

NPS collaboration meeting
Feb 16, 2022
NPS calorimeter assembly tasks

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Crystal wrapping

https://wiki.jlab.org/cuawiki/index.php/Wrapping_procedure

page discussion edit history move unwatch

Wrapping procedure

- Crystal wrapping procedure: .pdf
- Video demonstration: <https://youtu.be/sUqlujqTfzY>
- The following material has been shipped to JLab:
 - 4 wrapping tools
 - 1200 198x81-mm2 tedlar sheets
 - 2 cutting mats
 - Aluminum block with crystal size (for training)

Delivered to JLab (EEL/126)
last Monday



Wrapping completed

12 days wrapping
only @ 2 + time
folding and oven

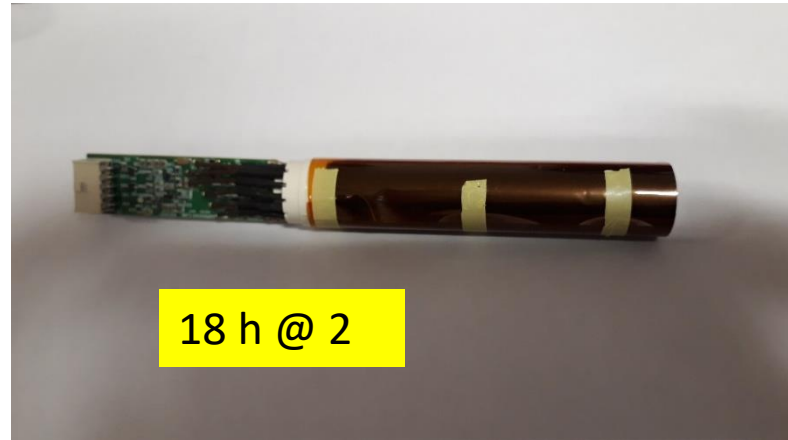


Tasks that could be done by the NPS
collaboration before our arrival (proposal)



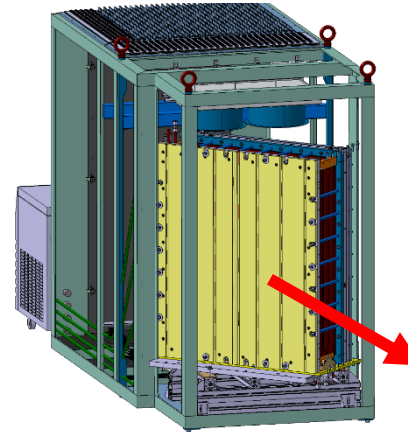
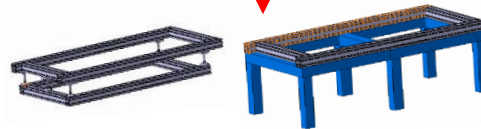
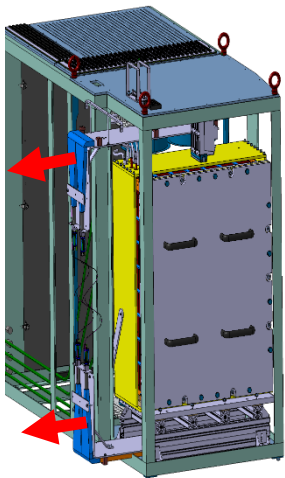
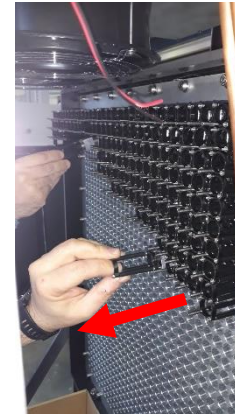
9 h @ 2

PMT + base assembly (1080)

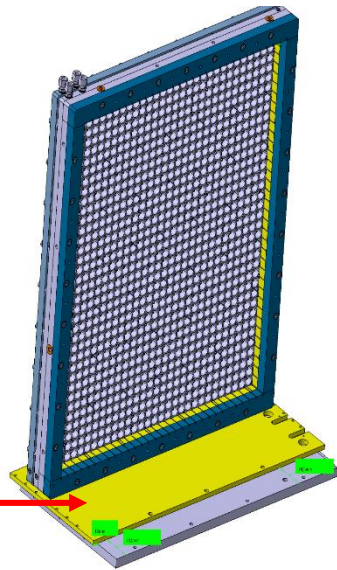
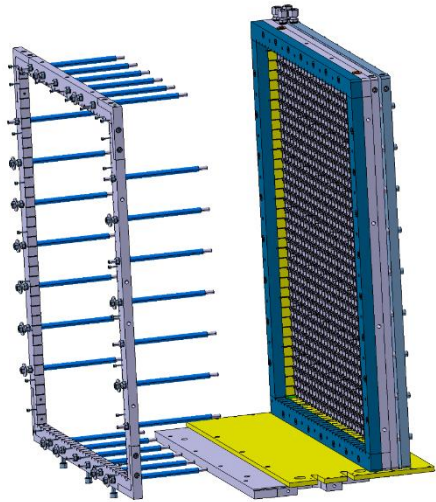


18 h @ 2

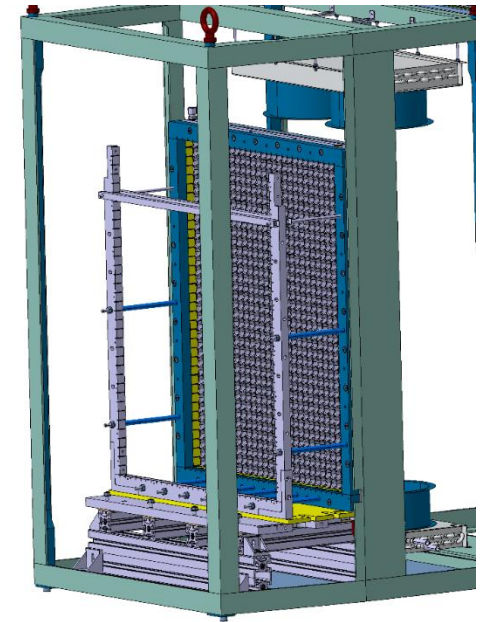
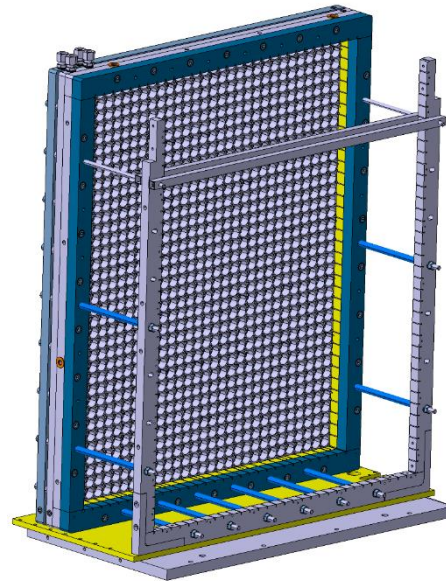
Kapton sheet/tape protection on PMT (1080)



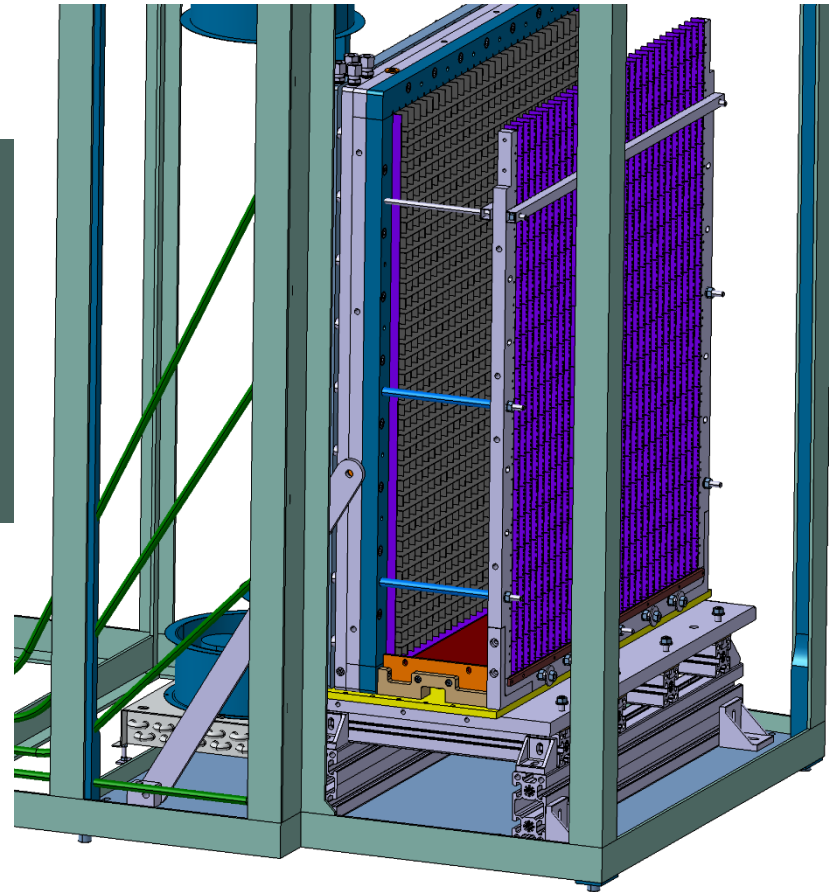
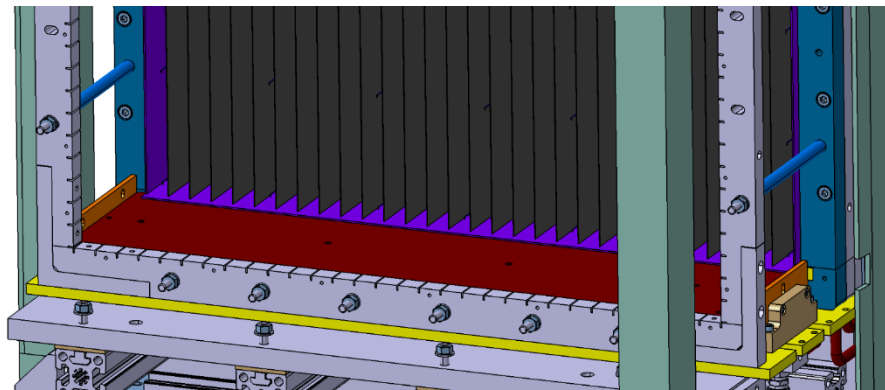
1) Open wood box , remove 30 PCB & all PMT supports, position onto JLab frame and remove calorimeter frame



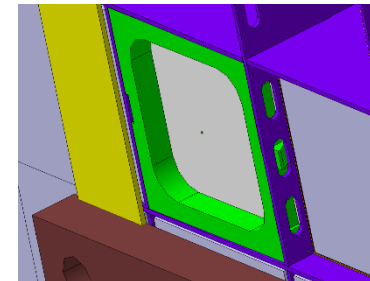
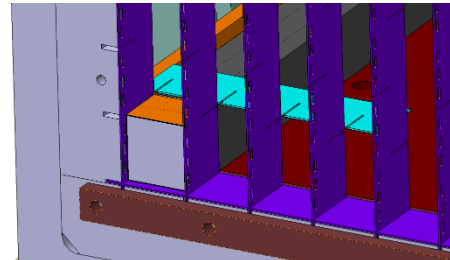
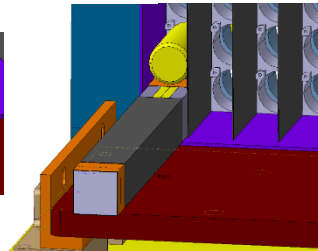
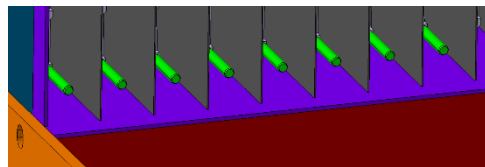
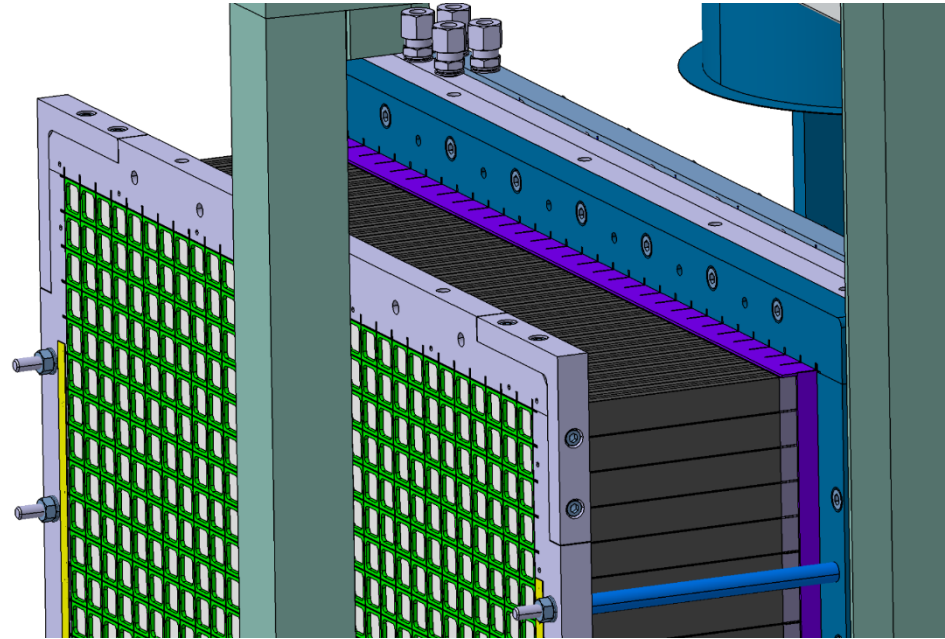
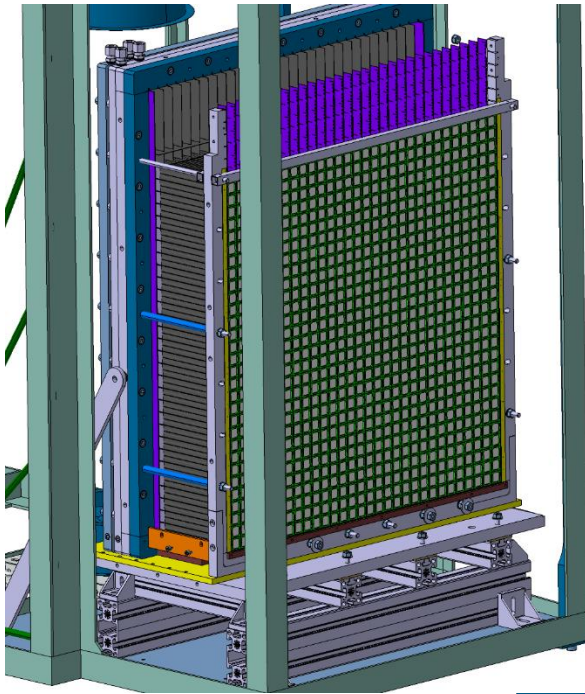
Bottom iron
shielding



3) Mounting bottom iron shielding plate, assembly calorimeter frame and insert in the box

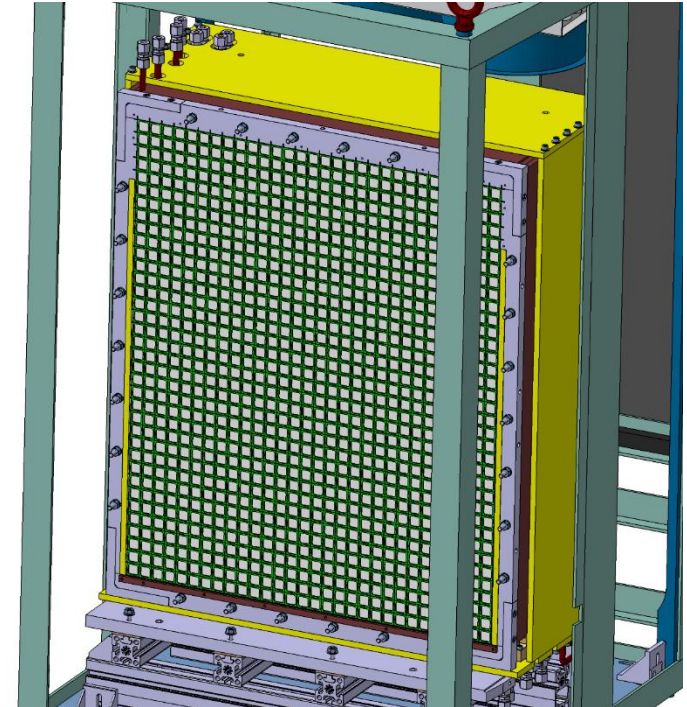
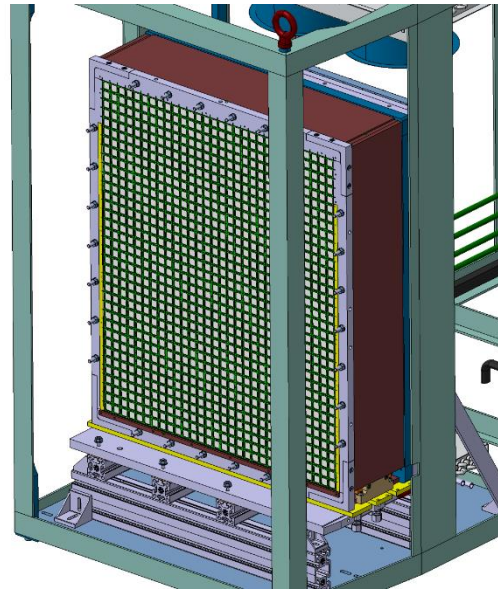
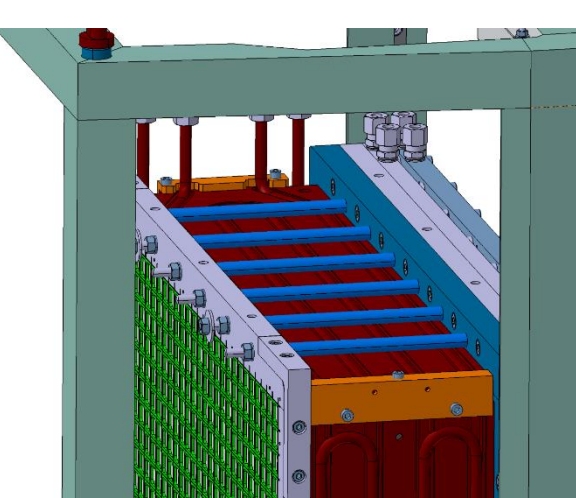


4) Assembly bottom copper plate, mu metal vertical plates and front vertical carbon plates



5) Stacking crystals

135 crystals = $3 + 3/4$ rows/ day @ 2 Maxi = 8 days



6) Mounting copper plates, foam and shielding plates

Main mounting steps at JLab

Days 15

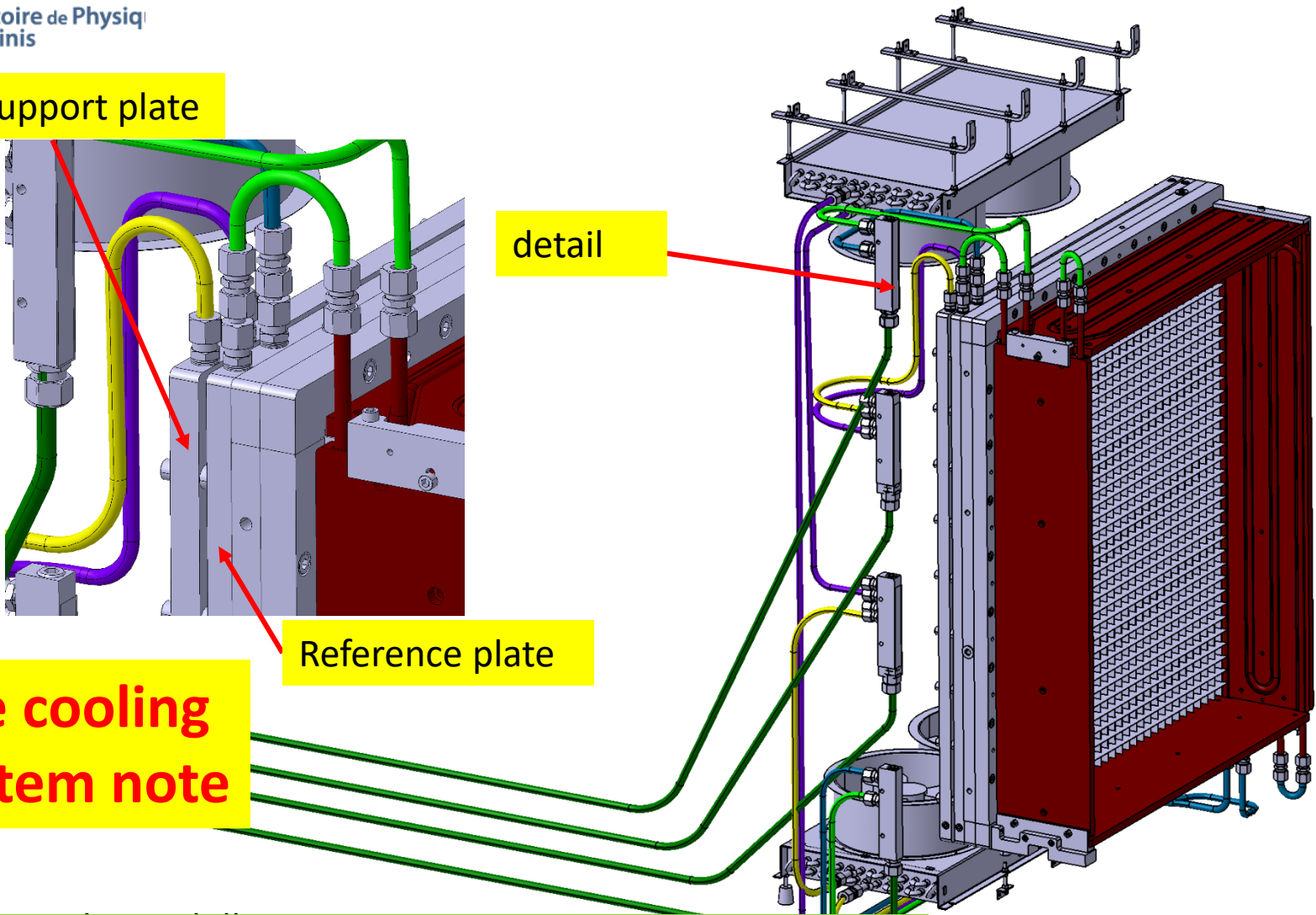
PMT support plate

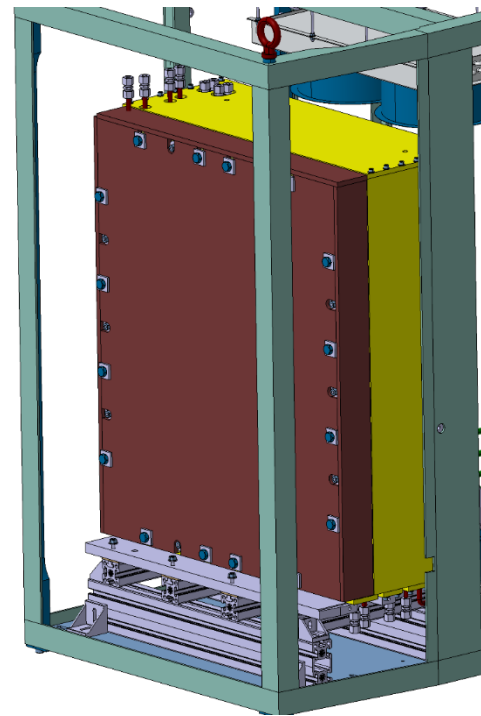
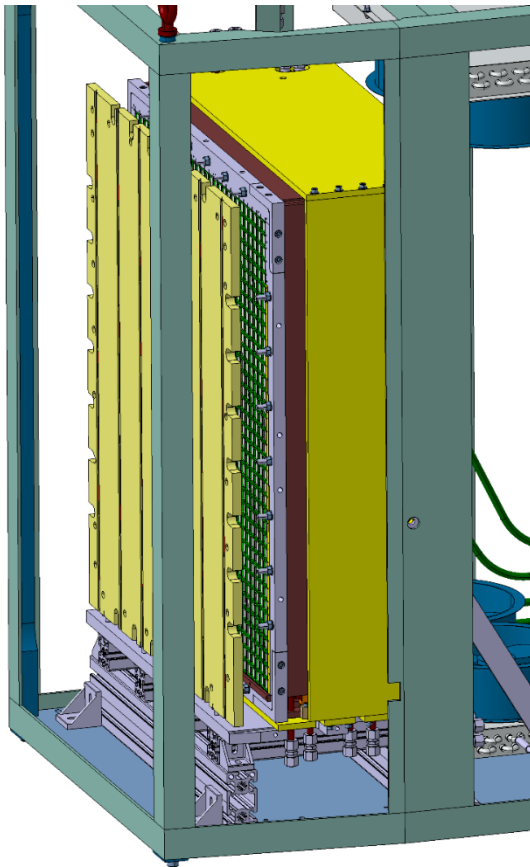
detail

Reference plate

See cooling
system note

7 : Connection of all the copper tubes and tightness test

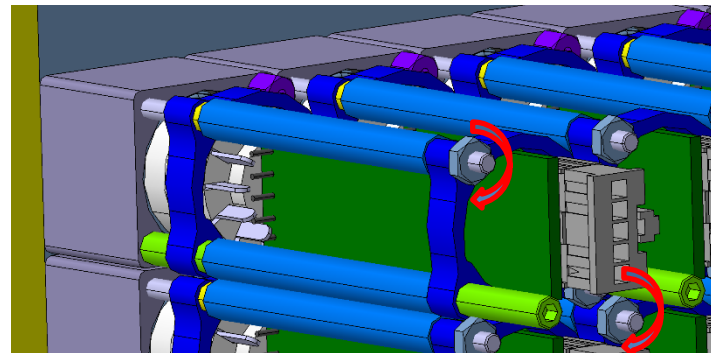
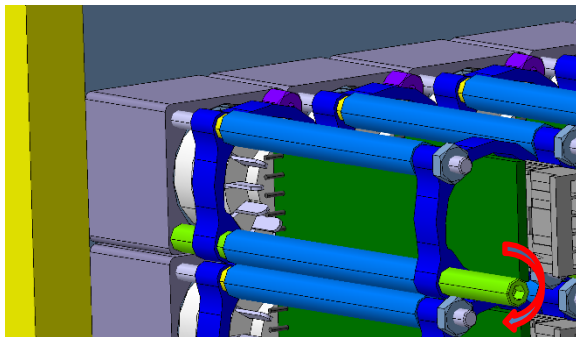
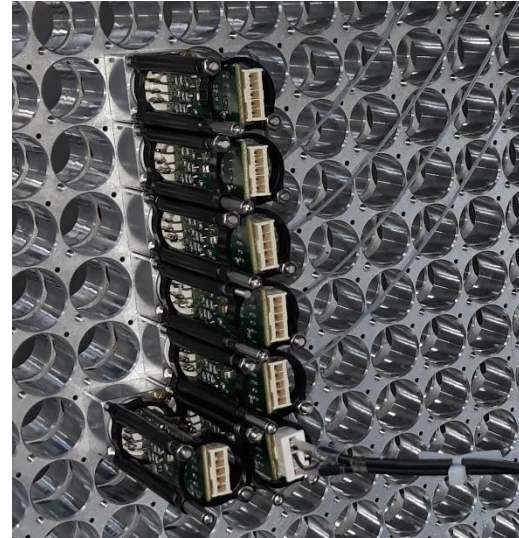




8) Mounting front PE plate with T° sensors, foam and Top plate



Add optical
grease

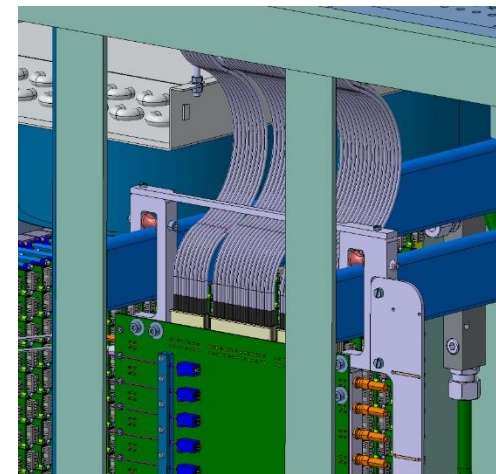
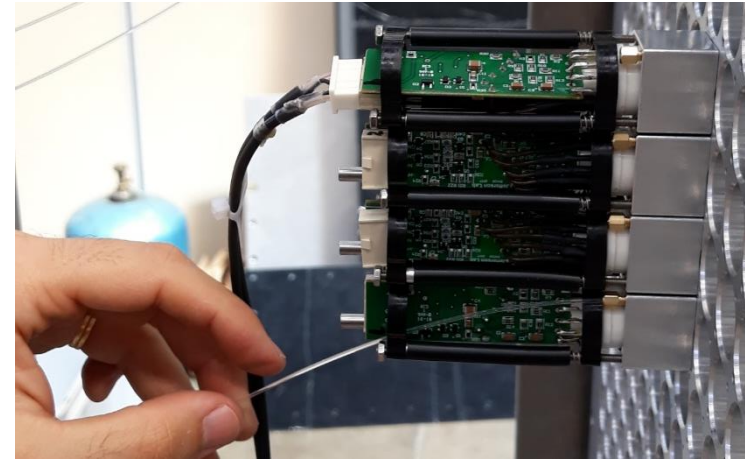
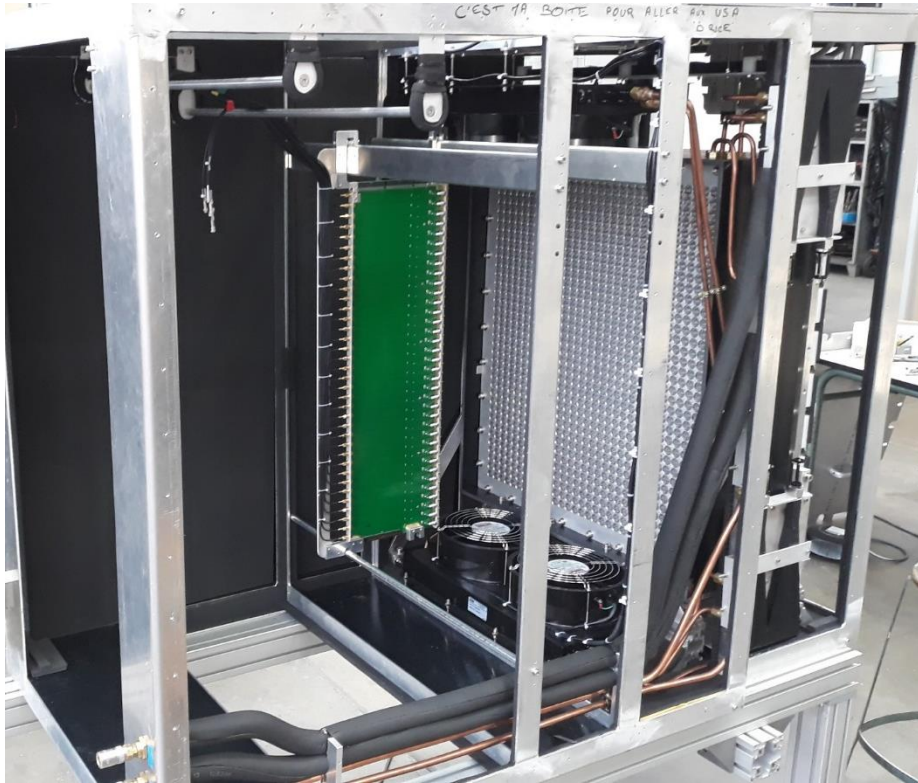
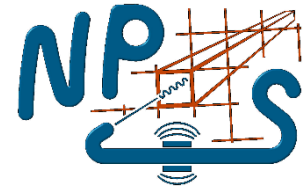


9) Mounting PMTs on support plate

2 peoples Max @ a time

Main mounting steps at JLab

Days 19 to 33

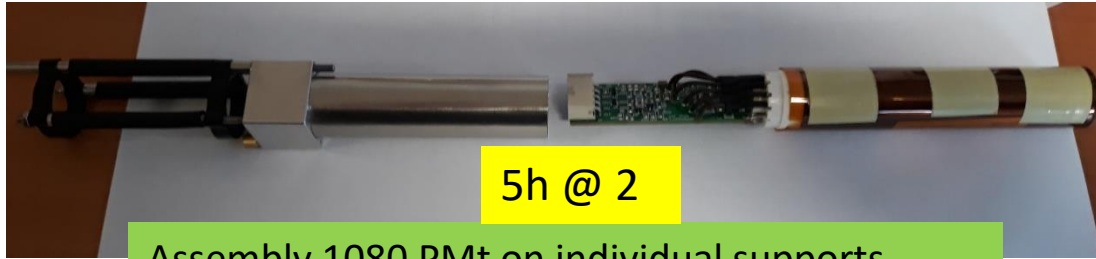
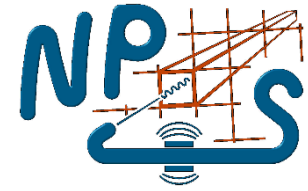


4h /PCB @ 1 alone

2 PCB / day = 15 days

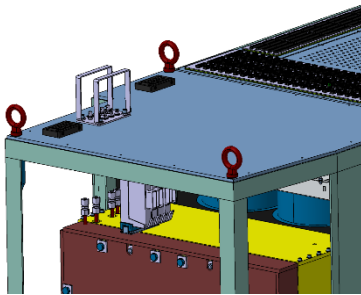
10) PCB mounting and cabling (fibers , HV cables ,LED flat cables and Anode cables)

Main mounting steps at JLab :
 // tasks



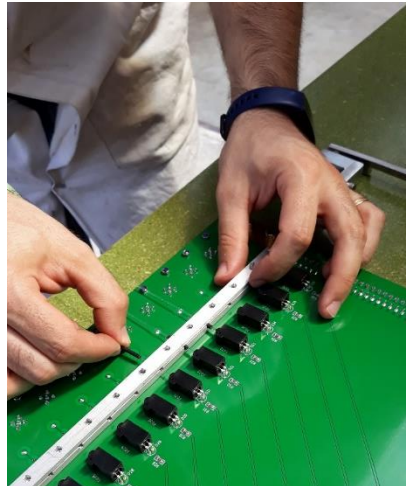
5h @ 2

Assembly 1080 PMt on individual supports



4h @ 2

T° sensors cabling



1h30/ PCB/person :
 2 peoples, 30 PCB
 3 to 4 days

30 PCB cabling on table :
 fibers + front cables

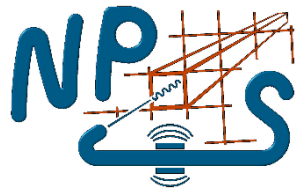
Additional
 backward sensors
 connecting

4h @ 2

Gas connection

1 day @ 2

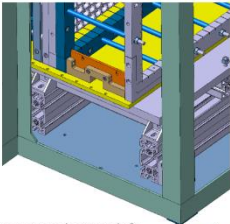
**NPS frame assembly:
 77 documented steps**



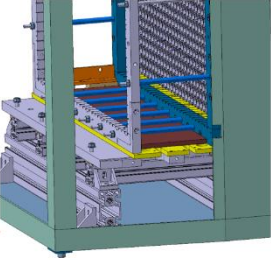
Assembly procedure

(link to .pptx file with 77 steps)

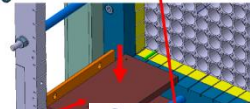
Mounting :Task 25



Mounting 1st layer
 bottom insulating foam
 (1 part)



Mounting bottom left
 cooling support



Mounting 2nd layer
 bottom insulating foam
 (7 parts)

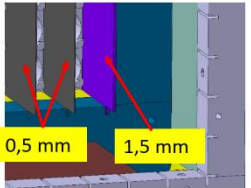
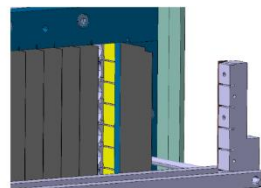
25 : Mounting of the bottom ins

Mounting :Task 26



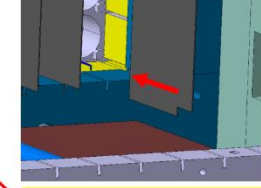
Slide the vertical mu metal plates
 (caution don't bend them ,very fragile)

26 : Mounting of the vertical Mu metal plates

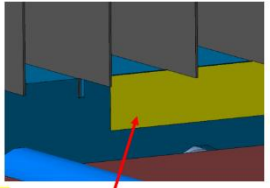


0,5 mm

1,5 mm



! Take care T° sensor wires



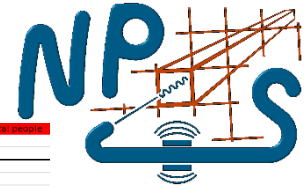
Put tape 12 mm Top and
 Bottom frames to maintain
 the plates

! Mu metal fragile

Put gloves to manipulate the mu metal

"Gantt" chart

[Link to this table](#)



Time	serial	Tasks	Name	Time and Pax	// tasks	// tasks	// tasks	// tasks	// tasks	// tasks	// tasks	Total people	
			Task reference : see ppt mounting procedure		Wrapping 1080 crystals	string 1	1080 PMTs +	1080 kapton or	1080 PMTs in their individual	fibers + front cables on PCB	final sensors con	Gas connecting	
					wrapping ready before our arrival ? needs 5' / crystal to wrap if reflective sheet preiminars folded 12 days @ 2 / without folding								
Day 1 administration													
Day 2 dismounting	1		Opening wood box	1 h @ 3									
	2		Remove black plastic plates	2 h @ 3									
	3		Removing 30 PCB protections	1 h @ 2									
	4		Removing 30 PCB	2 h @ 2									
	5		Removing bottom wood base	0,5 h @ 2									
	6		Lift box and pull down on Jlab frame	2 h @ 4									
Day 3 dismounting	7		Removing 1080 PMT supports from box	4 h @ 2									
	8		Removing 2 scintillators	0,5 h @ 2									
	9		disconnecting copper tubes	0,5h @ 2									
	10		removing reinforcement arms										
	11		Removing false plastic shielding	1 h @ 2									
	12		Removing front reinforcement plate	1 h @ 3									
	13		Removing Top aluminum plate	1 h @ 3									
	14		Removing threaded rods and fixing nuts	1 h @ 3									
	15		Removing calorimeter support from box										
Day 4 dismounting and start mounting	16		Removing 4 copper plates										
	17		Removing front PE plate										
	18		Removing front frame	3 h @ 3									
	19		Removing screws under base plate	1 h @ 3									
	20		Mounting Bottom iron shielding plate										
	21		Mounting front frame	1,5 h @ 3									
	22		Mounting bottom tubes and light test	2 h @ 2									
	23		Mounting calorimeter support in the box	2 h @ 3									
	24		Mounting bottom foam	2 h @ 2									
Day 5 mounting frame crystals	25		Mounting vertical Mu metal plates	1 h @ 2									
	26		Mounting bottom cooling plate										
	27		slide bottom H 1,5mm Mu metal	0,5 h @ 2									
	28		Re connect bottom right tubes	0,5 h @ 2									
	29		slide vertical carbon plates										
	30		slide 1st H carbon plates and adjustment shims										
	31		preliminary mounting reinforcement arms	2 h @ 2									
	32		inserting stop plastic part	6/crystal / people									
	33		inserting 1st crystal with its wrapping	2 peoples mounting									
	34		adjust backward height of crystal	7 h /day									
	35		adjust front height of crystal	135 crystals/day @2									
	36		insert 1st raw (step 34 to 37)	3 -3/4 raws/day									
	37		slide carbon H plate	*2 peoples help mounting									
	38		insert 1st 0,5 mm Mu metal										
	39		insert front plastic part with reflective sheet										
	40		Insert layer front plastic part with reflective sheet										
	41		Stack crystal raws until raw 28 (tasks 34 to 42)										
	42		Stack crystal raws until raw 29 (tasks 34 to 42)										
	43		mounting top aluminum frame										
	44		Stacking the 6 last raws										
	45		remove right side rods										
Days 7 Stacking 135 crystals	34 to 41			7 h @ 4									
Days 8 Stacking 135 crystals	34 to 41			7 h @ 4									
Days 9 Stacking 135 crystals	34 to 41			7 h @ 4									
Days 10 Stacking 135 crystals	34 to 41			7 h @ 4									
Days 11 Stacking 135 crystals	34 to 41			7 h @ 4									
Days 12 Stacking 135 crystals	34 to 41			7 h @ 4									
Days 13 Stacking 135 crystals	34 to 41			7 h @ 4									
Day 14 mounting cooling and foam	48		mounting vertical right copper plate										
	49		mounting right side rods with spacers										
	50		mounting vertical left copper plate										
	51		mounting corner to fix top copper plate										
	52		mounting Top copper plate	2 h @ 3									
	53		mounting foam around copper plates	1 h @ 3									
	54		mounting the 2 vertical shielding plates										
	55		mounting the top shielding plate	1 h @ 2									
	56		mounting arms and spacers 2 mm	1 h @ 2									
	57		connecting all copper tubes and tightness test	4 h @ 4									
Day 15 finalising front calo	58		mounting front PE plate with sensors										
	59		mounting front PE plate with sensors	1 h @ 2									
	60		mounting front foam	1 h @ 2									
	61		mounting Top aluminum plate with connectors and cables	1 h @ 3									
Day 16 monting PMT	67		mounting 1080 PMT assembly on support plate										
	68		mounting 1080 PMT assembly on support plate										
	69		mounting 1080 PMT assembly on support plate										
Day 17 monting PMT	67 to 69			7 h @ 2									
Day 18 monting PMT	67 to 69			7 h @ 2									
Day 19 mounting and connection 2 PCB in box	72		mounting first left PCB										
	73		connecting fiber and front cables on PMT support										
	74		connecting LED flat cables										
	75		connecting anode cables to the top plate	3,75 h/pcb @ 1 Max at a time									
	76		mounting of all pcb (tasks 72 to 75)x30	2 PCB/day @ 1 alone in the box									
	77		close the box	2 h @ 3									

- May 30 - Jun 16 (~3 weeks): 6 people [Brice, Emmanuel, Laurent, Thi, Carlos D., Miktat]
- Hope to finish most of the frame assembly (if crystal wrapping is done before)
- A subset can/will return after the Summer, if needed.

Additional help
more than
welcome !

