



# n\_TOF Technical Report at the 68<sup>th</sup> INTC Meeting

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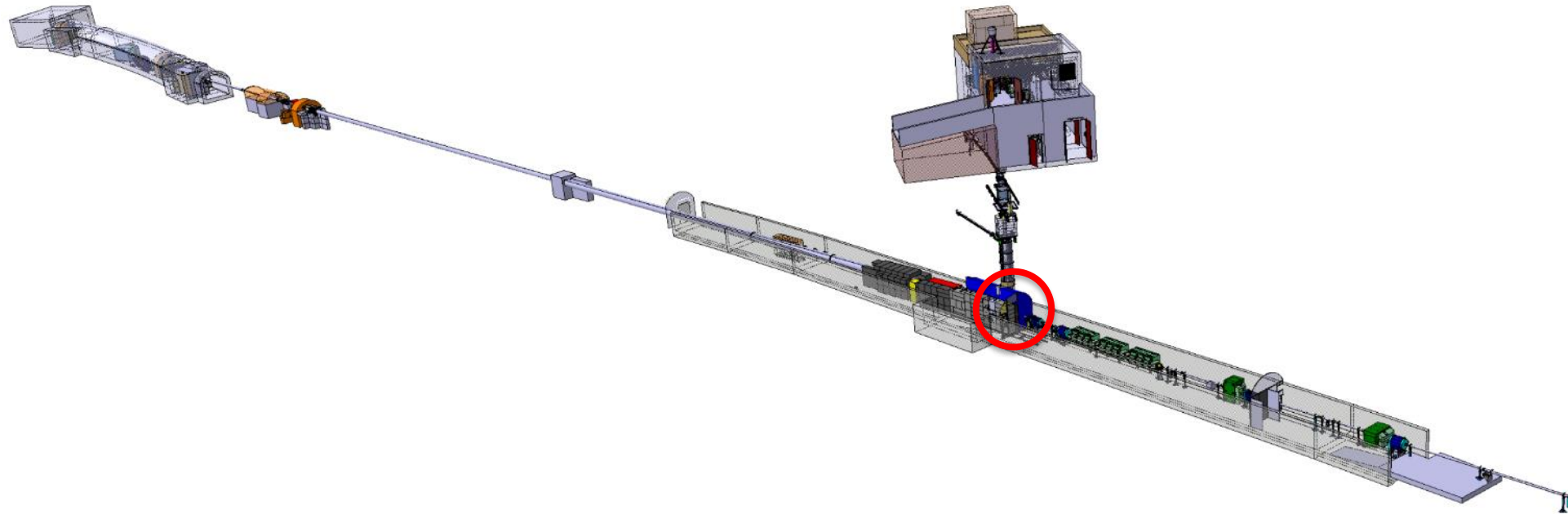
09/11/2021

# Outlook LS2

## **Main activities for the facility since June:**

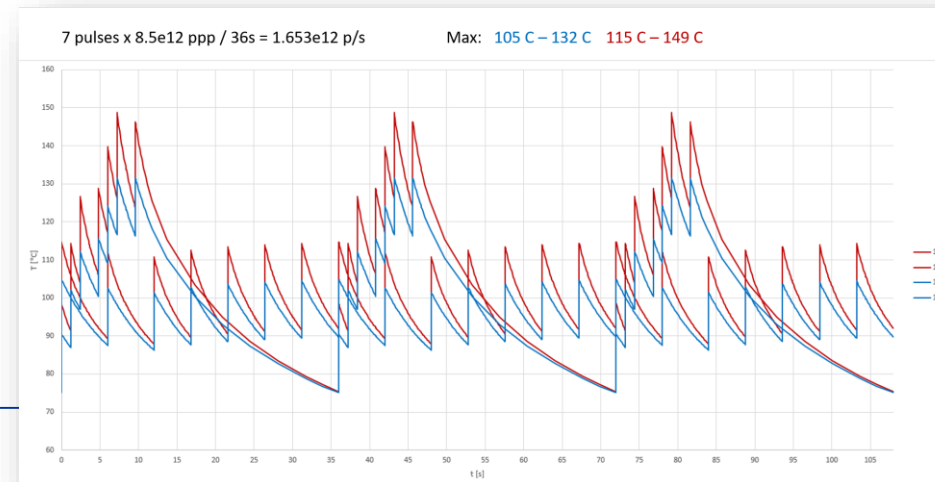
- New spallation target with beam
- FTN line
- Horizontal beam line
  - New collimator #2
  - NEAR

# New n\_TOF target



# n\_TOF spallation target #3

- First beam on target received on 19th July 2021
- Commissioning went well, no issues discovered



- **Our Constrains from target Target:**

- Designed for 15x15mm<sup>2</sup>
- Maximum average intensity on target = 160e10 p/s
- Dimensions for high intensity pulses  $\approx$  215 mm<sup>2</sup>.
- Dimensions for low intensity pulses  $\approx$  40 mm<sup>2</sup>.

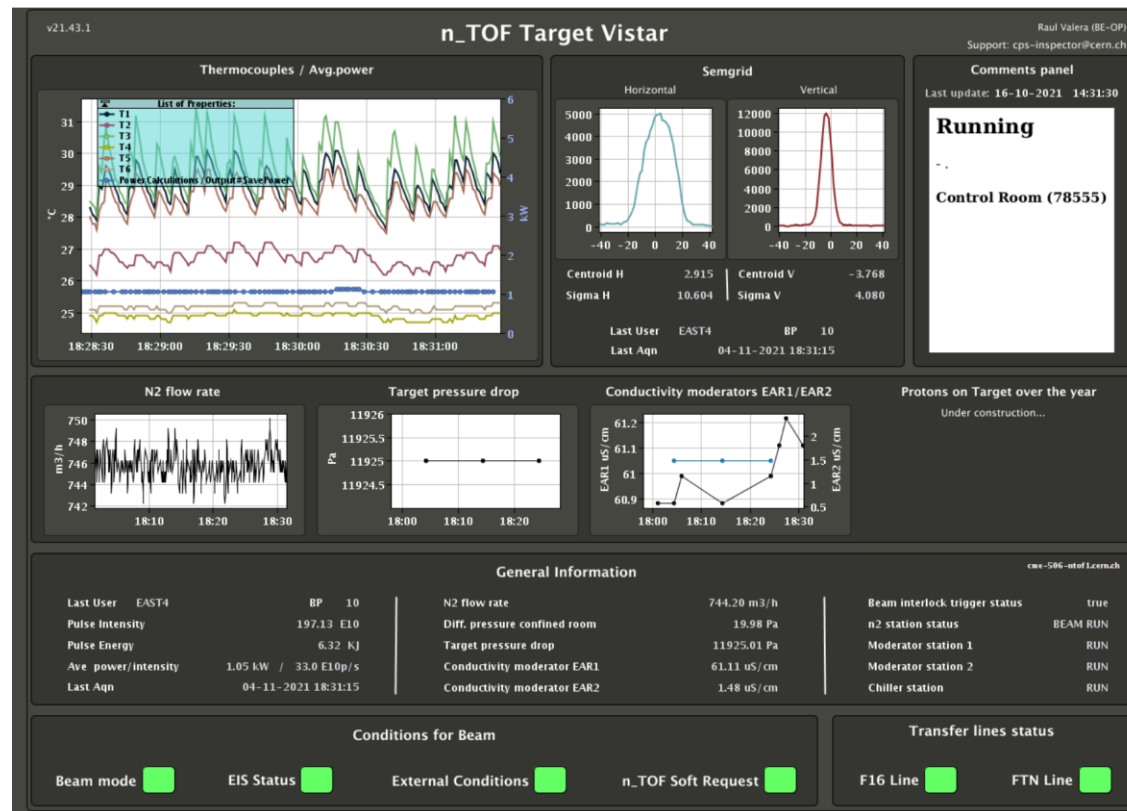
courtesy R. Esposito

- **Our Needs for Physics:**

- Two different intensities: 7.5-8.5e12ppp and 2-3.5e12ppp.
- 1.05e17 protons per day made in 30 days, in average, as the campaigns before the LS2.

# n\_TOF spallation target #3

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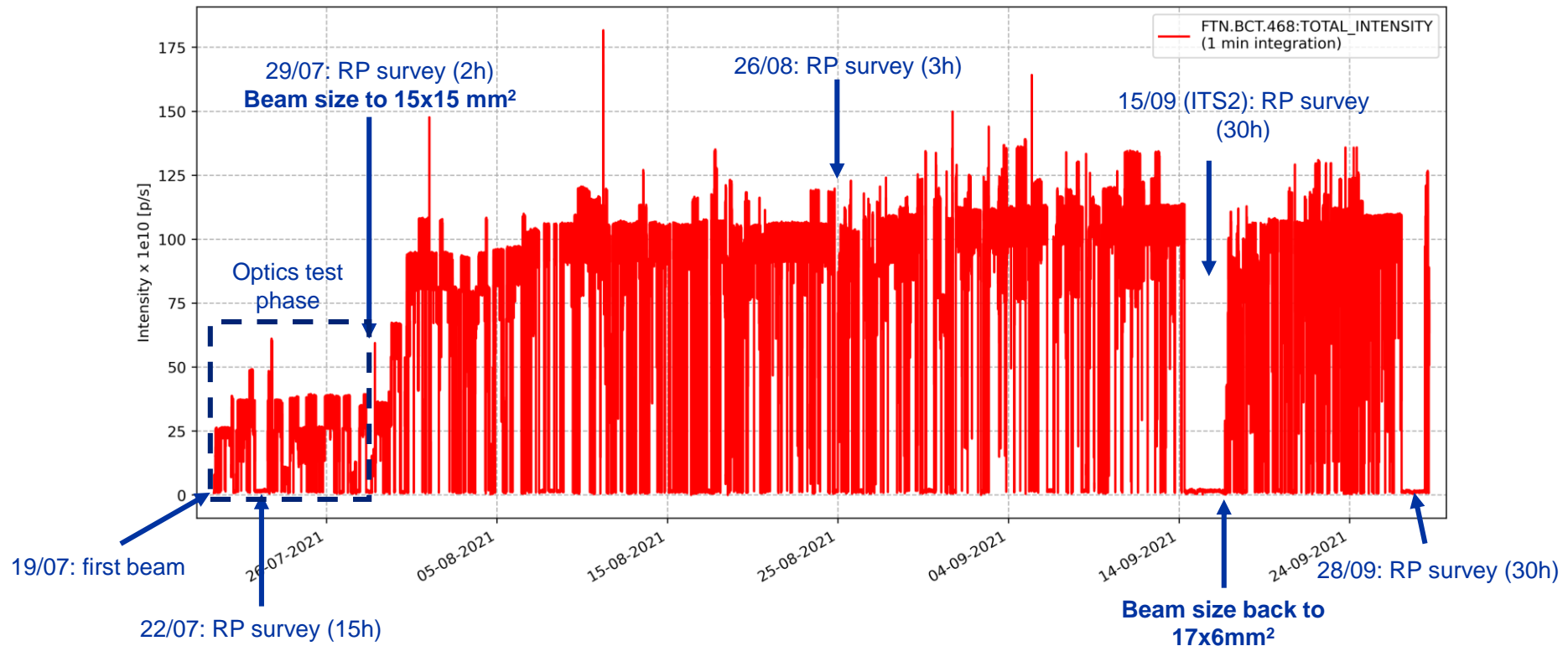
new n\_TOF Vistar!  
Thanks to R. Valera and  
colleagues

# FTN line

- RP discovered a hot(s) spot end of August
- Location identified and confirmed in the center of the first dipole
- Beam size measured with the new SEM at the end of the line
- Discrepancy with post-LS2 beam size and applied settings

# FTN line

## RP surveys in FTN: history



courtesy F. Pozzi, J-F. Gruber

# FTN line

## RP surveys in FTN: contact measurements

ID	Reference	Position	Dose rate [ $\mu\text{Sv/h}$ ]	Dose rate [ $\mu\text{Sv/h}$ ]	Dose rate [ $\mu\text{Sv/h}$ ]
			Date: 26-08-21	Date: 15-09-21	Date: 28-09-21
			Cool down time: 3 h	Cool down time: 30 h	Cool down time: 30 h
1	-	Start of FTN	-	-	-
2	QFO.435	UPSTREAM	-	-	-
3	QFO.435	DOWNSTREAM	-	-	-
4	DHZ.436	DOWNSTREAM	-	-	-
5	QDE.450	UPSTREAM	1500	-	2200
6	QDE.450	DOWNSTREAM	1500	-	550
7	DVT.451	DOWNSTREAM	200	-	200
8	-	Between DVT.451 and FTN.BTV454	-	-	-
9	-	Between DVT.451 and FTN.BTV454	-	-	-
10	FTN.BTV454	UPSTREAM	200	-	200
11	FTN.BTV454	DOWNSTREAM	1500	800	1500
12	BHZ 456	HOT SPOT	10000	18000	8100
13	BHZ 456	DOWNSTREAM	600	-	-
14	BHZ 459	DOWNSTREAM	300	-	-
14.1	BHZ 462	UPSTREAM	400	-	-
15	BHZ 462	DOWNSTREAM	200	-	-
16	QFO.465	DOWNSTREAM	300	-	-
17	UWB.474	DOWNSTREAM	-	-	-
18	QDE.480	UPSTREAM	2500	3200	1750
19	QDE.480	DOWNSTREAM	5000	3400	1630
20	BSG.484	DOWNSTREAM	-	-	1100

Dedicated RP measurements at contact of the most activated equipments

Two hot-spots:

1. BHZ456 (decreased by a factor of 2.2)
2. SEMgrid (decreased by a factor 2.1)

courtesy F. Pozzi, J-F. Gruber



# FTN line

## Conclusions

**New optics implemented (pre-LS2 optics, 17x6 mm<sup>2</sup> beam size) shows a clear benefit in reducing beam losses in FTN**

- Residual dose rate after 30 h of cool-down decreased from 360  $\mu\text{Sv/h}$  to 76  $\mu\text{Sv/h}$  at BHZ456 location
- No showstopper to increase the beam intensity (up to maximum average of  $1.66\text{e}12$  p/s)
  - Open point: target survivability with reduced beam size

**Operational dosimetry for RP surveys in FTN**

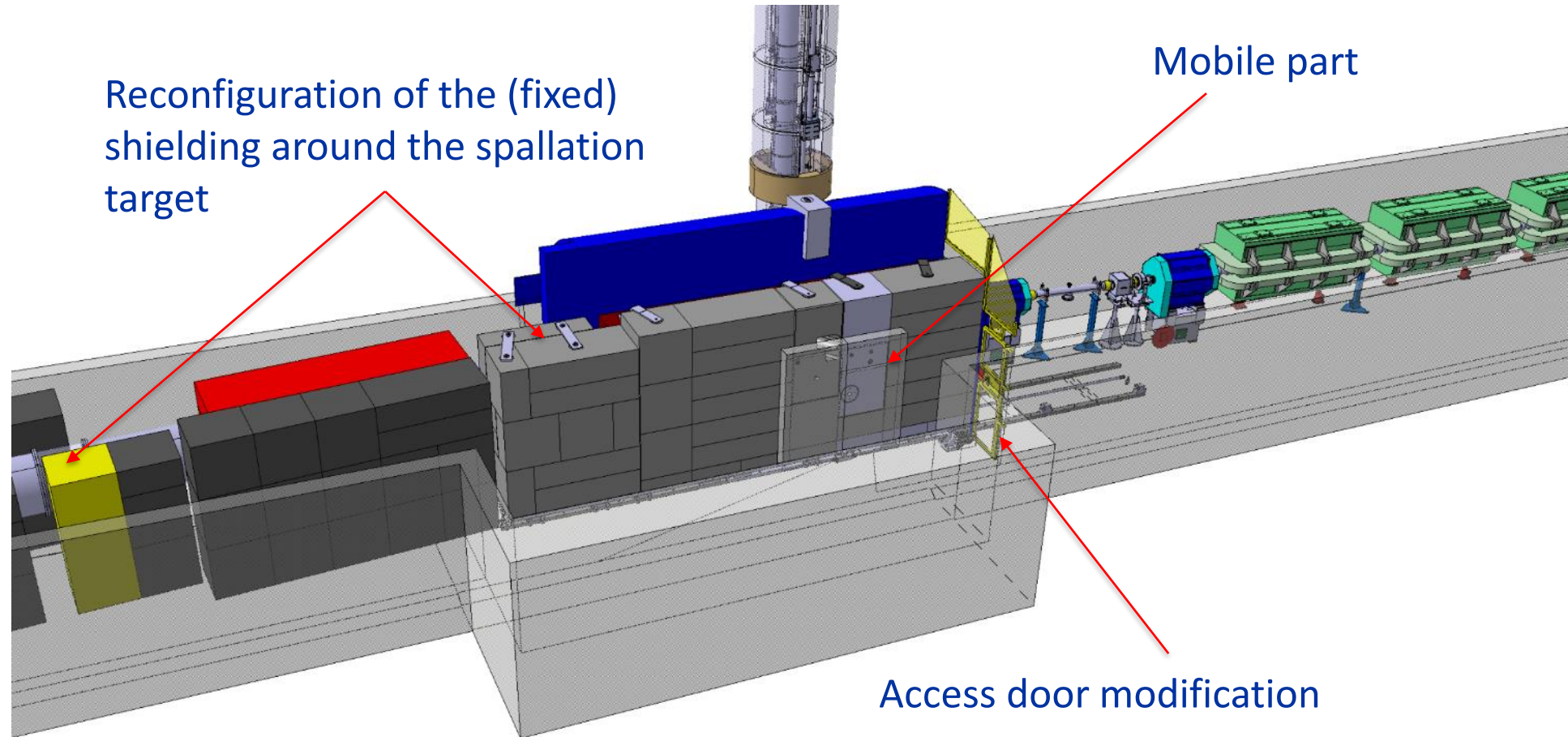
- Collective dose: 44 person. $\mu\text{Sv}$
- Max. individual dose: 23  $\mu\text{Sv}$

**the ABT team continues their FTN studies**

courtesy Bettina Mikulec

# n\_TOF target shielding and NEAR

Third Generation n\_TOF Spallation Target and Vertical Neutron Beam Line  
EDMS [TOF-TAR-EC-0001](#)



# Perspectives on "NEAR-target" station

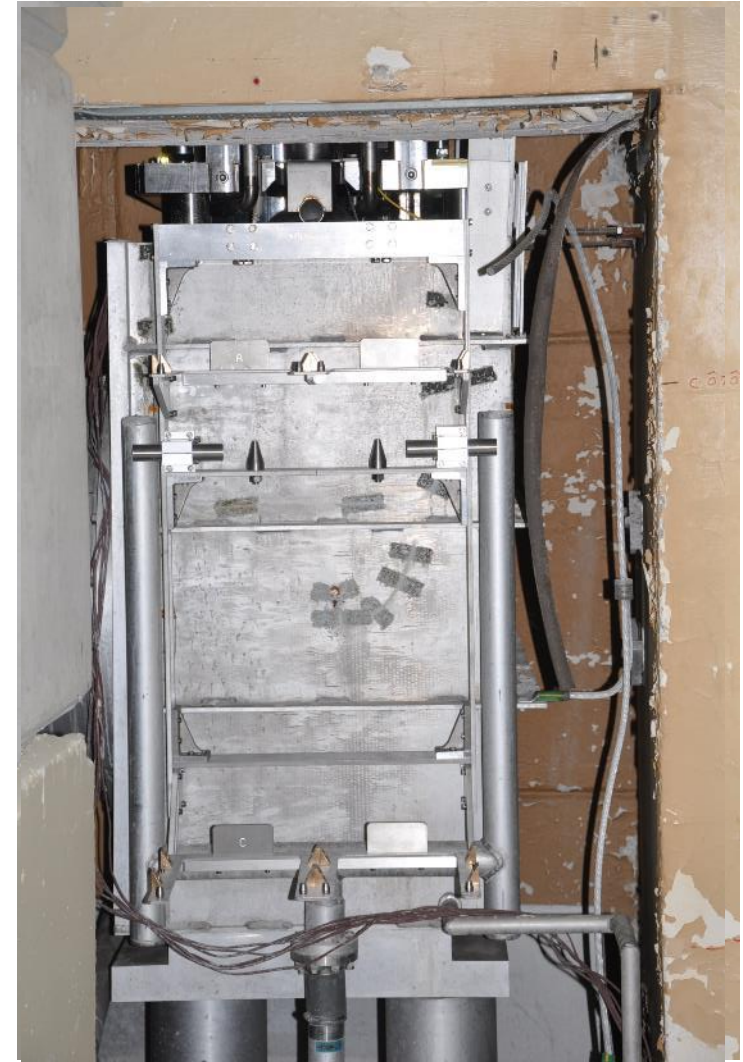
Three main areas and orientation:

- R2E
- R2M
- Sample activation



# NEAR

- Shelf for R2M samples installed in June, first series of samples installed for beam start



# NEAR



courtesy D. Senajova



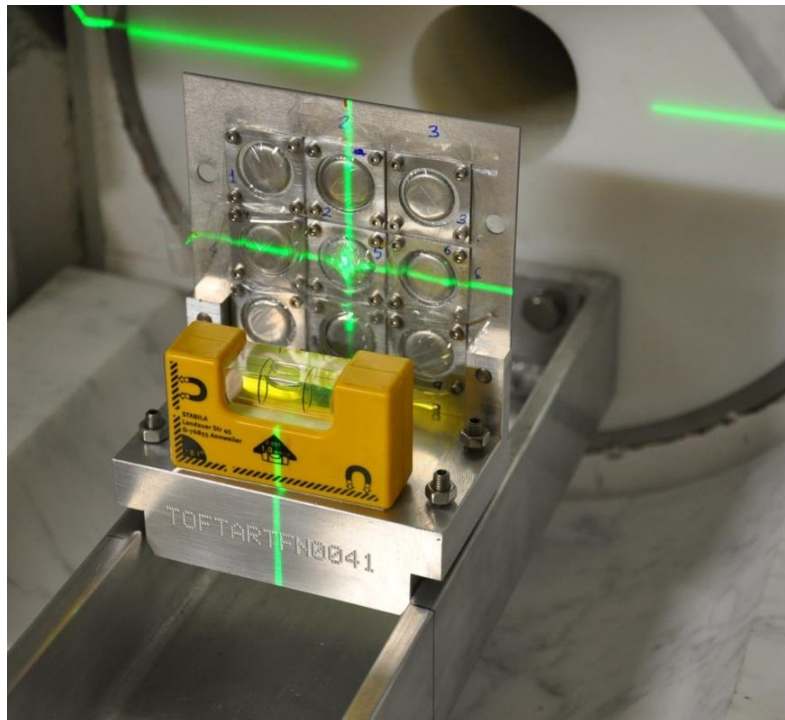
# NEAR

- Irradiation test of AlF<sub>3</sub> as potential moderator material

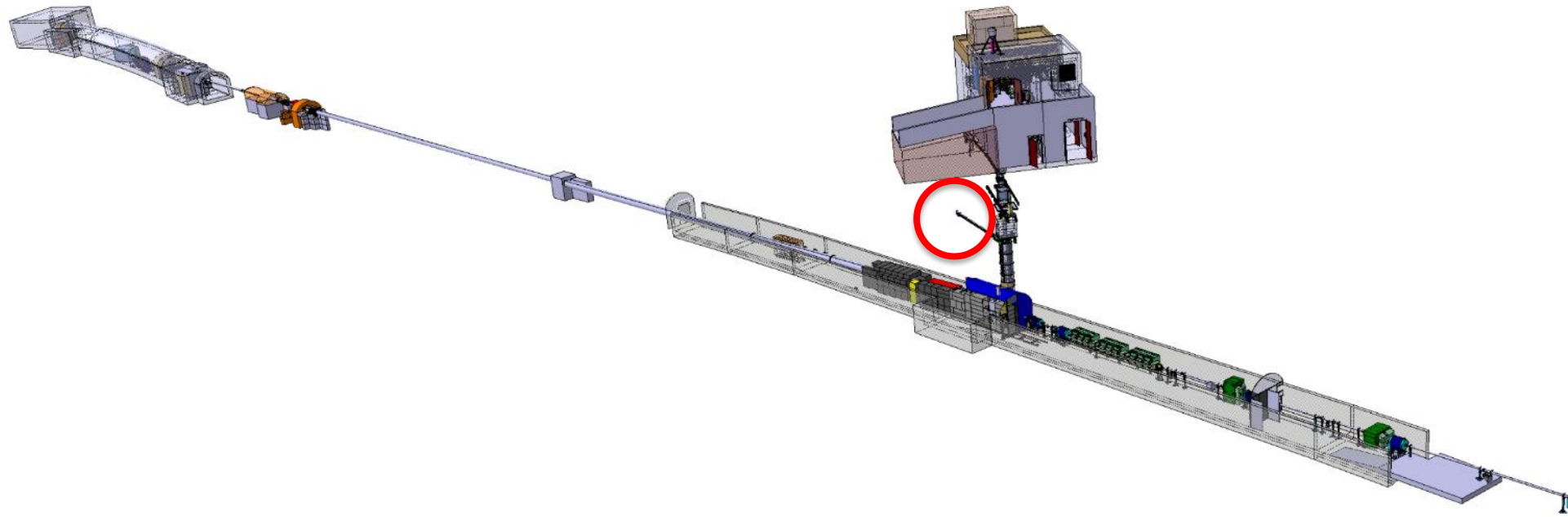


# NEAR

- Different set-ups for multi foil activation



# n\_TOF water cooling station





# Target #3 cooling and moderator station

- Target nitrogen cooling required the full replacement of the target cooling and moderator circuits
- Major efforts from CV to develop the technology to match the specifications and RP requests ([EDMS 2068336](#))

F. Dragoni



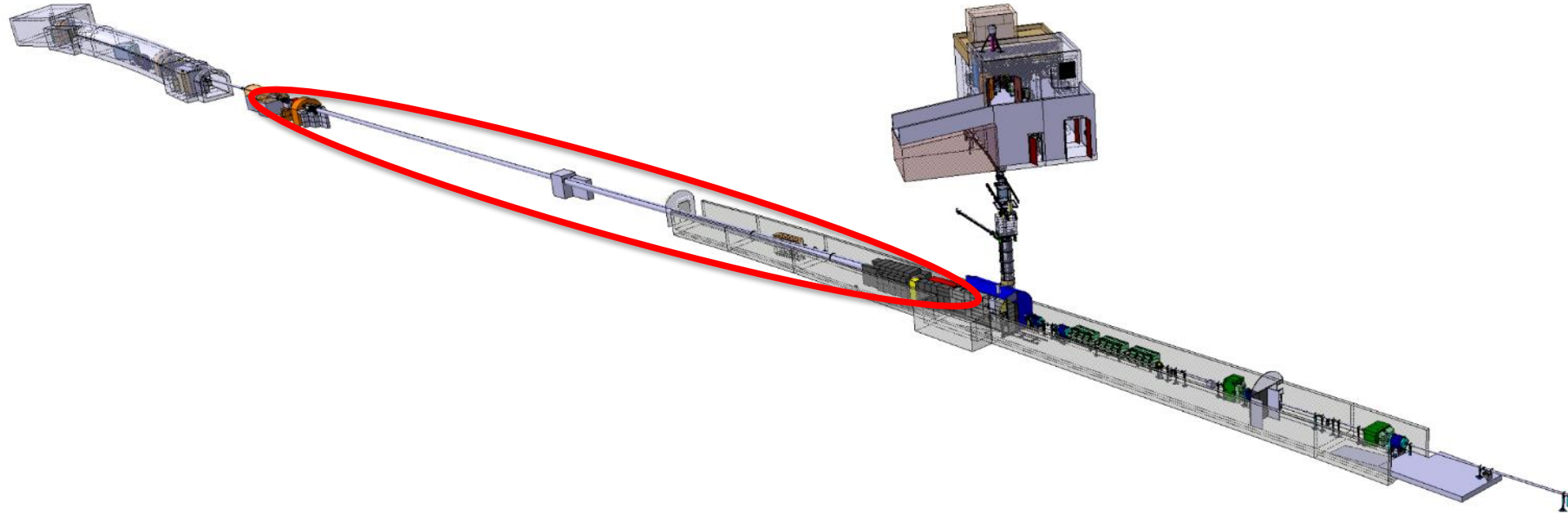
This Photo by Unknown Author is licensed under [CC BY-NC](#)

# Target #3 cooling and moderator station

- New spectrometer from CV
- RP monitors CD10 + BM8



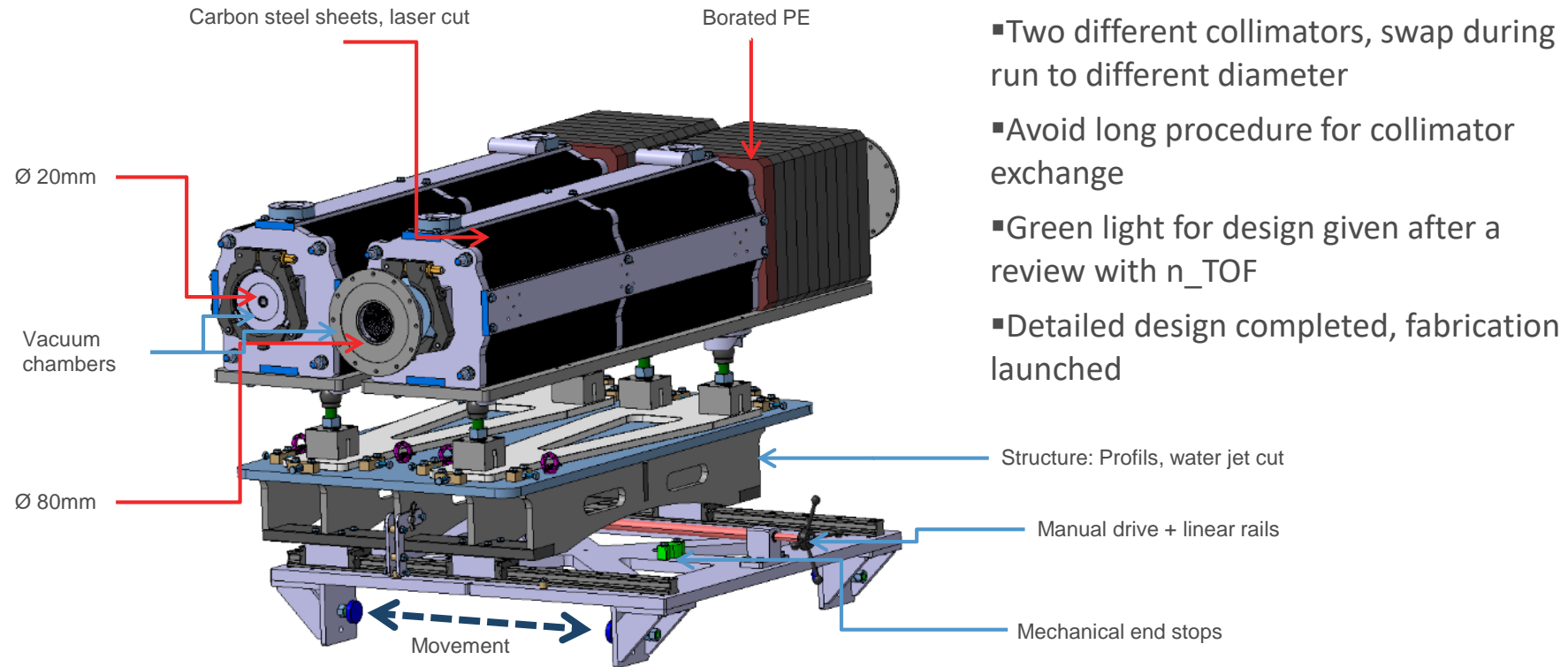
# n\_TOF horizontal beam line (TT2A)



# New sweeping magnet



# New collimator #2 → EAR1



Assembly ongoing, installation planned week 27

# New collimator #2 → EAR1



- Already one collimator swap during run
- Beam position confirmed by Survey to be within 0.1 mm



# n\_TOF Experiment LS2 activities

- Cabling campaign in EAR1 (remove the old sweeping magnet cables, replace the detector cables in the rack/bunker area) - Completed
- Implementation of the ASN-OFSP safety recommendations in EAR2
- New safety file includes modifications implemented during LS2 [EMDS 2604713 - n\\_TOF Target Facility Safety Overview](#)
- Consolidation of the gas system in EAR2 - completed
- Consolidation of the alignment system – ongoing
- Upgrade of the n\_TOF electronics laboratory - completed
- DAQ upgrade
- Consolidation and R&D program for detectors - ongoing

# Conclusions

- Target performance as expected!
- Cooling and moderator stations up and running
- New permanent magnet and second collimator work well
- NEAR has started activity
- First beam on target 19th July 2021
- FTN line needs still tuning – most likely modifications on the long term needed





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