

MAGiC progress update

11/02/2019 — IKON 16

Instrument design update

- All in-bunker components are designed
- Guide hall elements are in progress
 - > Waiting on the common shielding project
- Experimental cave design:
 - > Iteration to simplify SE handling
 - > See SE session on 12/02



- Choppers and detectors awaiting funding

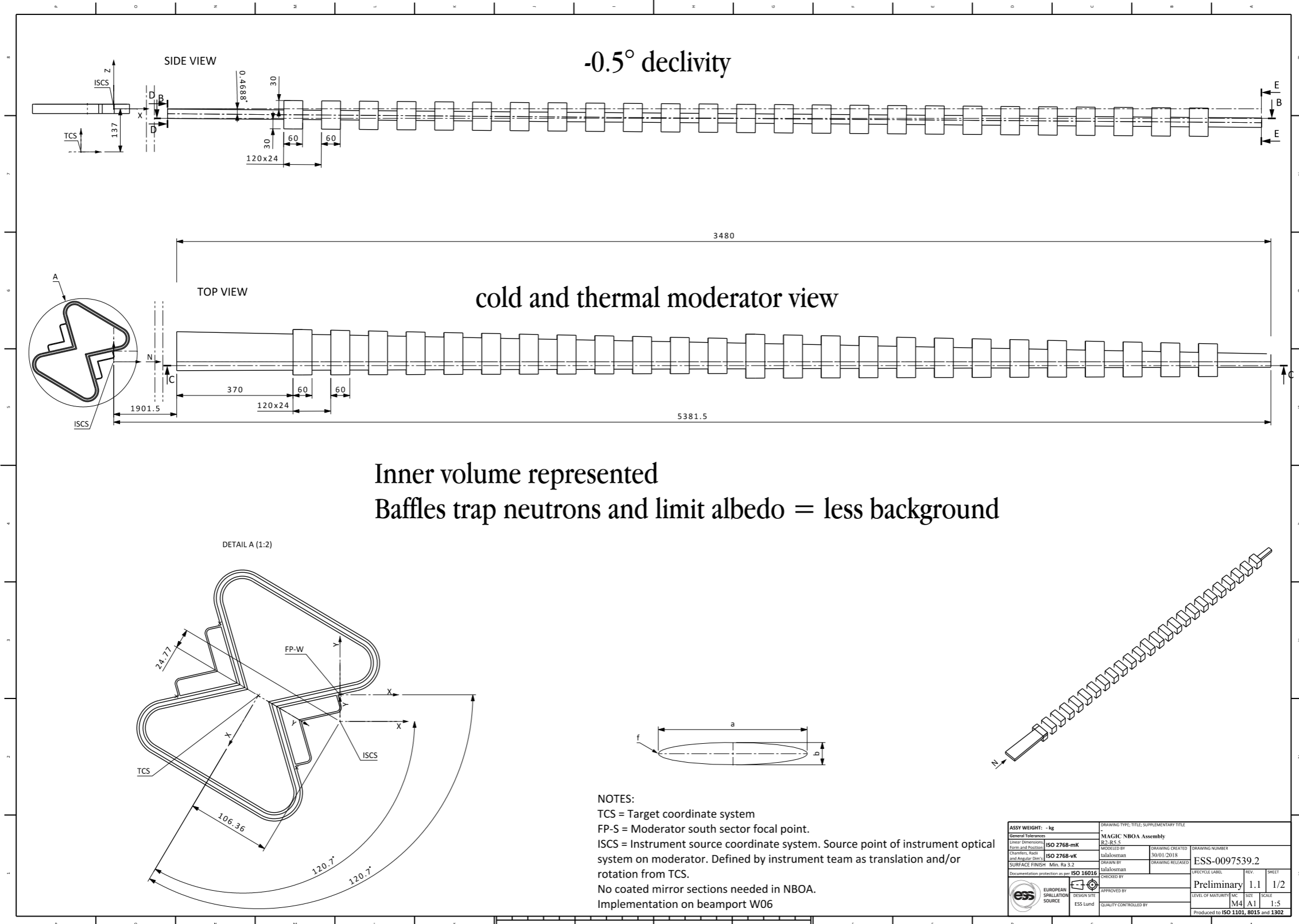


- Analyzer prototyping done



NBOA: first MAGiC component produced

NBA = Neutron Beam Assembly => no supermirrors for MAGiC

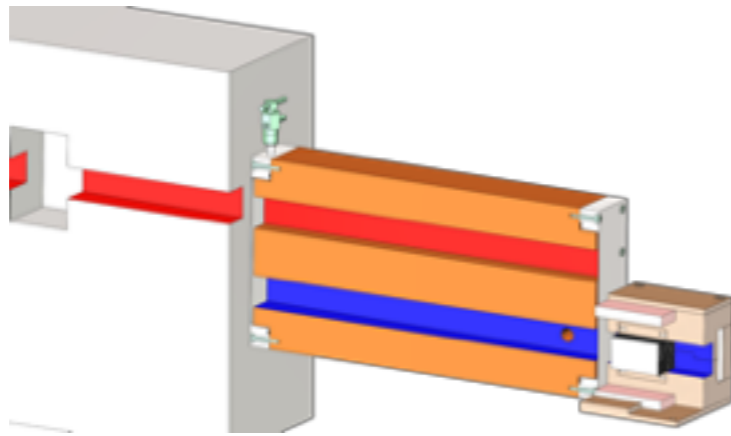


Inner volume represented
Baffles trap neutrons and limit albedo = less background

NOTES:
 TCS = Target coordinate system
 FP-S = Moderator south sector focal point.
 ISCS = Instrument source coordinate system. Source point of instrument optical system on moderator. Defined by instrument team as translation and/or rotation from TCS.
 No coated mirror sections needed in NBOA.
 Implementation on beamport W06

ASSY WEIGHT: - kg	DRAWING TYPE, TITLE, SUPPLEMENTARY TITLE		
General Tolerances	MAGIC NBOA Assembly		
Linear Dimensions	ISO 2768-mK	DESIGNED BY	DRAWING NUMBER
Form and Position	R2-RS 5	talalossman	ESS-0097539.2
Chamfers, Radii	ISO 2768-mK	DRAWING CREATED	
and Angular Dist.		30/01/2018	
SURFACE FINISH	Min. Ra 3.2	DRAWN BY	DRAWING RELEASED
		talalossman	
Documentation protection as per ISO 16016	Checked by	APPROVED BY	LEVEL OF MATURITY
			Preliminary 1.1
			REV. SHEET
			1.1 1/2
			LEVEL OF MATURITY
			M4 A1
			SCALE
			1:5
			Produced to ISO 1101, 8015 and 1302

Light shutter & SSB



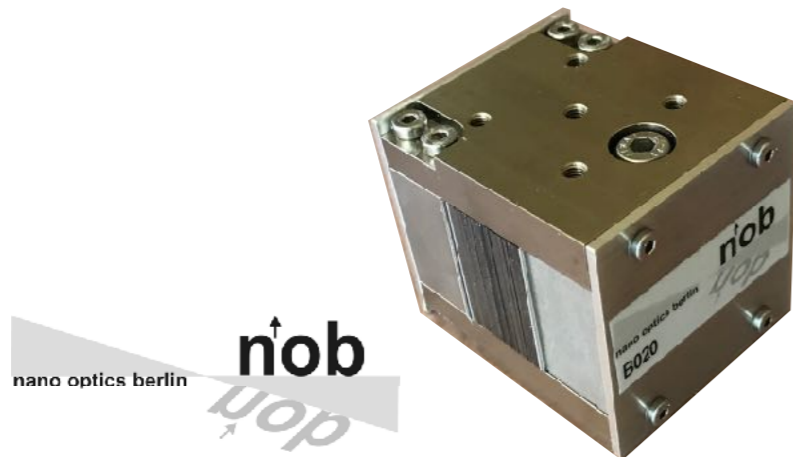
SSB placed in the Light Shutter

Light Shutter = positioning system for SSB

Still waiting for an answer on feasibility

Reported at last IKON and STAP meeting ...

NBOA validated = no going back without a major redesign of the polarization and guide system ...



Polarizing solid state bender:

replica of MAGiC's one: 20x30x50 mm

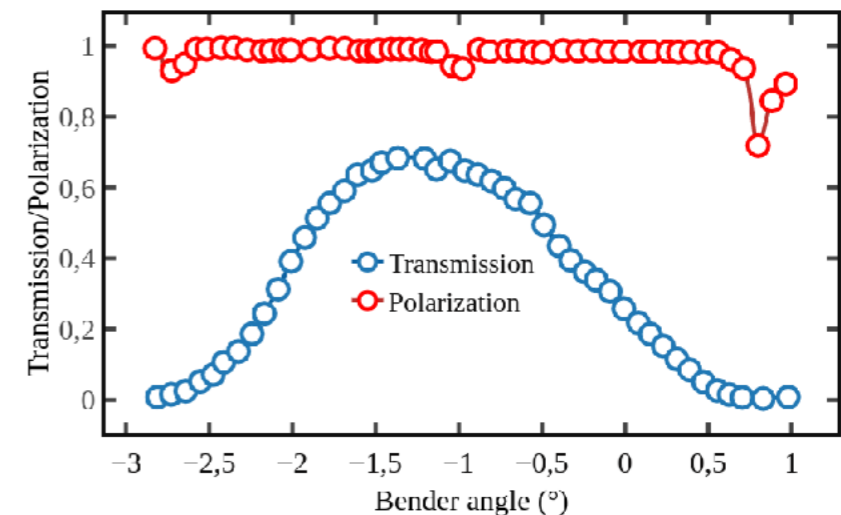
150 μm Si blades coated with FeSi

$m=3.8$ on reflective side

$m=3$ on opposite side + Gd layer

1 kGauss saturating field

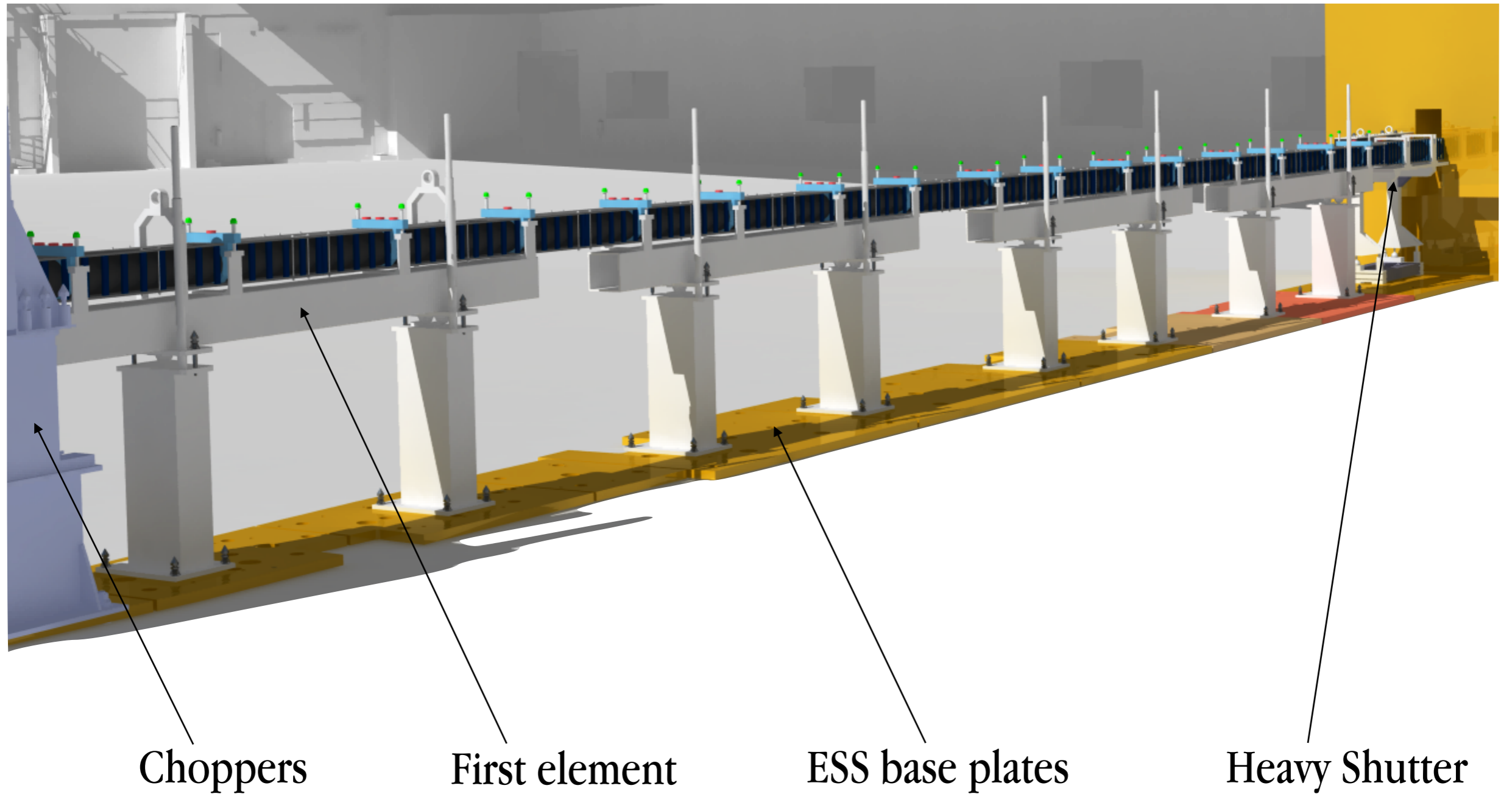
Cd protected magnets (MAGiC's BBG will be the protective layer)



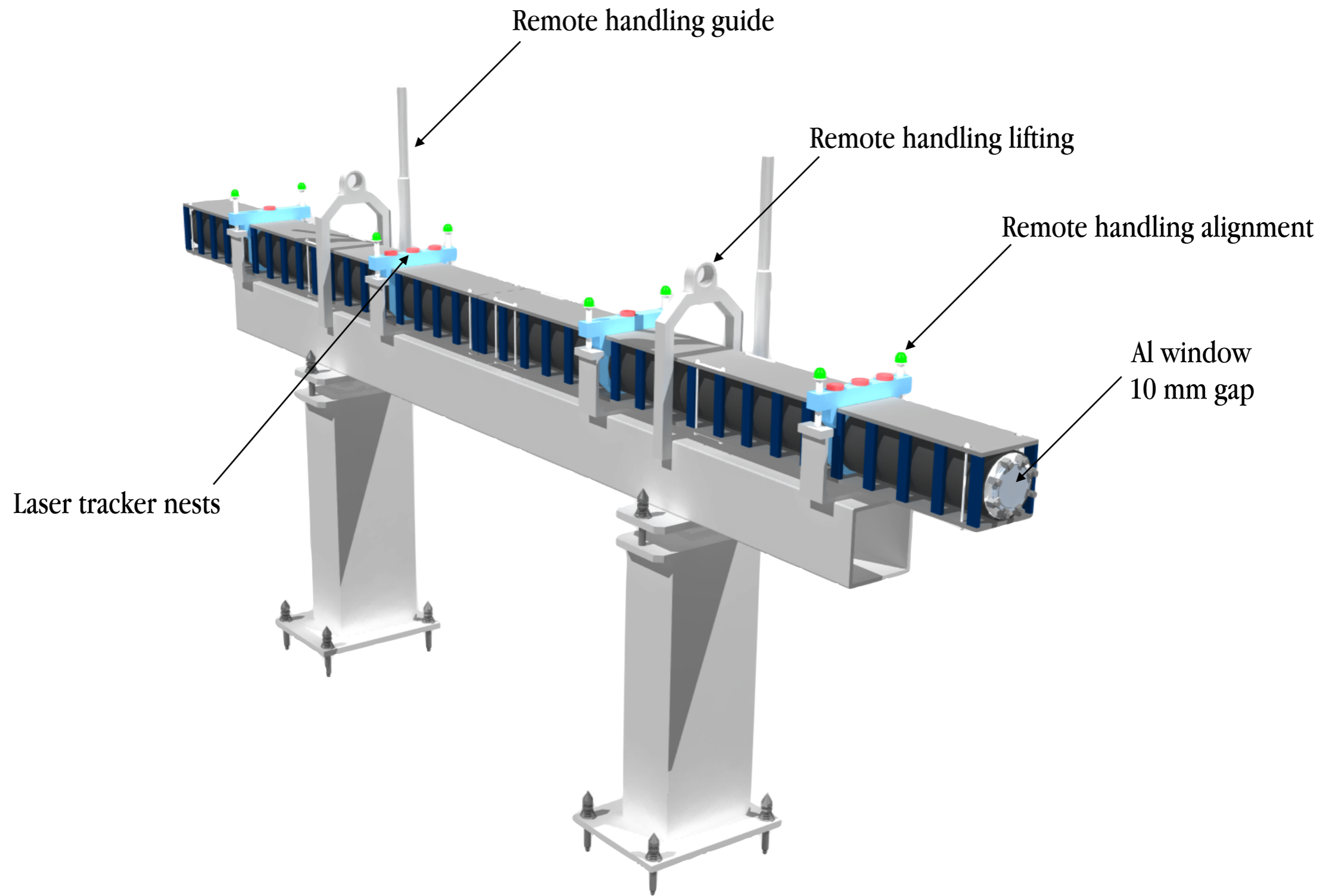
Tested at LLB on 6T2 !

Work as expected

Guide elements & Remote handling



Remote handling details



Heavy Shutter

- Partly remote handled rotating heavy shutter
- Iso-static
- Cost efficient

- Neutronic calculations from TG2

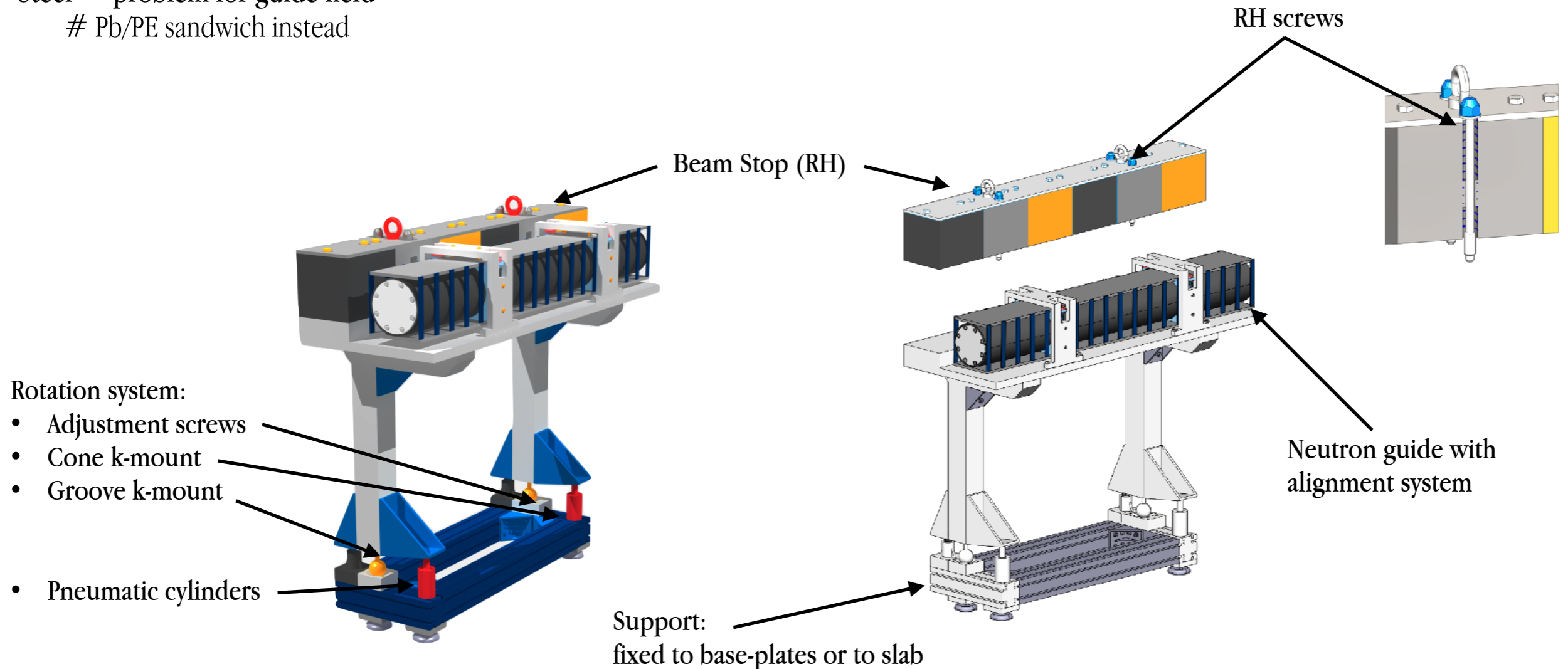
Borax/Steel/Copper/Borax/Steel/Copper

1500 mm = 6x250 mm

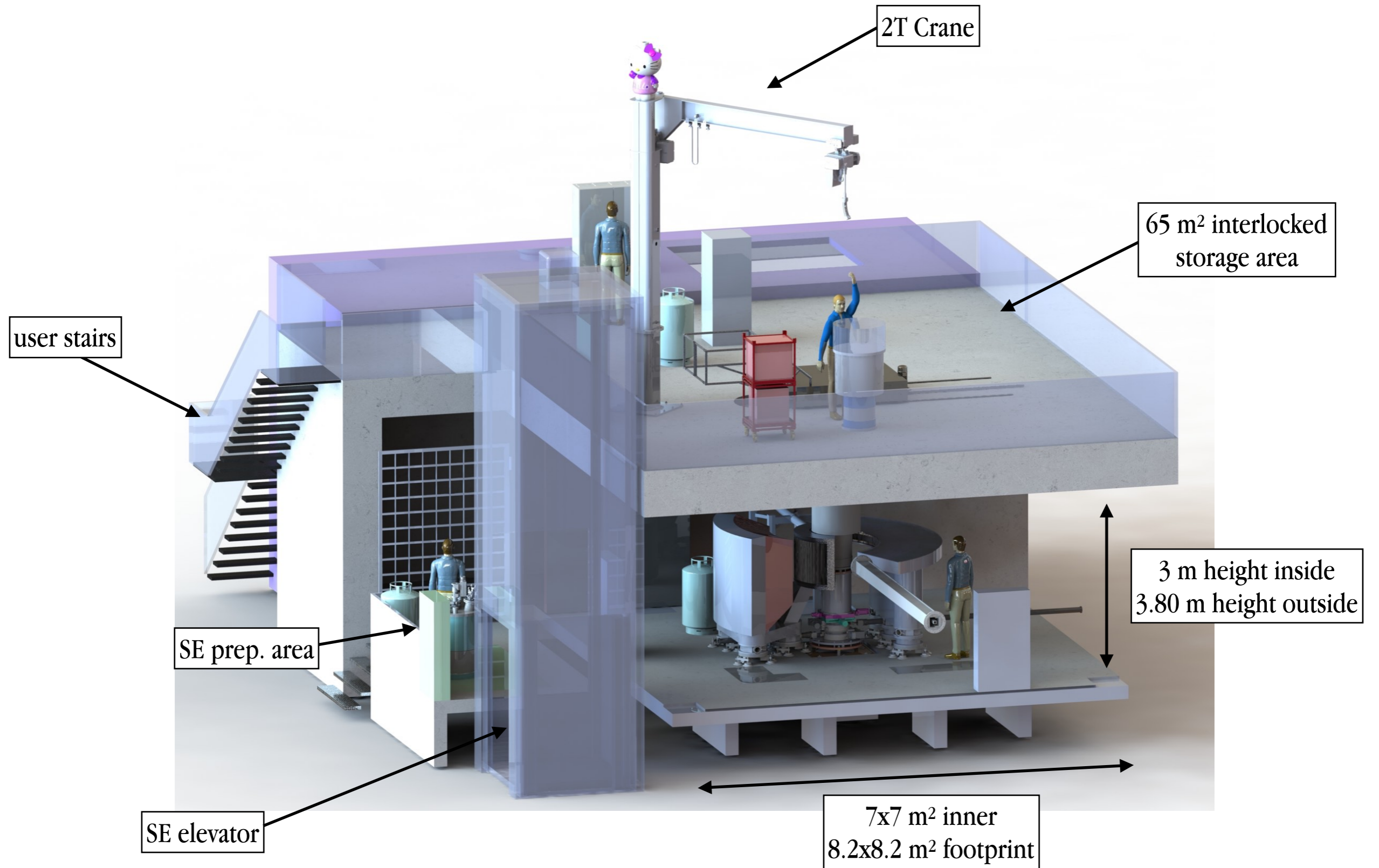
- Steel = problem for guide field

Pb/PE sandwich instead

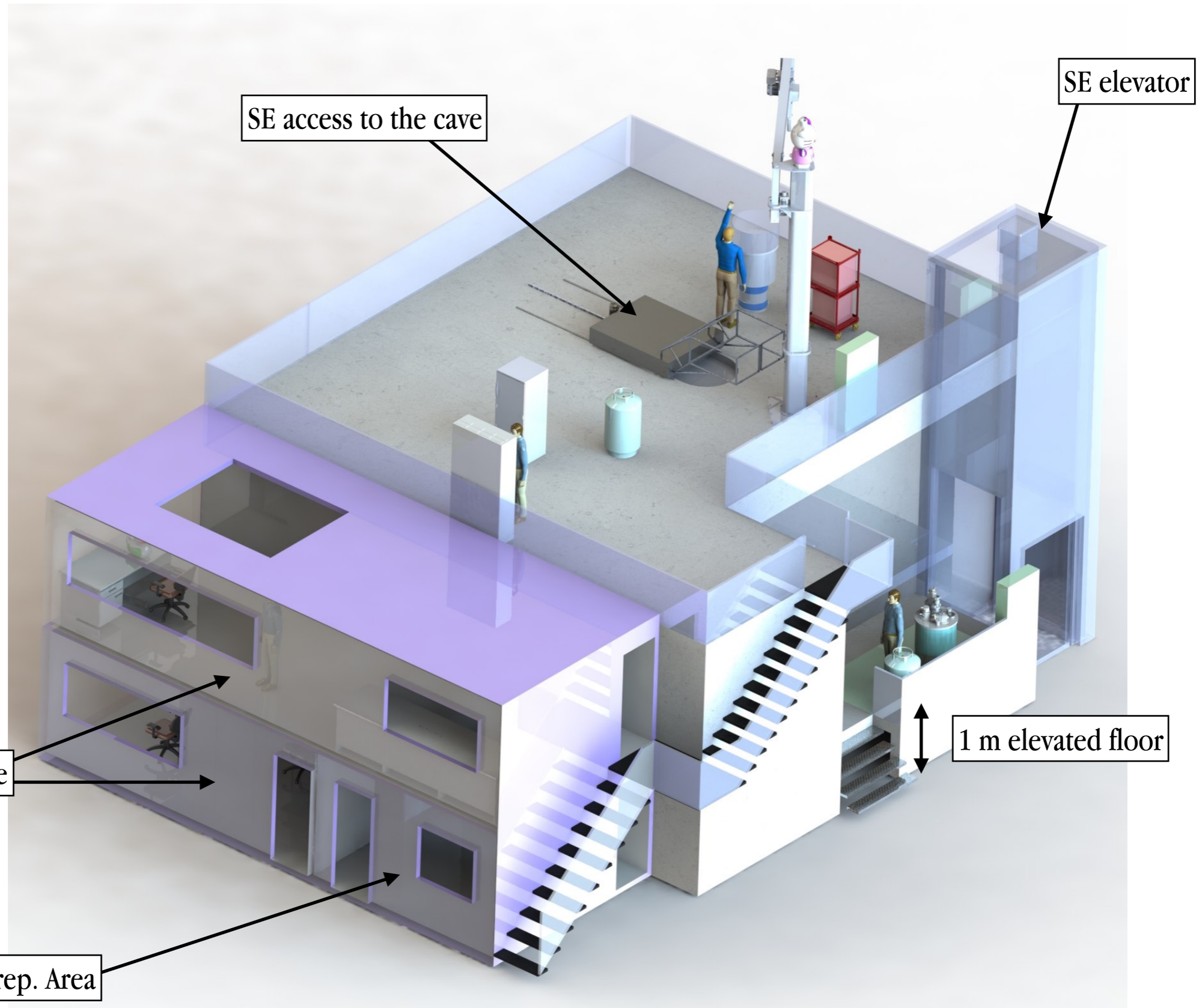
- No important activation (except BS)
- Easy/fast/safe BS dismount through RH
- Safe Heavy Shutter maintenance and BW access
- Independent guide vacuum housing
- Small 10 mm guide interruption with down and upstream guide system



Experimental cave



Experimental cave



PSI: polarization analyzer

Concept

Solid state, wide-angle fan analyzer

straight channels, 0.15 mm width, 40 mm length

Neutrons $2 \text{ \AA} - 6 \text{ \AA}$, analysing power 99 %

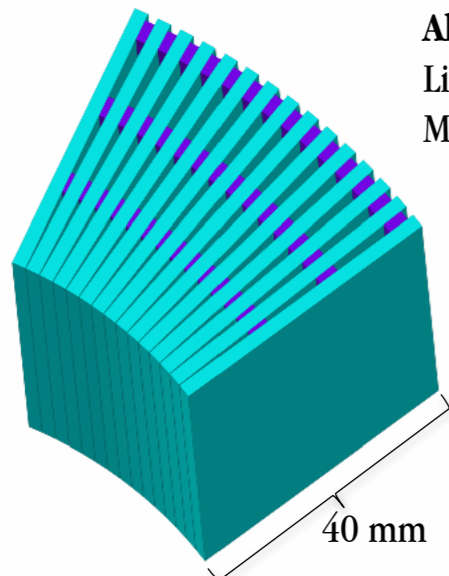
Angle covered: 120°

Active height: 100 mm

Inclined channels $\approx 0.5^\circ$

Neutron channel
0.15 mm Si,
straight

Al spacers
Linear increase
Maximum $6 \mu\text{m}$



Prototype

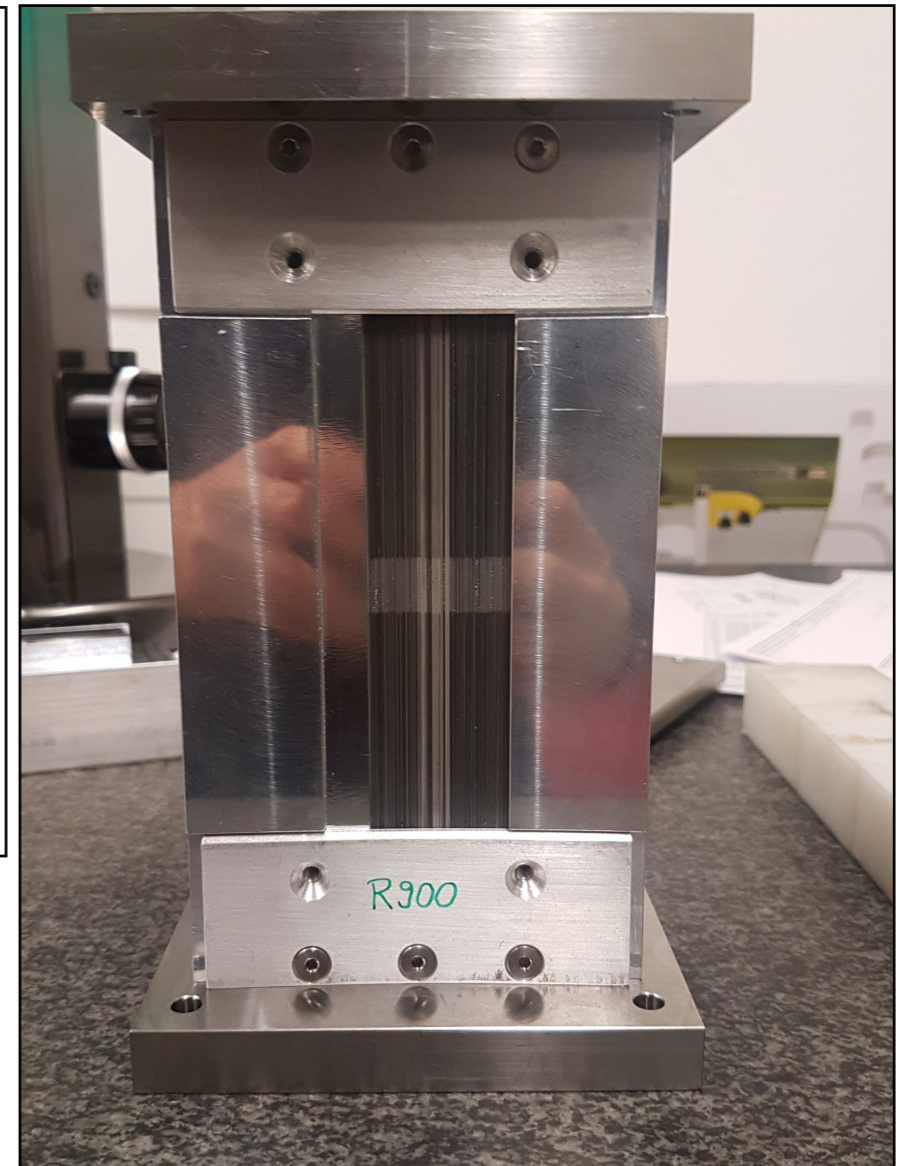
- $\sim 2^\circ$ deg prototype built in 2018
- Remanent supermirror coating + spacers sputtered in house
- Issues with bulging
- Beamtime at BOA (SINQ)
- Data analysis ongoing

PSI-Team Analyzer

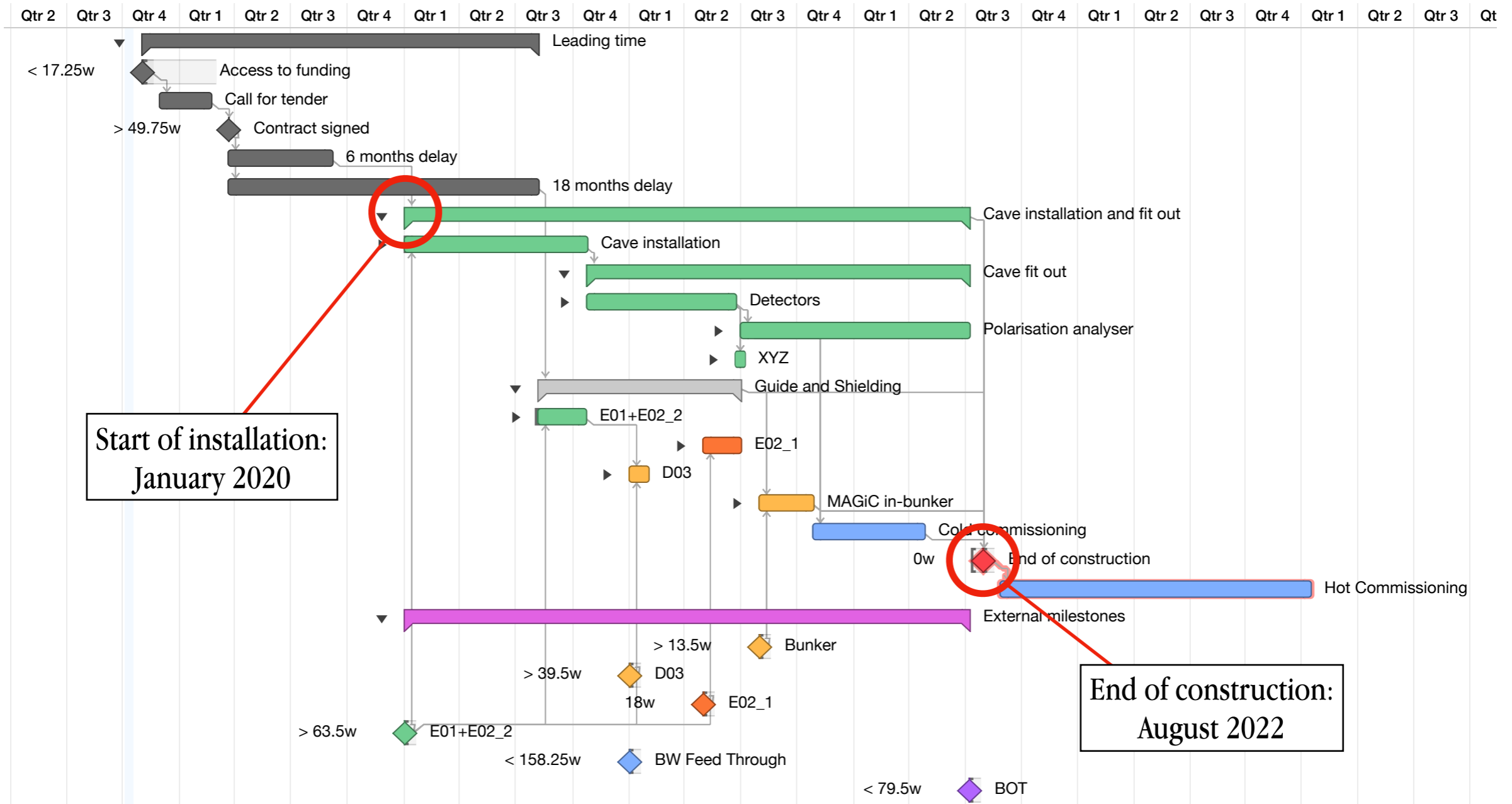
C. Klauser & R. Mühlebach

L. Hohlitzner, A. Bollhalder, T. Mühlebach

M. Horisberger, U. Filges



Installation plan



Dedicated session: installation of instrument in West Hall (MAGiC, CSPEC, BEER, BIFROST)

TG3 process

- 31st of January 2017: TG2
- 05th of May 2017: official switch into phase 2
- First estimate for end of Phase 2: November 2018
- ... rebaselining in between + TG3 process defined ...



	Jan'19	Apr'19	May'19	Aug'19	Sep'19	Oct'19	Nov'19	Feb'20
MAGIC	<p>CTV [Handled remotely]</p> <ul style="list-style-type: none"> - Detectors d. Large detector e. Small detector <p># Doro Pfeiffer; Tobias Richter; Laurence Page; Helena Ramsing; Alex Holmes (SAD if common vacuum housing)</p> <ul style="list-style-type: none"> - Choppers a. Pulse Shaping Choppers b. Selection Chopper c. Band Selection Chopper <p># Nikolaos Tsapatsaris; Marie-Louise; Markus Olsson; Laurence Page; Helena Ramsing; Erik Nilsson; Fabien Rey; Tobias Richter (DMSC)</p>	<p>CTV [Handled remotely]</p> <ul style="list-style-type: none"> - Beam transportation: b. Neutron Guide System h. Focusing device i. Radial Collimator <p>### Solid state bender ### Beam bridge Guide ### Heavy Shutter</p> <p># Phillip Bentley / Damian Martin</p> <ul style="list-style-type: none"> - Experimental cave: a. Structure c. Infrastructure (Crane; Elevator; Utilities) f. Control hut <p># Alex Holmes; Laurence Page; Helena Ramsing; Federico Rojas; Antonio Bianchi (Logistics; Installation/Construction); Ken Andersen (Operations); Marie-Louise; Tobias Richter</p>	<p>IDR [In-person mtg]</p> <ul style="list-style-type: none"> - Polarization a. Polarization analyzer b. XYZ polarization (share interface with analyzer) <p># Werner Schweika; Ken Andersen</p>	<p>IDR [In-person mtg]</p> <ul style="list-style-type: none"> - Experimental cave: a. Structure c. Infrastructure (Crane; Elevator; Utilities) f. Control hut <p>- Sample prep lab: structure subcontracted</p> <p># Alex Holmes; Laurence Page; Helena Ramsing; Federico Rojas; Antonio Bianchi (Logistics; Installation/Construction); Ken Andersen (Operations); Marie-Louise; Tobias Richter (DMSC)</p> <p>CTV [Handled remotely]</p> <ul style="list-style-type: none"> - Sample prep ab: structure subcontracted + some equipment - Sample table - Cryostat [ask Alex when he prefers to do this CTV] <p># Alex Holmes</p> <p>Sub-TG3.1 [Handled remotely]</p> <ul style="list-style-type: none"> e. Small detector [IDR not needed as Werner will follow up and keep DG updated as the design evolves] <p># Doro Pfeiffer; Tobias Richter; Laurence</p>	<p>IDR [In-person mtg]</p> <ul style="list-style-type: none"> - Beam transportation: b. Neutron Guide System d. Positioning e. Support h. Focusing device i. Radial Collimator <p>### Solid state bender ### Beam bridge Guide ### Heavy Shutter</p> <p># Phillip Bentley / Damian Martin; Valentina Santoro; Erik Nilsson (if in-bunker)</p> <p>...and their MCA</p> <p># Federico Rojas; Helena Ramsing; Tobias Richter</p> <ul style="list-style-type: none"> - Choppers a. Pulse Shaping Choppers b. Selection Chopper c. Band Selection Chopper <p># Nikolaos Tsapatsaris; Marie-Louise; Markus Olsson; Laurence Page; Helena Ramsing; Erik Nilsson; Fabien Rey; Tobias Richter (DMSC)</p>	<p>Sub-TG3.1 [Handled remotely]</p> <ul style="list-style-type: none"> - Beam transportation: b. Neutron Guide System d. Positioning e. Support h. Focusing device i. Radial Collimator <p>### Solid state bender ### Beam bridge Guide ### Heavy Shutter</p> <p># Phillip Bentley / Damian Martin; Valentina Santoro; Erik Nilsson (if in-bunker)</p> <ul style="list-style-type: none"> g. Collimation slits f. Polarization handling (Guide field; Rotators; Saturation field; Spin flipper) h. Focusing device i. Radial Collimator <p>Maybe also Fast shutter at the experimental cave</p> <p>...and their MCA</p> <p># Federico Rojas; Helena Ramsing; Phillip Bentley / Damian Martin; Werner Schweika; Tobias Richter</p> <ul style="list-style-type: none"> - Detectors d. Large detector <p># Doro Pfeiffer; Tobias Richter; Laurence Page; Helena Ramsing; Alex Holmes (SAD if common vacuum housing)</p>	<p>Sub-TG3.2 [Handled remotely]</p> <ul style="list-style-type: none"> - Polarization a. Polarization analyzer b. XYZ polarization (share interface with analyzer) <p># Werner Schweika; Ken Andersen</p> <ul style="list-style-type: none"> - Choppers a. Pulse Shaping Choppers b. Selection Chopper c. Band Selection Chopper <p># Nikolaos Tsapatsaris; Marie-Louise; Markus Olsson; Laurence Page; Helena Ramsing; Erik Nilsson; Fabien Rey; Tobias Richter (DMSC)</p>	<p>Sub-TG3.3 [In-person meeting]</p> <ul style="list-style-type: none"> - Sample environment interfaces (cryostat, can be delayed up to 2021 without impact on the instrument installation plan) - Global Infrastructure - Drawing package of complete system <p>Final TG3</p>

This year planning

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May to November
IDR + sub-TG3 of the complete instrument

April 19

Huge CTV process (guide, cave, Polarization, ...)

25th of January 19
Choppers and Detectors CTV





MAGIC CHOPPER & DETECTOR CTV

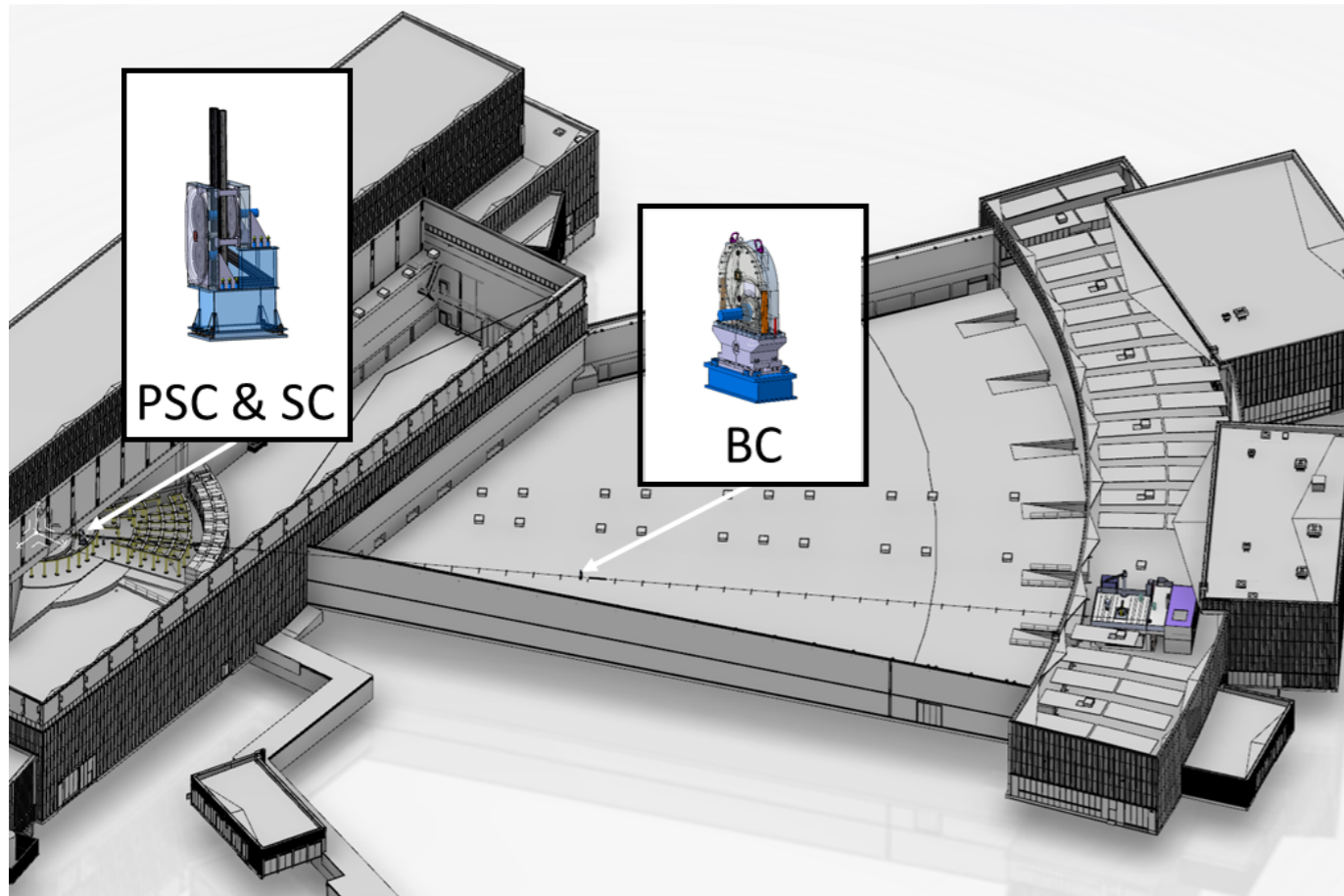
11.02.2019

Member of the Helmholtz Association



Choppers CTV

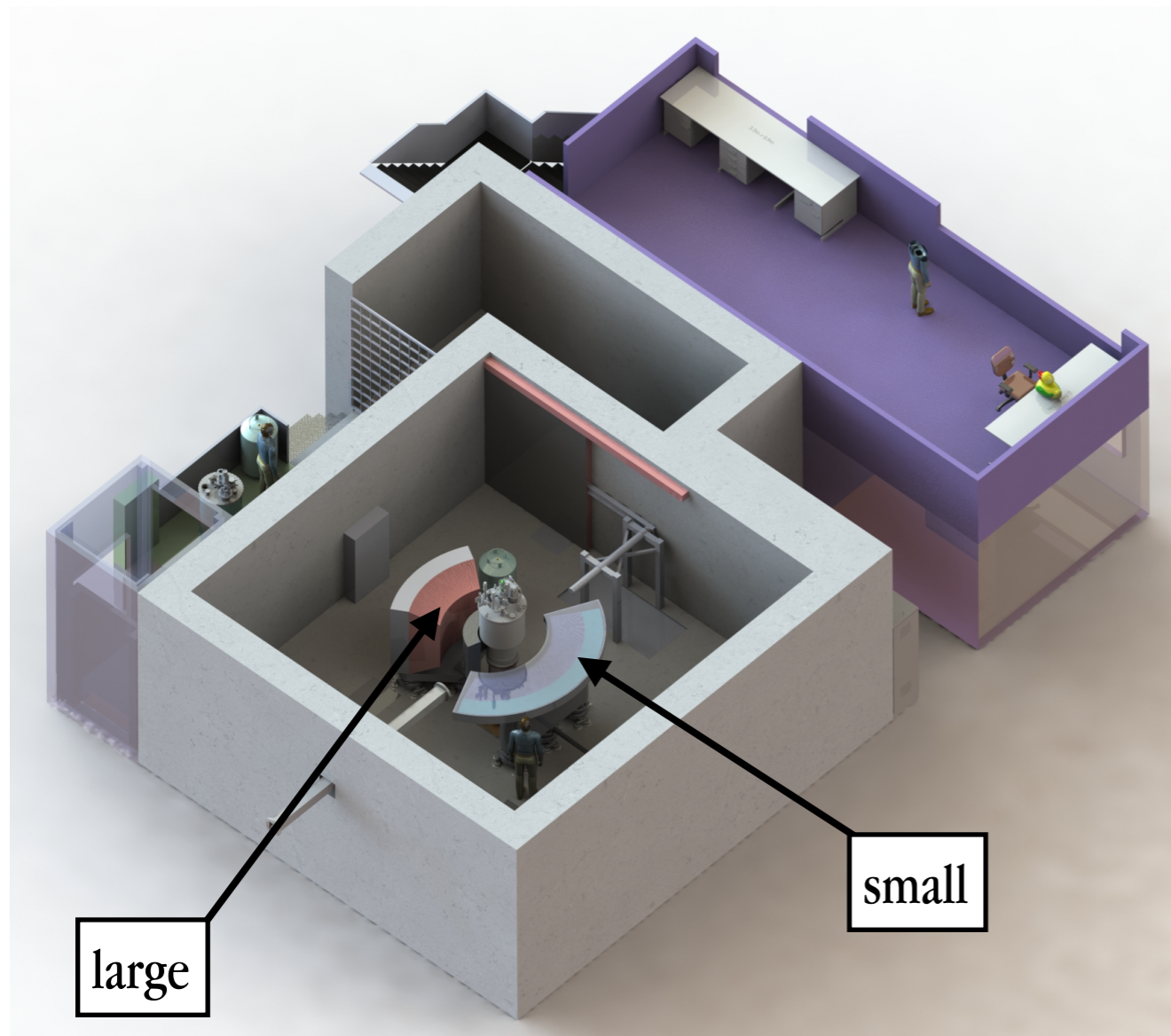
CTV on 25.01.2019



- Excellent template provided by ESS chopper group ! 😊
- Positive feedback, only 2 minor comments
- **Challenges for schedule**
 - delivery April 2021
 - **technical Annex** in review
 - procurement May 2019
 - SKF test ~March 2019

Detectors CTV

CTV on 25.01.2019



B-10 coating on one side
sensitive depth ~ 50 cm


- Good comments and support by detector group contact.

Thanks! 😊

- CTV seems now ready to accept
- **Challenges for schedule**
 - delivery March – Sept 2021
 - **technical Annex** still in review
 - procurement planned March 2019 ?
 - start CAD design at company asap

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Straight forward planning
Instrument team is committed

What could go wrong ?

ment

April 19

Huge CTV process (guide, cave, Polarization, ...)

25th of January 19
Choppers and Detectors CTV



Access to funding !

- MAGiC is LLB (CEA + CNRS), JCNS (FZJ) and PSI
- ESS (IKRC) only considers TAs when they are all available

Access to funding !

- MAGiC is LLB (CEA + CNRS), JCNS (FZJ) and PSI
- ESS (IKRC) only considers TAs when they are all available
- Funding availability:
 - > **JCNS = TA signature (ready)**
 - > **PSI = MoU signature (in progress)**
 - > **LLB = IKCA signature (with legal)**
- IKRC validation in April ? Later ?
- No TAs = delays



Wrap up

- We are technically progressing as expected
- STAP is convinced by the instrument design

- Still some technical unknown:
 - > Experimental cave shielding, PSS, SSB positioning
 - > Communication from 1400 km

- Legal stuff needs to be addressed:
 - > Not an instrument team deliverable
 - > Management (ESS, partners) needs to quickly converge

