

SBN/ICARUS status

Andrea Zani – CERN

EP-NU meeting – 19/04/2018



Premise / Breaking News!!

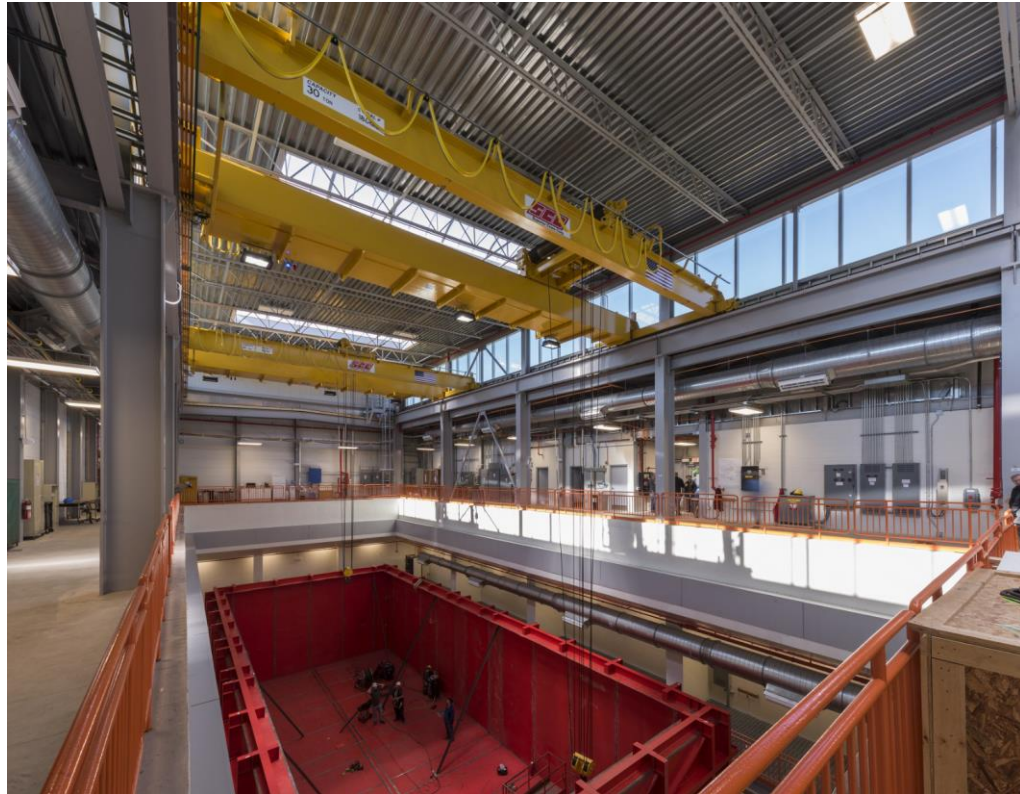
- DOE veto on work on ICARUS modules was lifted at the end of last week.
- Work on ICARUS CRT and Cold shield was not affected, and it is going on right now.
- In this presentation there will be an introduction of installation/commissioning activities.
- I will not go into details of CRT today



Far Detector building



Inside the FD building

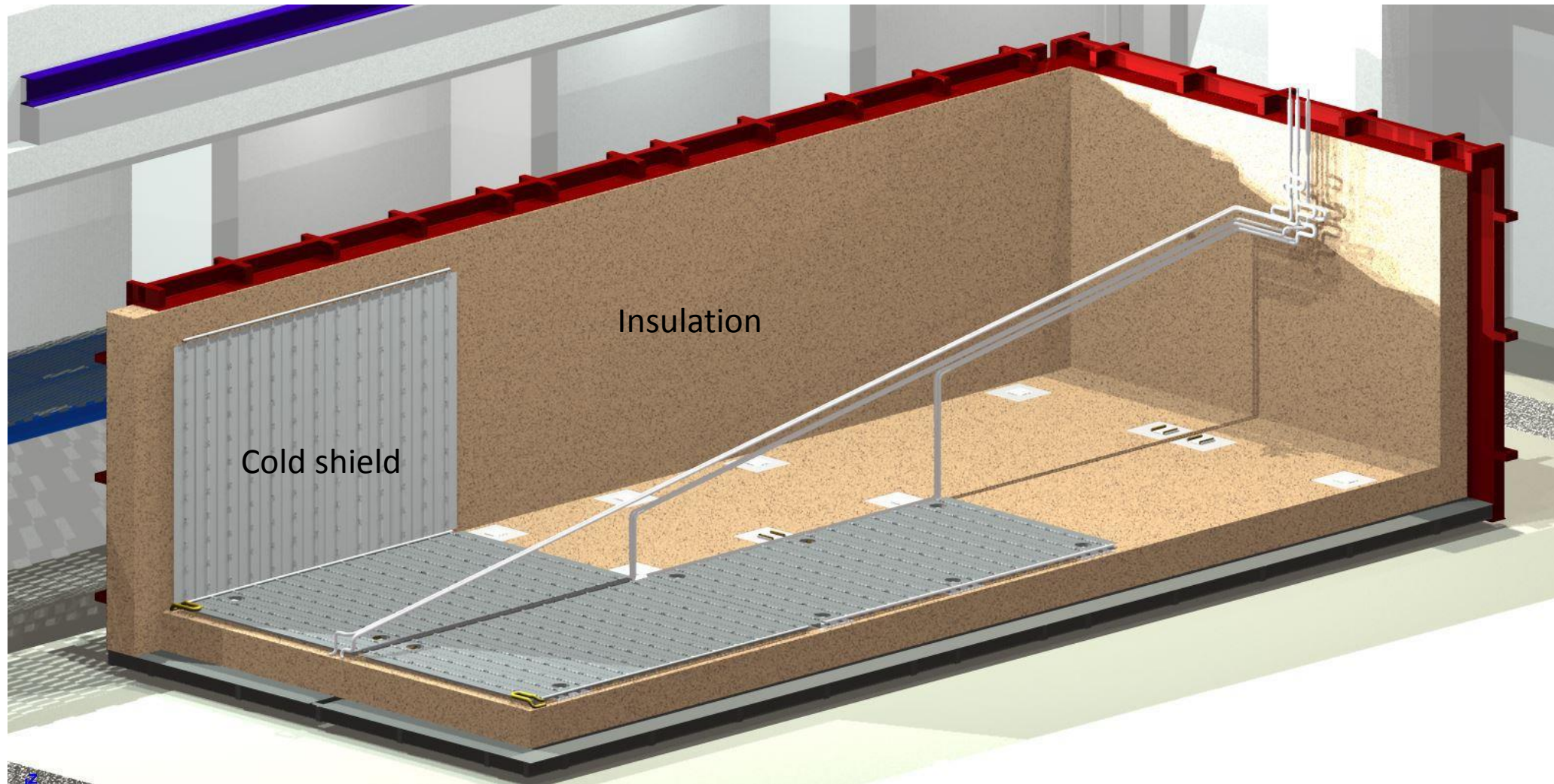


Summer 2017: only external structure is complete

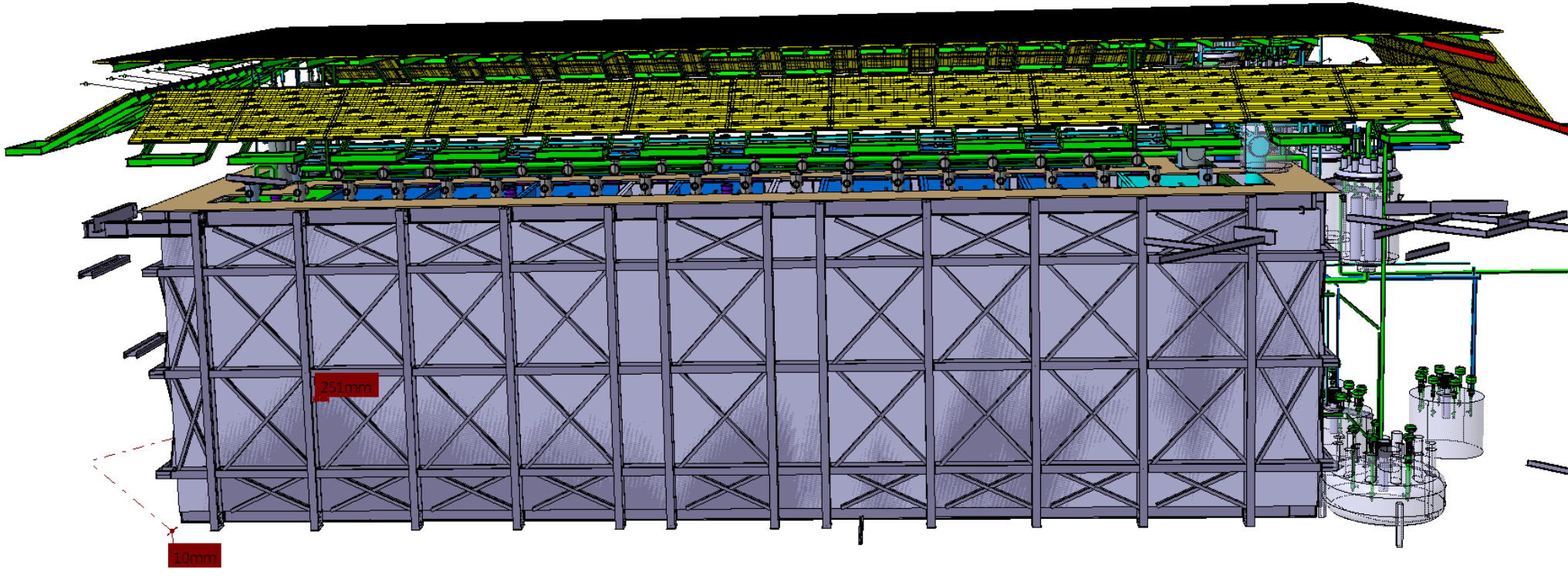
Thx to Angela



Model of external T600 structure



Model of top CRT



T600 cryostats

April 2018: first module ready to be covered with its tent, in order to start welding work.



Summer 2017:
traveling to FNAL

First activities in the pipeline

- Cover of the cryostats: to be finalized this week
- Feet installation: starting this week on the cryostats
- Cold shield assembly and installation: 4 weeks, starting now
- Welding of first door on first module: starting next week (estimated one week per door)
 - Follow up: nuts sealing (details in two slides)
- Welding operations will continue for about one month, after which (mid-may) first mechanical vacuum test can start.

Cold shield

Assembly and installation starts this week. CERN personnel (Frédéric Merlet) on site. Two INFN technicians (Pavia/Catania) will arrive at the end of the week, to work with FNAL personnel, followed by two more INFN techs (Bologna). Estimated workload around 4 weeks.



Door sealing

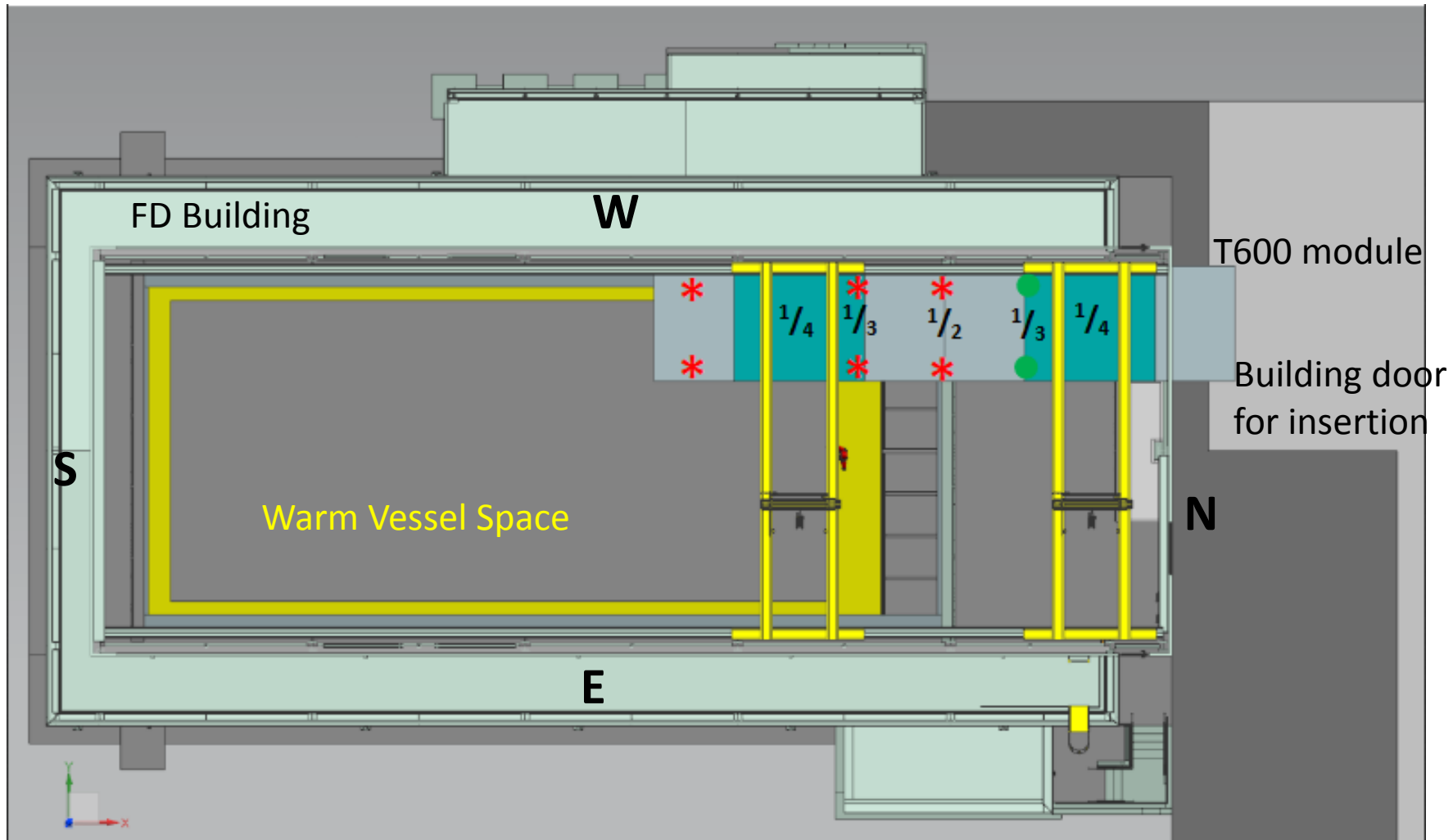


- Welding interface between cryostat main body and door
- Install special nuts ensuring leak-tightness

Cryostats insertion in FD building

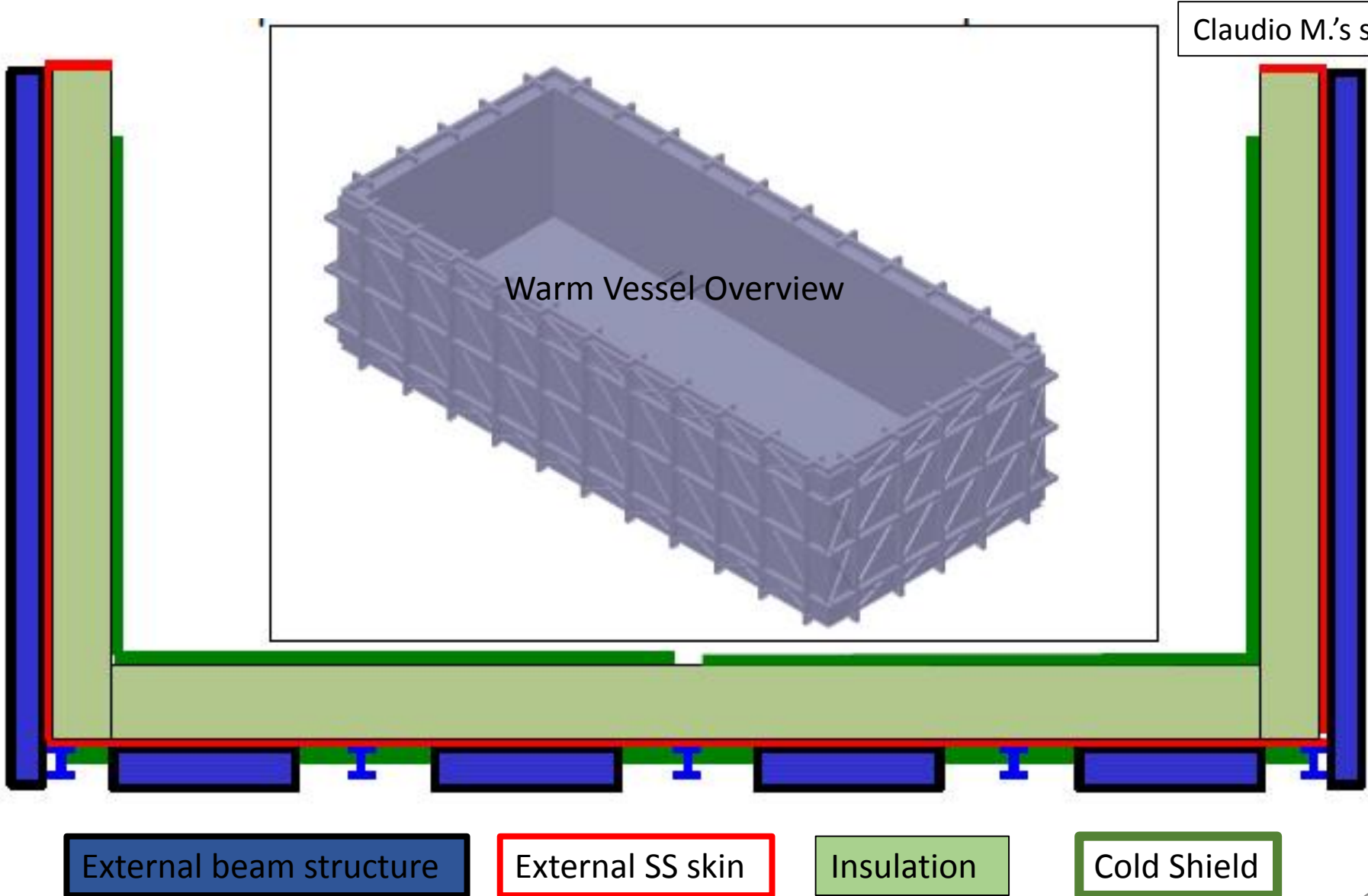
At the end of April the two building cranes will be upgraded, to be able to carry the modules.

A contract for rigging has been awarded, some engineering specs are missing and will be finalized once the North wall of the cold shield is in place.

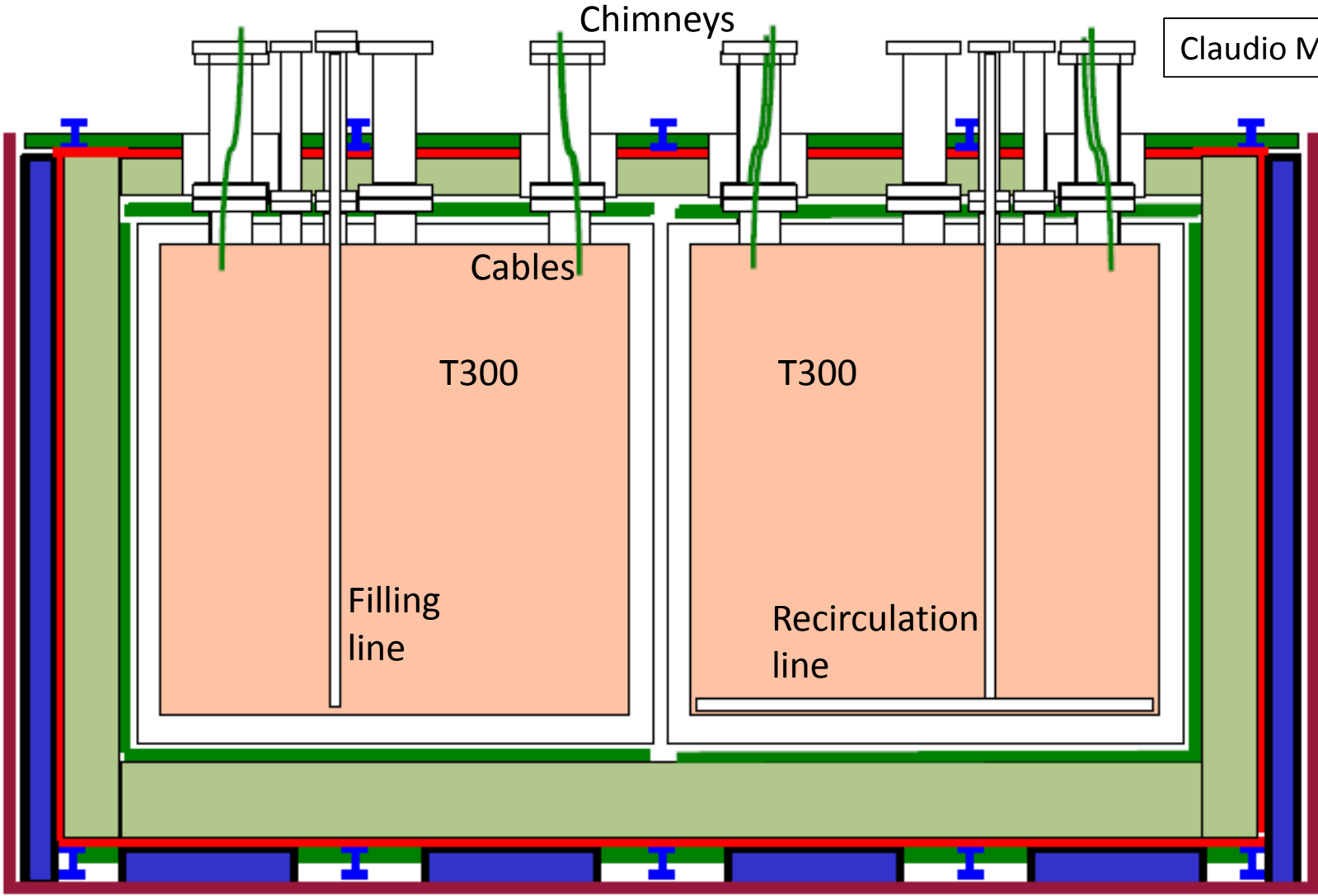


Scheme of T600 installation layers

Claudio M.'s slide



Scheme of T600 installation layers



Bottom/side CRT modules

Overview of following activities

Activity	Sub-activity	days
Vacuum	Phase 1 - leak test on the doors	5
	Phase 2 - leak test on chimneys and manholes	5
	Phase 3.1 - Final leak check - overpressure	5
	Phase 3.2 - Final leak check - vacuum	14
	Phase 3.3 - Vacuum phase	30
Cryogenics	Controls and instrumentation tests	5
	Blank test of valves, pumps, etc.	5
Cold Commissioning		10
Filling with Lar		15
Stabilization	Fine tuning of LN2 circulation and LAr recirculation - pressure stabilization	15

Detector commissioning	HV commissioning - Wire planes	1
	HV commissioning - Field cage	1
	PMTs HV and readout - switch on	5
	PMTs calibration	12
	TPC readout; with DAQ	25
	Trigger system startup	15
	Purity verification	5
	Test data taking	30

Detector pre-commissioning	Connectivity tests - HV for the drift (Cathodo, race tracks, grids).	3
	Connectivity tests - PMTs	3
	Connectivity tests - Optical fibers	12
	Connectivity tests - Wires - First T300	12
	Connectivity tests - Wires - Second T300	14
	Connectivity tests - Internal slow controls	5
	Noise and grounding tests - PMTs	12
	Noise and grounding tests - Wires	11
	Noise and grounding tests - Cryogenics	5
	Wires biasing tests	5
DAQ and communications	24	
Internal slow controls	5	

CRT	Complete installation of top CRT	60
	Bottom CRT functional tests	120
	Back Side CRT functional tests	25
	Side CRT functional tests	25
	Bottom + Side CRT commissioning (DAQ)	25
	Top CRT functional tests	20
	Trigger and DAQ Integration and final commissioning	12

Activity on electronics at CERN

- CERN is collaborating with Pavia and Padova group for the purchase, test and preparation of the electronics for the T600, concerning, PMTs, TPC, and trigger system.
- A test of trigger system based on PMTs is in preparation at b182 (INFN Pavia, Marta, FNAL).
- Electronics for the TPC has been purchased and it is being delivered at CERN. INFN Padova personnel is working on testing of the boards from CAEN, and assembly of the hardware (minicrates to be mounted on top of the detector penetrations).
 - Electronics tested and optimized over multiple iterations with 50L chamber set up at CERN, b182.
- Decoupling and Biasing Boards for the wire planes have been developed mainly by INFN Padova personnel, with Francesco's help. We have all components in house and production is under way now.



Original schedule of installation

- Given the recent release of the DOE veto, I am still gathering information concerning a more detailed schedule.
- Assuming that the detector modules will be brought inside the FD building in June, right after that one can proceed with chimneys installation.
Completion of the cold shield and warm vessel (top parts) would take place in August. Crosses and electronics installation will follow after that (September).
- The old desiderata was to start vacuum phase (lasting 1-2 months) before Christmas and leave the cool-down (15 days) for 2019. However... (see next slide).
- Installation of cryogenics (recently delivered at CERN) will proceed in parallel, in order to fit within the above dates.
- Production and installation of top CRT will proceed in parallel as well.
- Shipping of material from CERN (general hardware, top CRT, top Warm Vessel, Cryo) is going to be organized very soon, accordingly.

Actual milestones to DOE

ICARUS Key Milestones on DOE schedule

Milestone	Description	Forecast Date Tech Driven
I-1	ICARUS detectors are ready to fill with liquid argon	May 2019
I-2	ICARUS detectors are filled with liquid argon and ready for detector commissioning (LAr purity adequate for physics has been achieved)	Nov 2019
I-3a	ICARUS detectors are ready for physics data - <i>CRT is operational</i>	Jan 2020
I-3b	ICARUS detectors are ready for physics data - <i>Shielding in place</i>	Feb 2020

Corresponding SBND milestones to DOE

SBND Milestones on DOE schedule

Milestone	Description	Forecast Date Tech Driven
S-1	SBND is ready for transport from Dzero Assembly Building to the SBN ND hall	Aug 2019
S-2	SBND detector is ready to fill with liquid argon	May 2020
S-3	SBND detector is filled with liquid argon and ready for detector commissioning (LAr purity adequate for physics has been achieved)	Oct 2020
S-4a	SBND detectors are ready for physics data - <i>CRT is operational</i>	Nov 2020
S-4b	SBND detectors are ready for physics data - <i>Shielding in place</i>	Dec 2020

Summary so far

- Activities are ongoing at FNAL for the coming weeks, mainly concerning the cryostats and the cold shield. Mechanical vacuum test will follow.
- The activity at CERN is now mainly related to Top CRT production (Umut, Paola, with INFN), reception of material, and preparation of electronics by with INFN Padova group, with our help (Francesco, myself) (*item not shown today*).
- A lot of material for cryogenics and completing installation of the T600 is going to be shipped soon from CERN to FNAL.
- I will gather more detailed information about the schedule. Definition of the presence of CERN personnel on site should follow.
 - This concerns both the installation/commissioning phase and then the data taking.