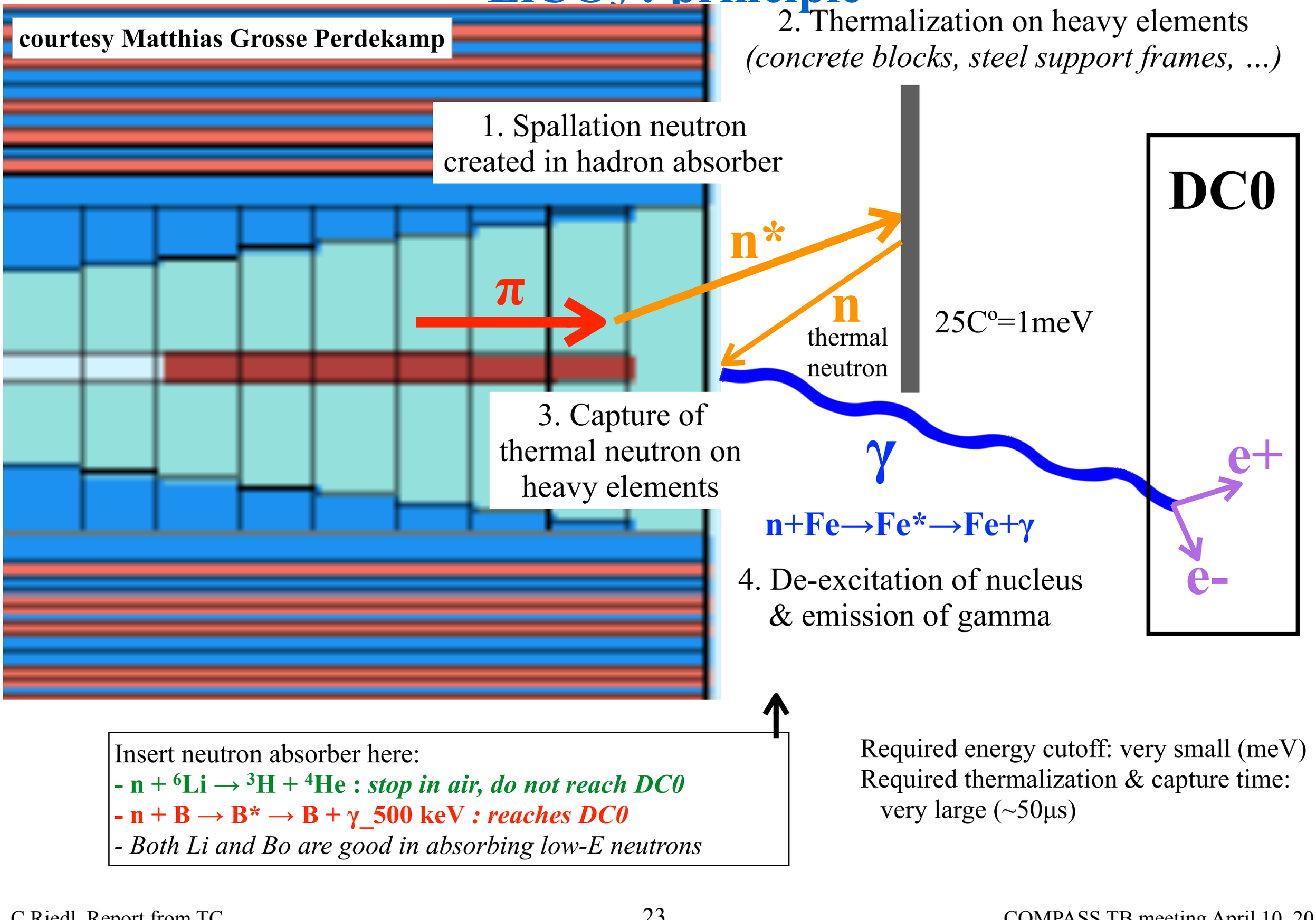
Access to beam tunnel needed:

29 - Open thermal isolation
30 - Dismount PMT assembly
31 - Cable installation
34 - Install PMT assemblies
35 - Test PMTs inside CEDAR
36 - Install crates and electronics
38 - Install and test optical system
39 - Close thermal isolation



Open & close thermal isolation: contact Serge Mathot. Also needs removal of vent by CV.

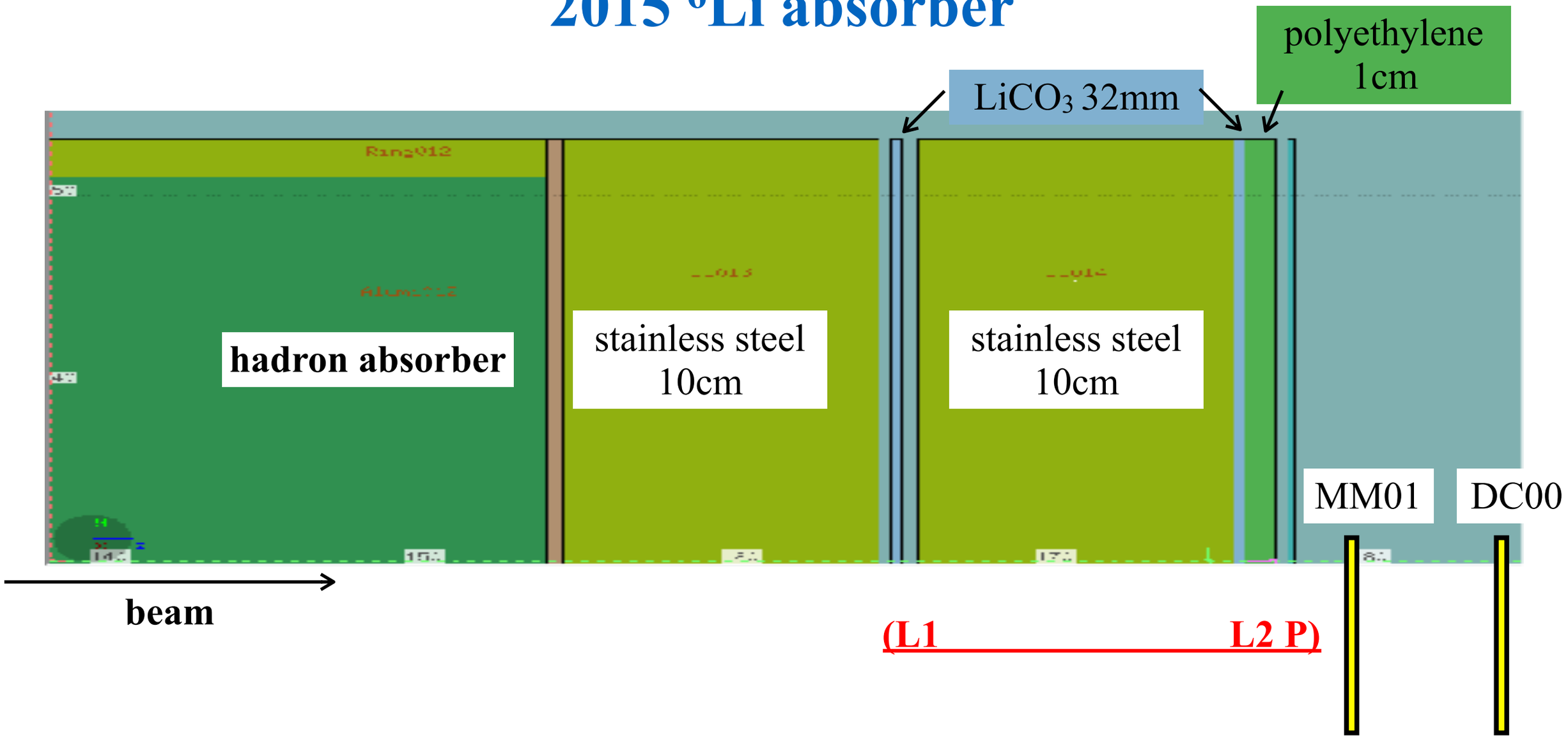
$^{6}LiCO_3$: principle



Insert neutron absorber here:
- **n + ^{6}Li → ^{3}H + ^{4}He : *stop in air, do not reach DC0***
- **n + B → B* → B + γ_500 keV : *reaches DC0***
- *Both Li and Bo are good in absorbing low-E neutrons*

Required energy cutoff: very small (meV)
Required thermalization & capture time:
very large (~50μs)

2015 ^{6}Li absorber



The polyethylene absorber was inserted to address a concern from Dietrich von Harrach. He believes that the background in DC0 stems from soft shower tails that exit downstream of the absorber and suggested a sheet of polyethylene to stop these shower tails.

Full EATM table (LS2)

Experimental Area	Experiment	Requirements	Main constraints	Readiness Status	Special Needs - Impacted Equipment / Service Groups Needed: Yes/No, Available/Schedule: ok/tbc Resources: financial and/or personel								
					EN/CV	EN/EL	EN/HE	EN/STI	TE/CRG	BE/ICS	BE/CO	HSE/RP	EN/EA
EA	**CLOUD**	requested operation in 2019, 2020, 2021	no operation possible during 2020 (EL/CV works)	ok for 2019 option for an early run in 2021	X	X							X
NA	**NP02 & NP04**	requested operation during LS2	no operation possible when chilled water is not available	operation possible between May and September	X	X			X	X	?		
	COMPASS	early commissioning likely required (e.g, for cryo target)	cooling water and cryogenics	to investigate if special solution like in 2018 is needed	X				X				X
	NA64	new experimental area	no particular show-stopper	ECR final draft available		X				X			X
	GIF++	operation during LS2 extension of bunker	gas consolidation and cooling/heating (minor)	ECR final draft available	X		X			X			X
	NA62	lKr must be maintained RP needs to access EA to be clarified	backup services must be tested (recent issue identified)	all ok (verification requierd) access to EA in discussion with RP	X	X			X	X	?	X	X
AD	**ALPHA, Base, etc.**	operation of BASE & ALPHA, services for all?	cooling requirements, electrical distribution (power cuts possible)	CRG ok, closed loop ok, short power cuts ok, ICS ok, BE/CO ?	X	X			X	X	?		X
ISOLDE	**Users**	early operation in 2020	all services and minimum RP	RP raised constraints, otherwise should be ok	X	X		X			X	X	
HIE-ISOLDE	**Users**	early operation in 2020	services and controls CRG availability?	in line with ISOLDE operation	X	X			X		X		X
AWAKE	**Run-1 Measurements** **Run-2 Preparations**	access system ready when services are also available	work on e-beam, laser system, plasma, diagnostics	can adopt to equipment/service group constraints				X			X		X