



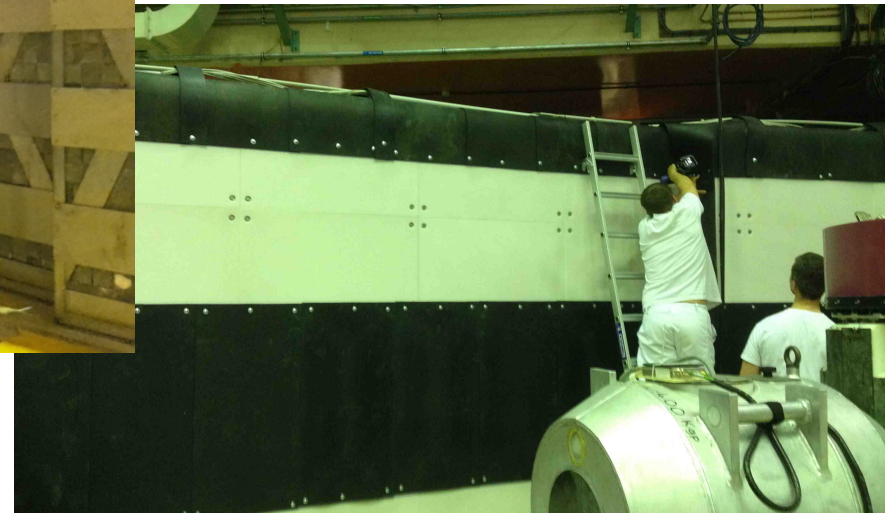
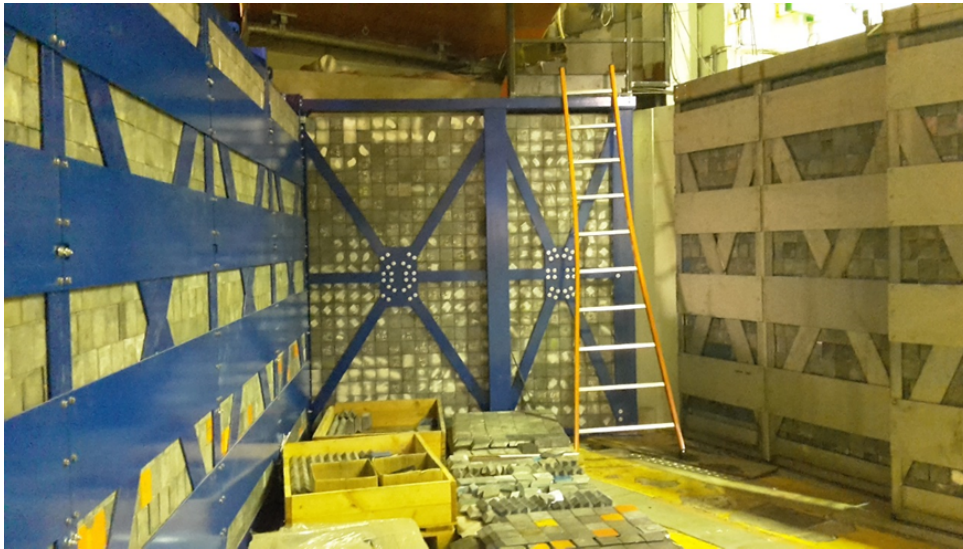
Installation epic

Anne STUTZ

Stereo Collaboration Meeting
11 october 2016

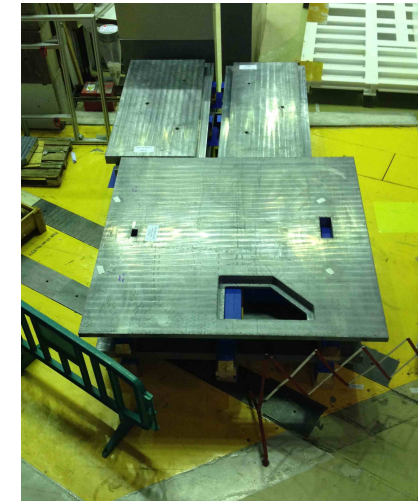
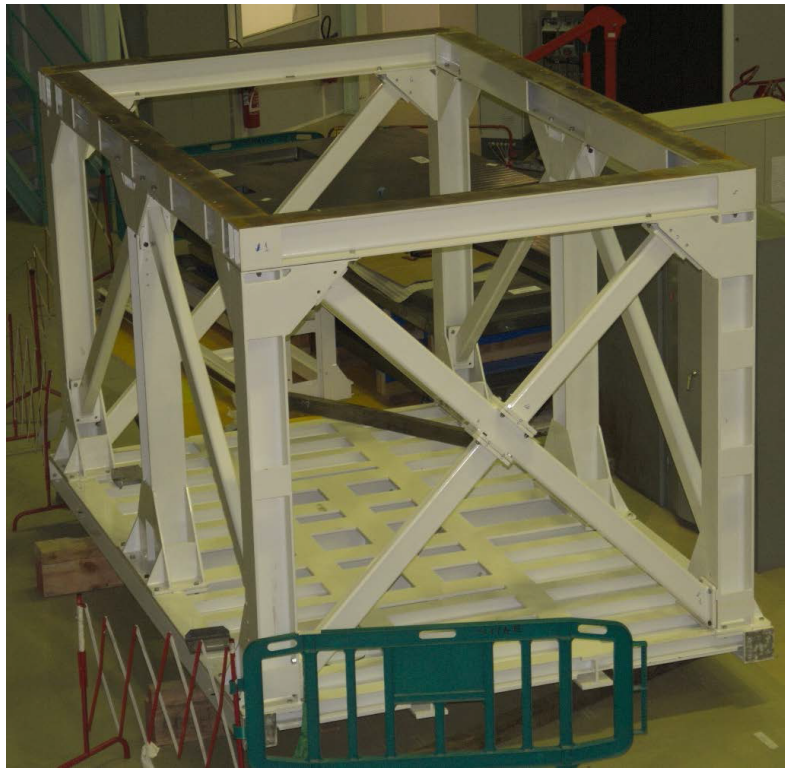
Starting point: Stereo casemate

- D19, Front and IN20 lead walls already installed (10/10/15 cm of lead)
- Borated PEHD (15 cm) + B4C (on top of the wall and at the beam level) on IN20 wall IN20 side.

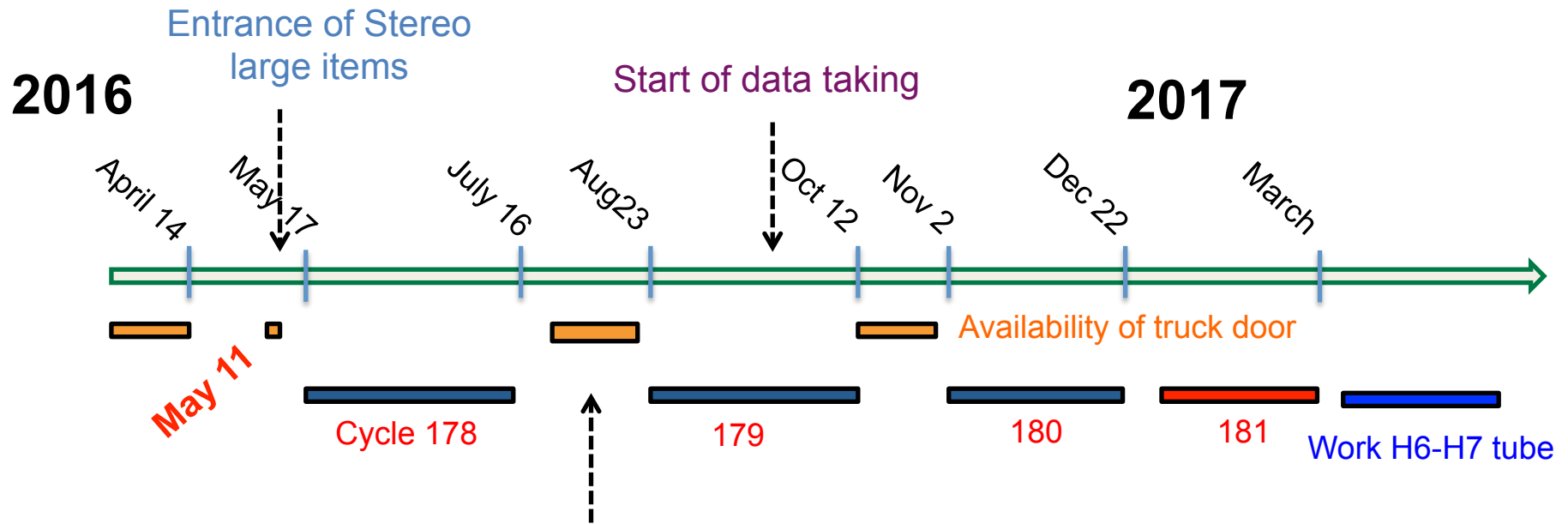


Starting point: delivered items

- Large items already entered at ILL
 - Support structure
 - Lead plates: floor (x4) and walls (x6)
 - Detector vessel



Starting point: tight schedule !

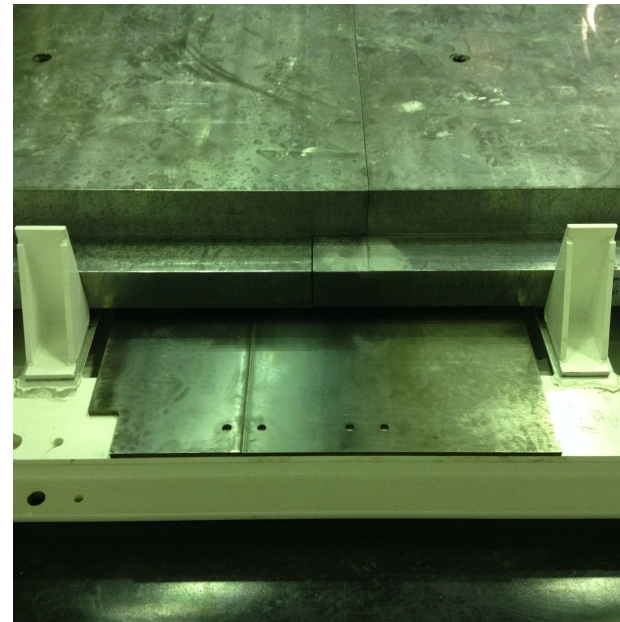
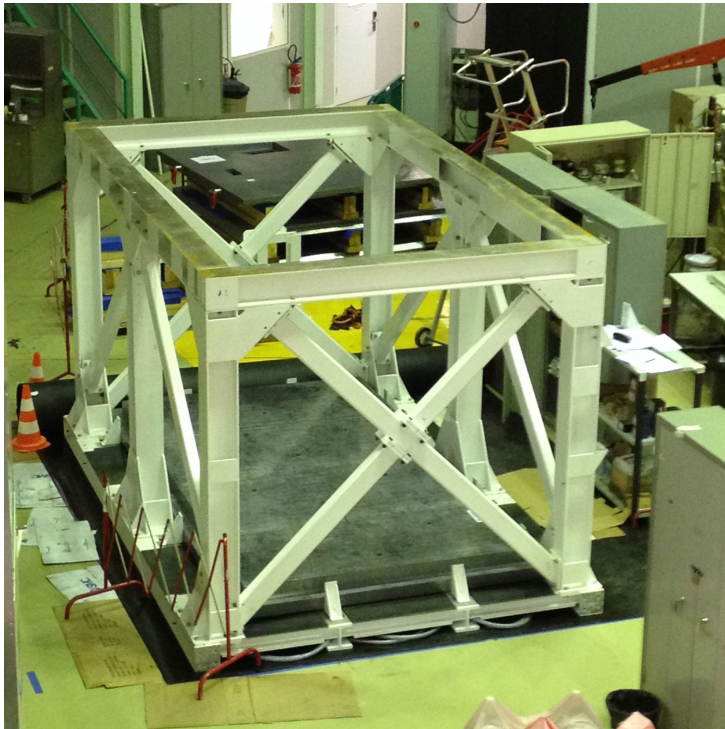


Entrance of last large items :

- muon veto,
- PEHD plates,
- calibration system

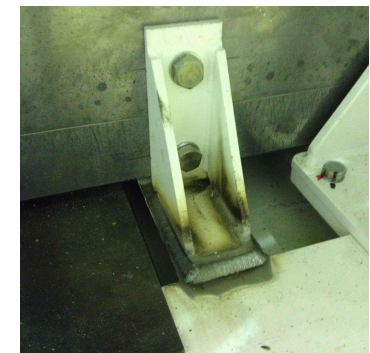
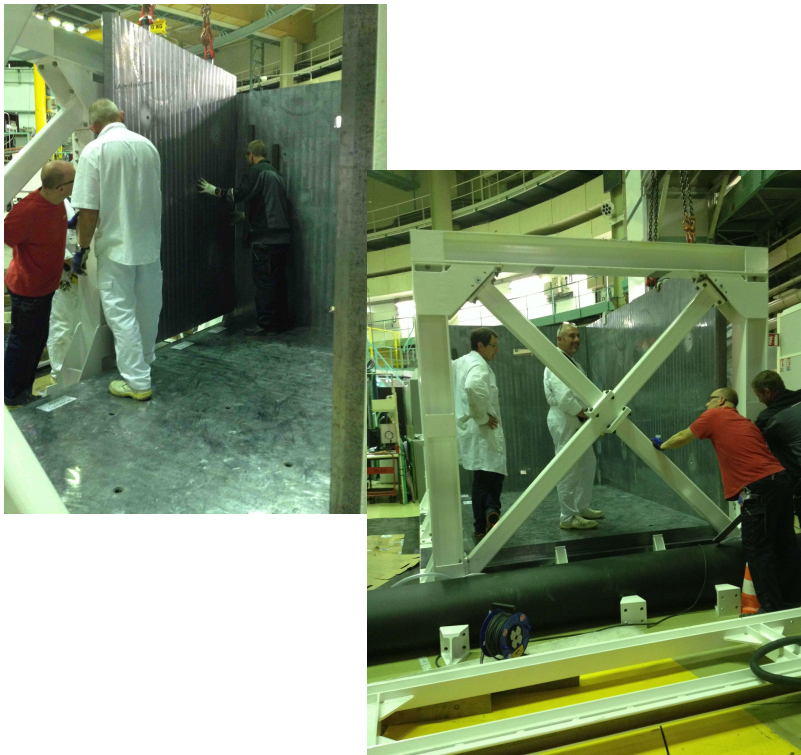
Support structure (LAPP/ILL)

- Setting the support structure on the liner
- Installation of supply hoses for air cushions
- Installation of soft iron (1 cm) and lead (20 cm) floor plates
- Temporary positioning the squares to fix lead walls to the structure



Lead shielding (LAPP/ILL)

- Installation of lead walls
 - 15 cm thick, 1 piece per small side and 2 pieces per long side, 5T/piece
 - residual gap between plates of the order of 2-3 mm on the calibration door side
- Welding support brackets on the structure (qualified subcontractor)
- Filling up handling holes with small lead balls



Lead shielding (LAPP/ILL)

- Installation of the arm that support the calibration door (~300 kg)



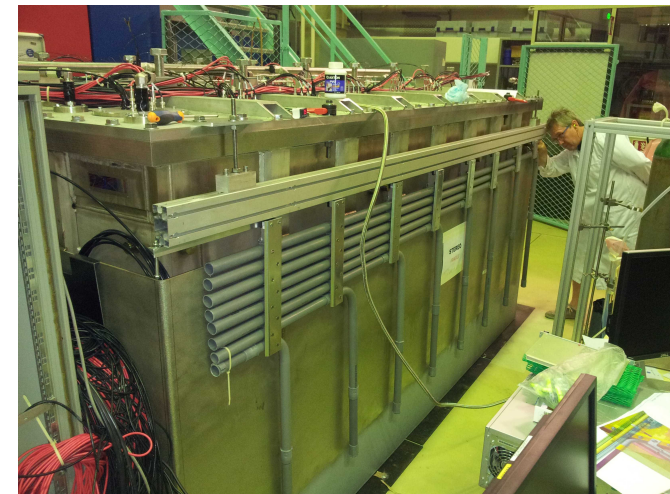
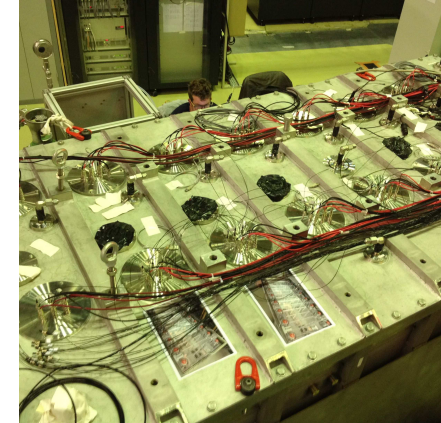
Support structure assembly (LAPP/ILL)

- Need to meet the safety/quality requirements of ILL and NECS calculations
 - Tightening screws to the torque + control
 - Change the assembly of diagonals because of non-conformity on the roughness coeff.
 - The contact surface of the beam was painted instead of being sandblasted
 - Adding one pin in the axis of the diagonal was not enough to fix the U piece
 - Need to weld the U piece on the structure (qualified subcontractor + remove front and rear lead walls during the operation)



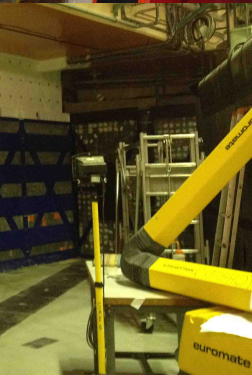
Work around the inner detector (LPSC/Irfu)

- Tests on detector after transportation:
 - All PMT work well (PE and LED runs)
 - New test of light leaks with individual optical fibers
 - Sensors
- Integration of Nomad DAQ in the ILL environment
 - Implementation of data transfer from ILL to LPSC
- Preparation of the detector tubing (filling and calibration tubes) with a mockup
- Detector tightness tests
 - residual leakage of 1.5 mb/h
- Emergency calibration system (plan B)



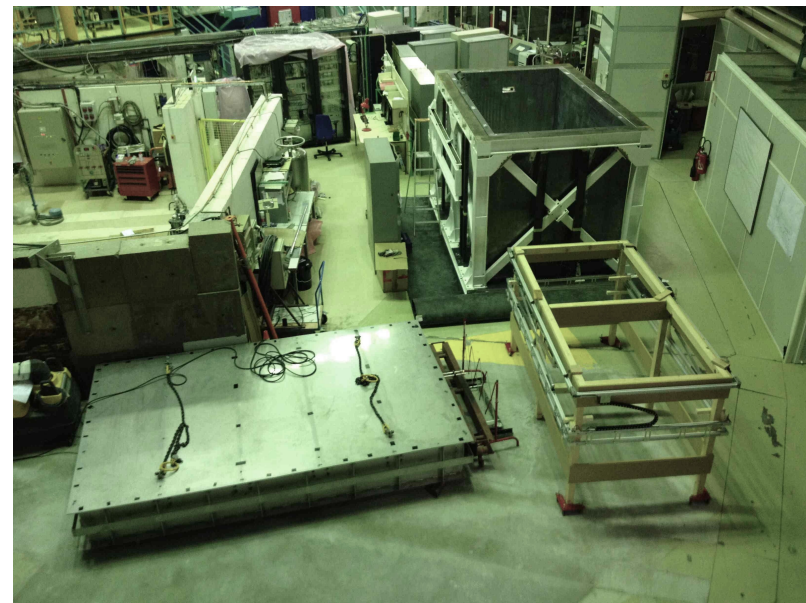
Layout of the casemate (ILL/LPSC/Nuvia)

- Background measurement in the casemate (see F. kandzia talk)
 - IN20 wall covered with B4C (Stereo side) to prevent n-capture on the wall structure
- Work on floor :
 - weld the lid of the cable channel and cover the floor with a flat cement screed
- Installation of the the D19 fire wall on the upper part of D19 wall
 - subcontracted to the NUVIA company (EI120 type with mineral fibers)
 - Cover top of the wall with B4C D19 side



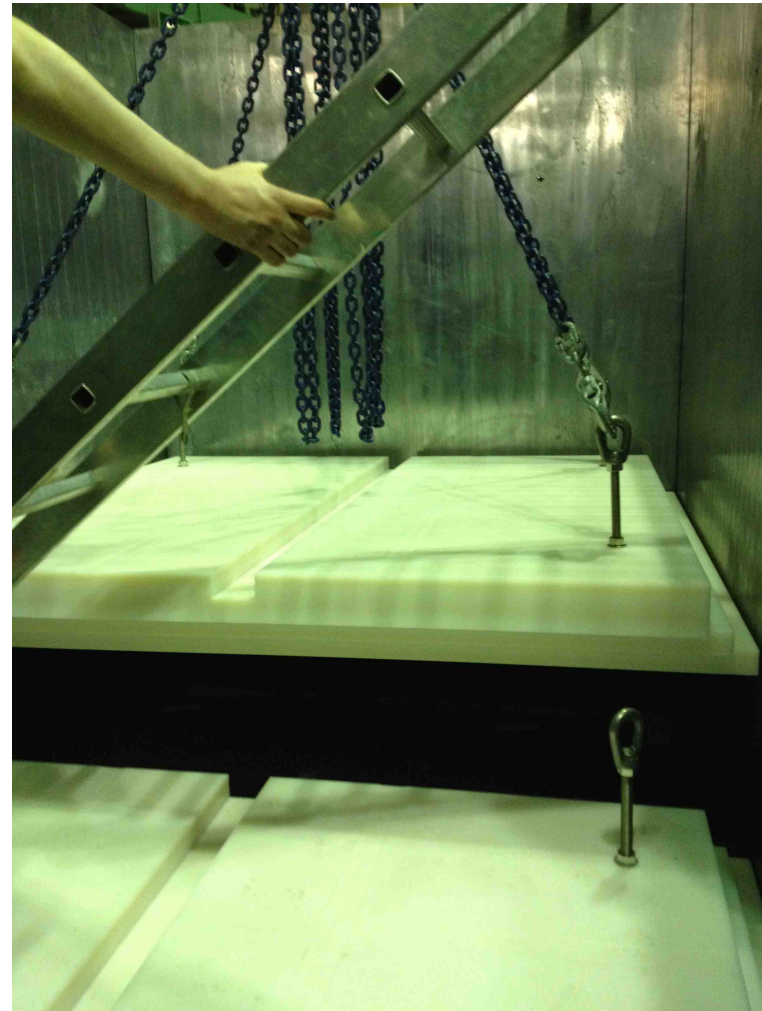
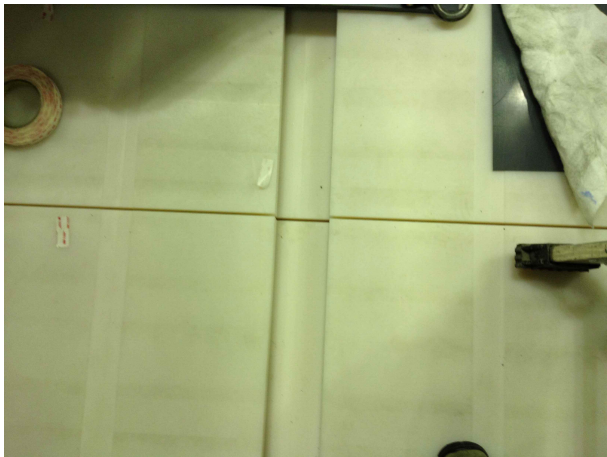
Entrance of last large items (LPSC/ILL/LAPP)

- Lead roof plates (x4) delivered on July 28th
- PEHD floor plates (x2) delivered on August 4th
- Muon veto (4.2 x 2.6 m) transportation from LPSC to ILL on August 8th
 - All PMTs and basis of the muon veto replaced one week before transportation (see J.S Real talk)
- Calibration system delivered at ILL on August 8th
 - Position encoder to be replaced
- PEHD walls (x6) and roof (x6) plates delivered on August 18th



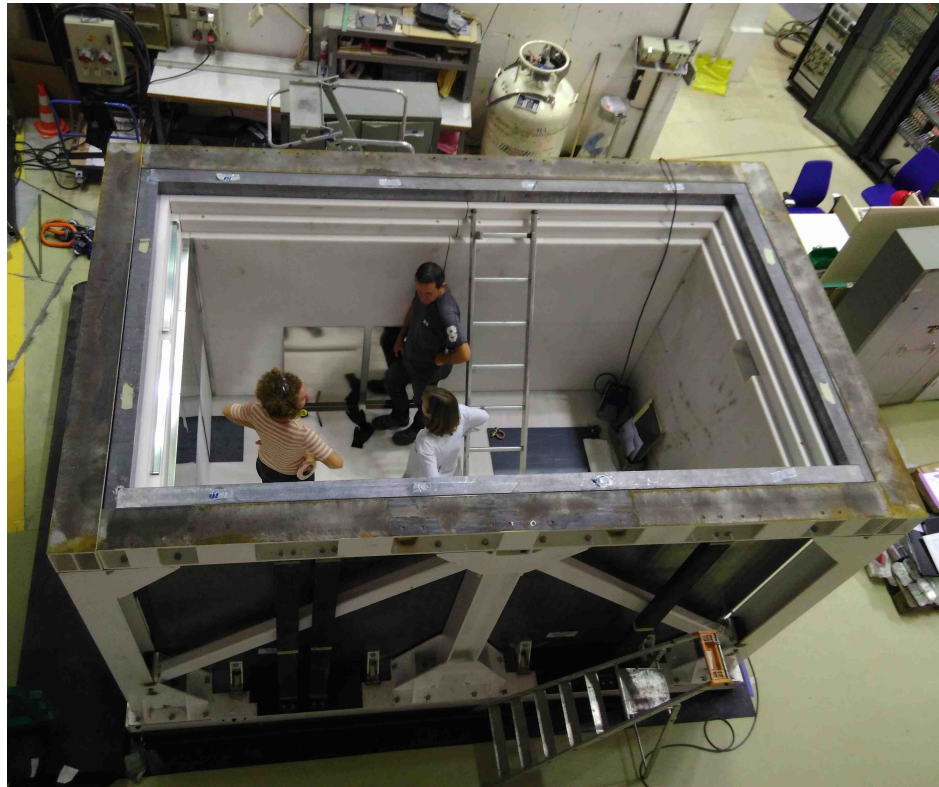
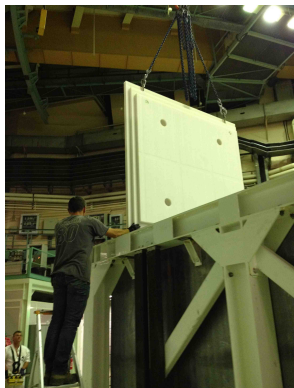
PE shielding: floor (LPSC/ILL)

- PEHD floor :
 - 20 cm of borated PEHD 500
 - one channel for calibration rail (90x50)
 - 2 plates, 5 mm gap for T dilatation
 - Handling nuts (stainless steel) not removed from PEHD
 - Filling up handling holes with PEHD plugs



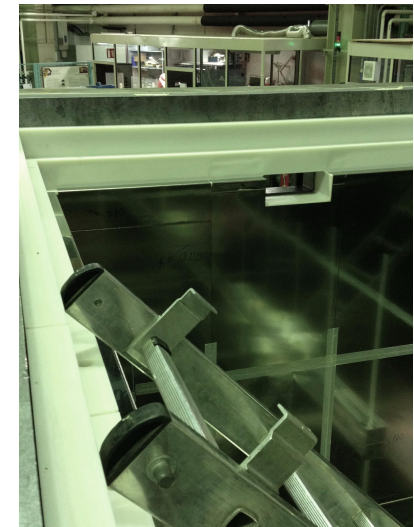
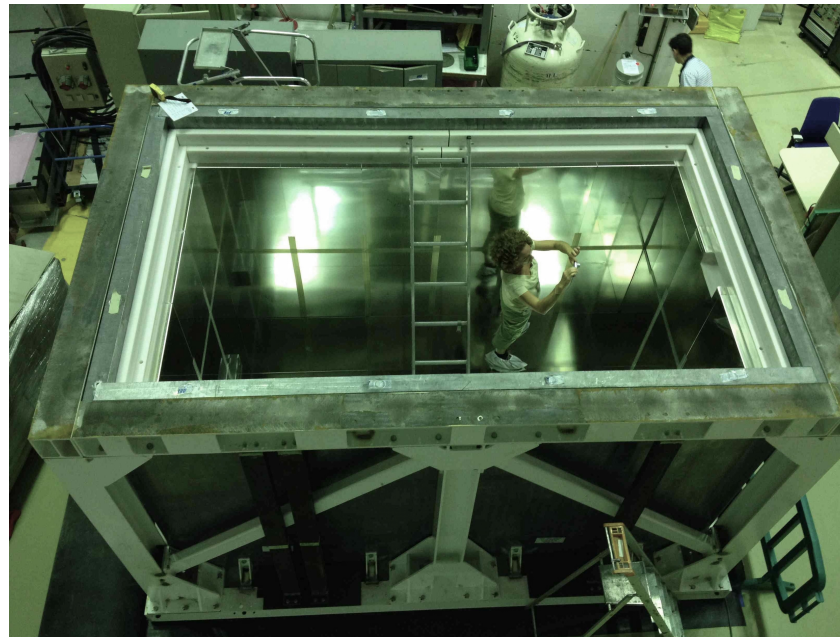
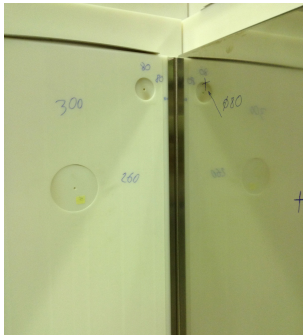
PE shielding : walls and calib. door (LPSC/ILL)

- Installation of borated PEHD walls (15 cm)
- Fixation of walls on lead plates with double eccentric system
 - One hole in lead was not well placed -> drilling a new one and filling up the old one with lead chips
- Removing handling nuts and filling up all handling and eccentric holes with PEHD plugs



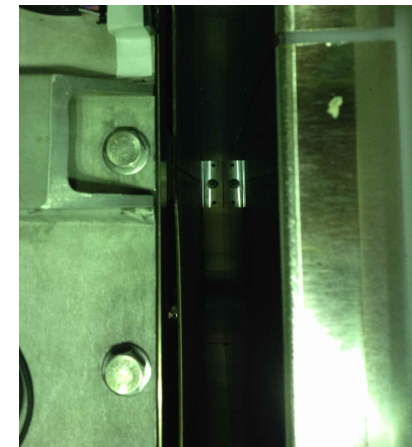
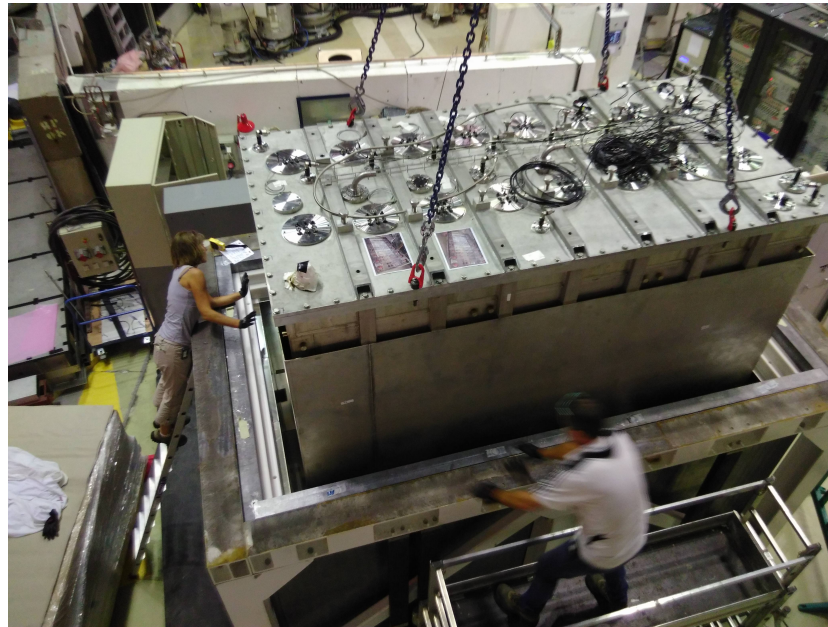
Mu-metal Shielding (LPSC)

- Install mu-metal shielding (1.5 mm thick) on PEHD with double sided tape
 - recovering bands and angles (4 cm wide) are inserted in small grooves in PEHD
 - Mu-metal Plates are folded on top and bottom for better connection with floor and roof plates
 - Need to cut 2 plates because they were folded wrong side
- Add PE sliding tape between plates to avoid interferences with calibration system



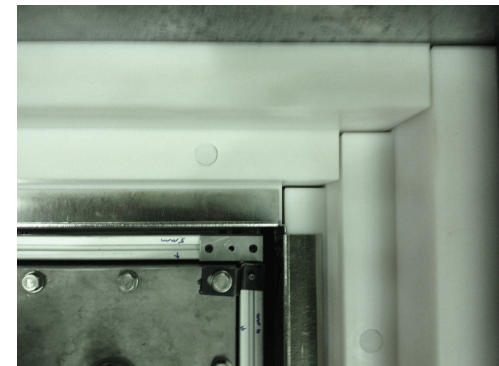
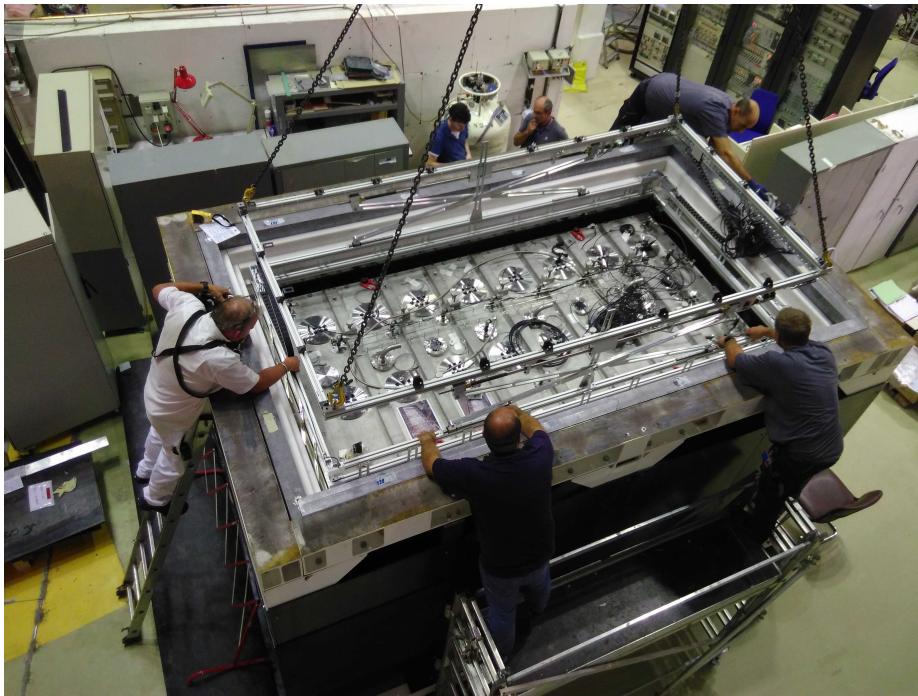
Detector insertion (LPSC/Irfu/ILL)

- Shielding ready for detector insertion on august 25th
- Installation of fixed blocks on the floor for detector centering
- Insertion of the detector
- Installation of adjustable centering blocks on the other sides: detector in contact with all blocks



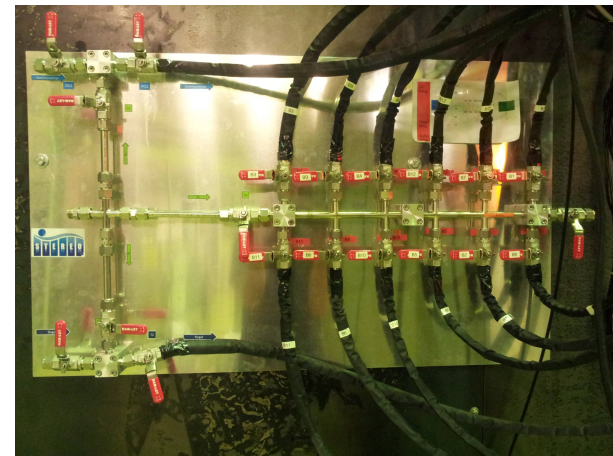
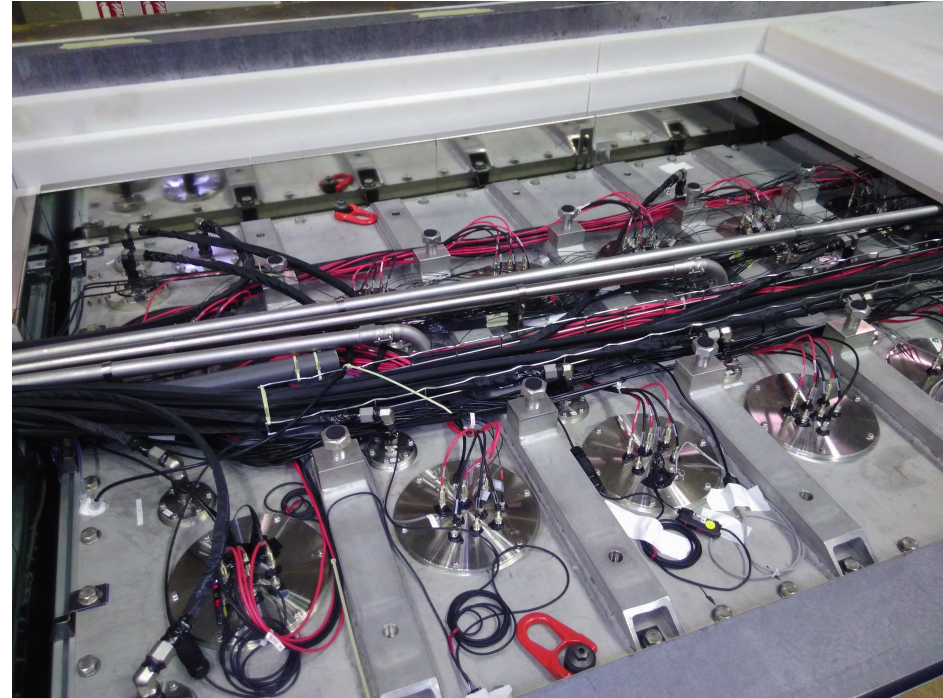
Insertion of the Calibration system (LAPP/ILL)

- Changing position encoder (X-Y plan) on the pantograph
 - Hysteresis is still there when the source is on the return path (see P. Del Amo Sanchez talk)
- Insertion of pantograph calibration system on August 31th
 - mechanical gaps between detector and shielding meet specifications
 - Displacement of the source holder inside shielding (with prototype control system) checked



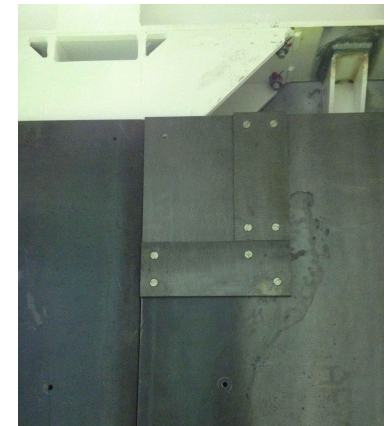
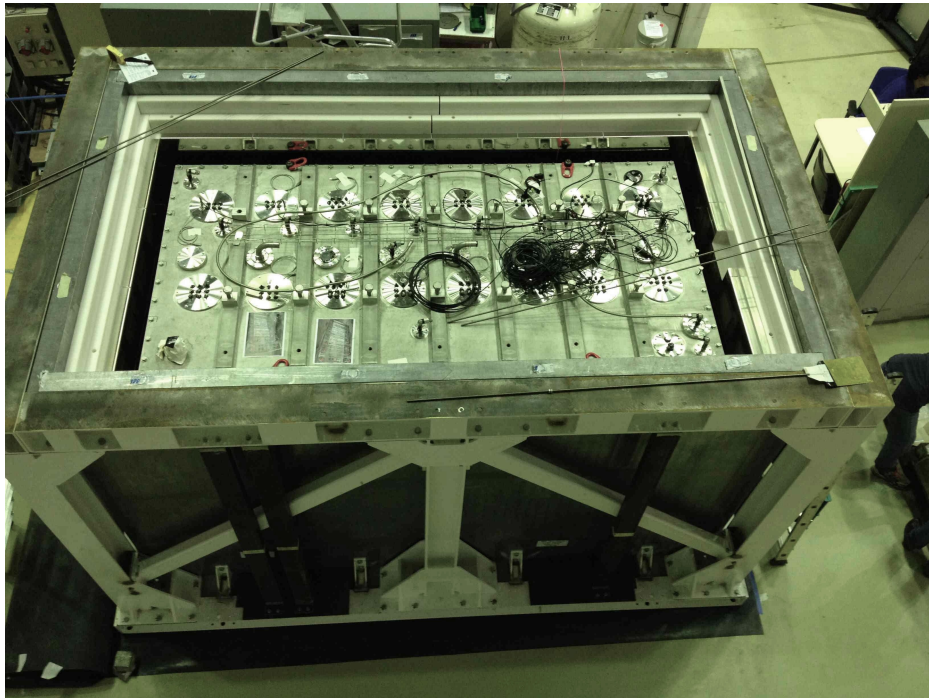
Detector cabling and tubing (LPSC)

- Cabling the detector
 - 48 PMT HV + 48 PMT signal
 - 36 Optical fibers / 4 bundles
 - Sensors
 - 12 cameras
 - 3 level-stop
 - 4 PT100
 - 2 Pressure (abs+diff)
 - 4 ATM (level P/T)
 - Control command for the pantograph
- Tubing
 - 3 calibration tubes
 - PFA filling pipes
 - 1 GC, 1 TG, 12 buffers
 - covered with shrink tubes
 - Exhaust
 - Emergency emptying
 - One tube for He3 or fluxgate detector
- Testing detector before closing:
 - PMT + optical fibers
 - Sensors
 - Tightness after tubing and installation of the liquid panel $\rightarrow 1.5 \text{ mb/h}$



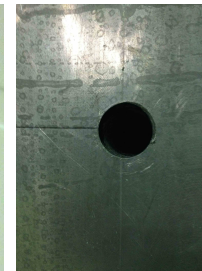
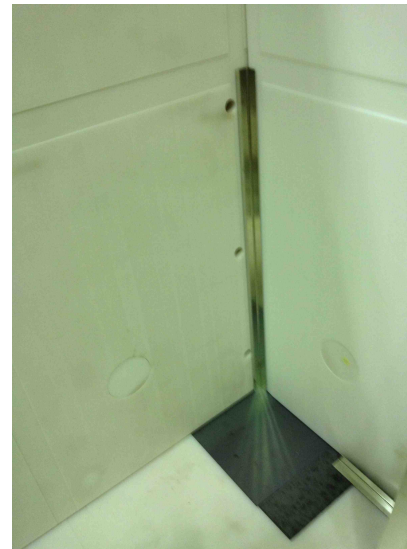
Soft iron shielding (LPSC/ILL)

- Installation of soft iron (1 cm) in the lower part of the shielding started on August 26th
 - Delayed because some plates were damaged during transportation (fell off the truck) → Patch on 2 plates
- Additional beams were fixed on the structure to support soft iron plates
- Fixation with thread-forming screws



Passages through shielding (LPSC/ILL/Irfu)

- Adding PEHD around passages through shielding
 - Passage of cables and calibration rail
 - Add B4C around the passage of cables
- Filling up holes dedicated to emergency calibration system
 - PEHD round bars + rolled lead sheets + lead bricks



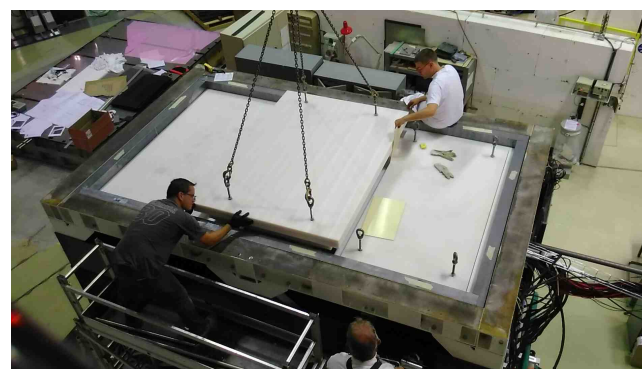
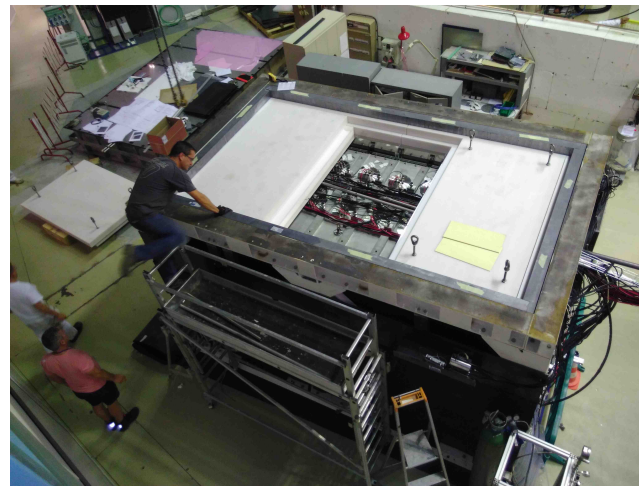
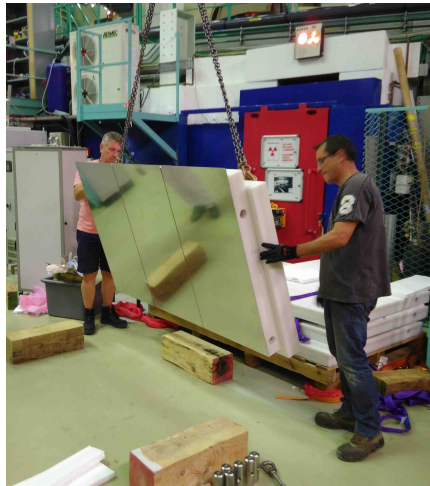
Soft iron and B4C shielding (LPSC/ILL)

- Covering soft iron with B4C (5 mm)



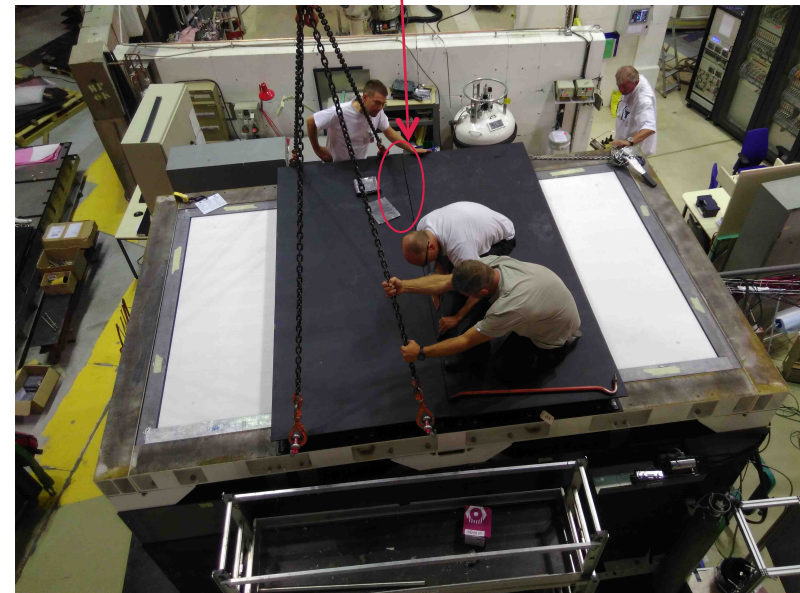
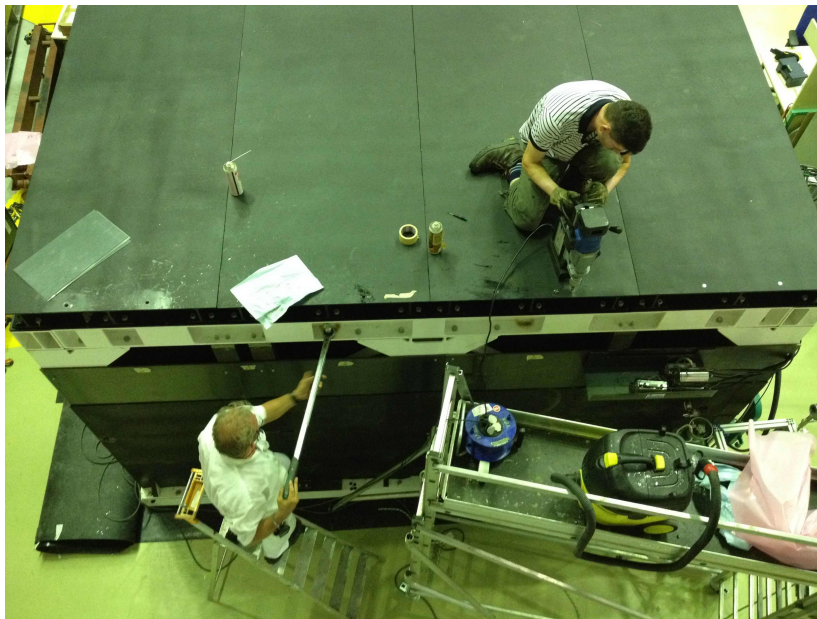
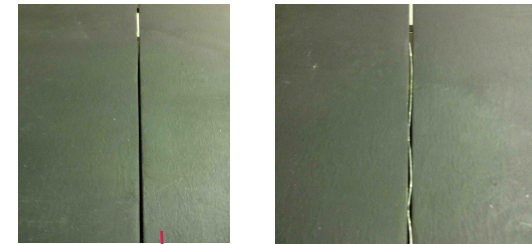
Closing the shielding: PE roof (LPSC/ILL)

- Closing PEHD shielding on September 6th
 - 29 cm in 2 layers (20 cm + 9 cm)
 - Mu-metal glued on PEHD roof plates before insertion
 - Gap between detector and PEHD roof meet specifications



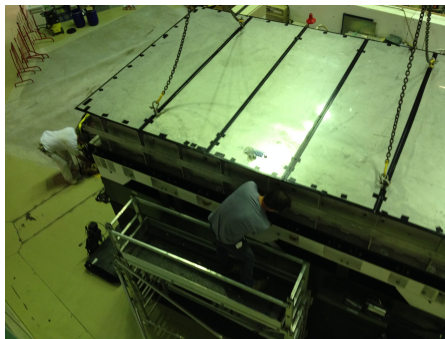
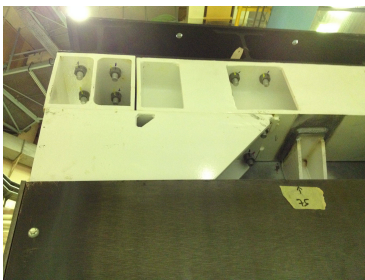
Closing the shielding: Lead roof (LAPP/ILL)

- Installation of lead roof plates (15 cm lead) on September 7th
 - Screwing lead roof plates to the structure
 - Tightening screws to the torque + control
 - No chicane between plates :
 - 1mm gap between the 2 center plates, IN20 side
 - Gap partially filled with 1 mm lead sheet



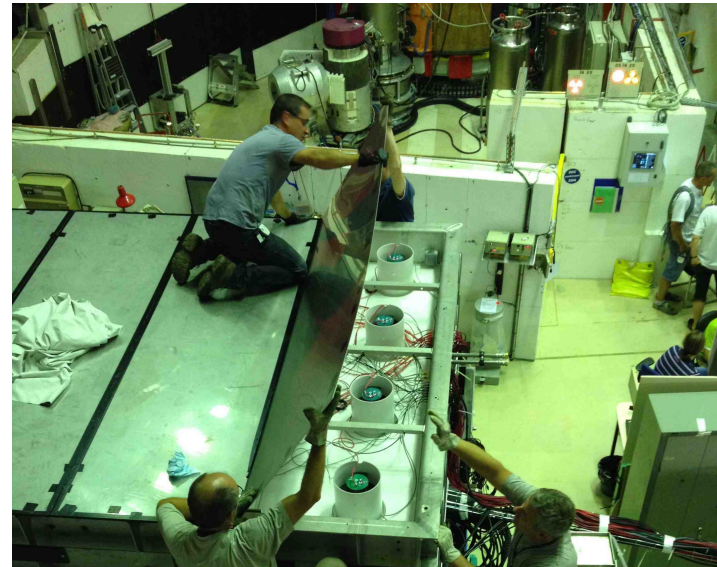
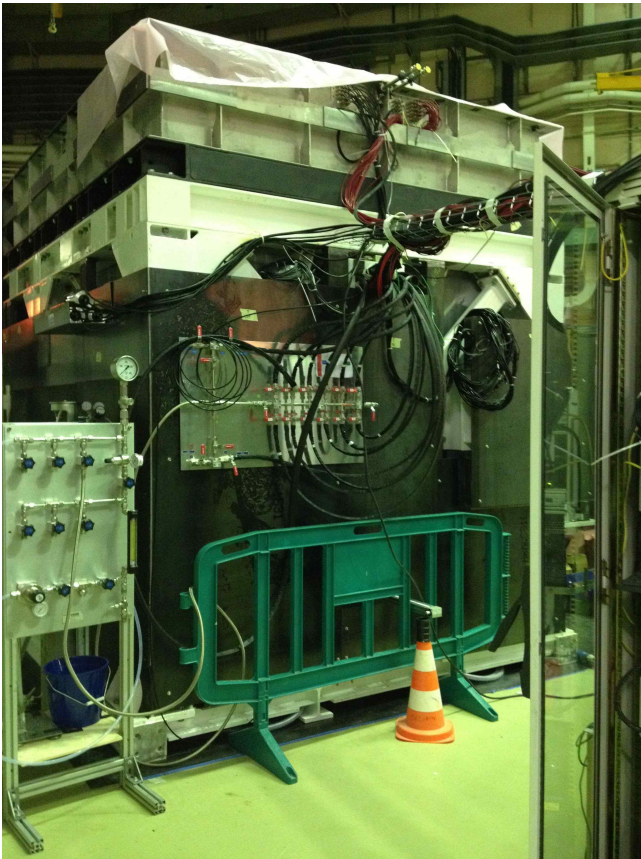
Installation of the muon veto (LPSC/ILL)

- Installation of muon veto on the lead roof on September 9th
 - Veto screwed on lead roof



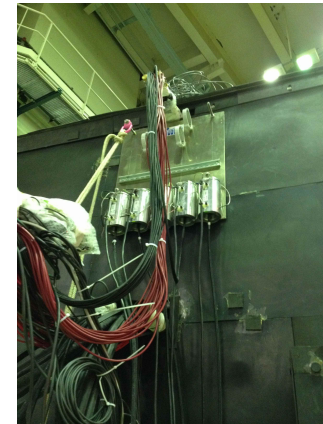
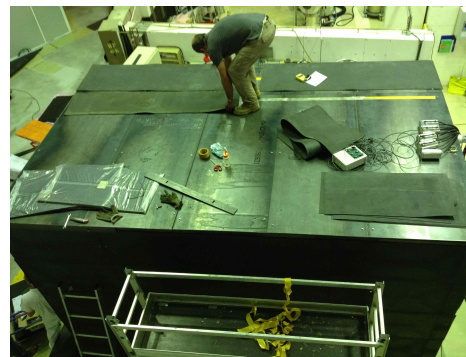
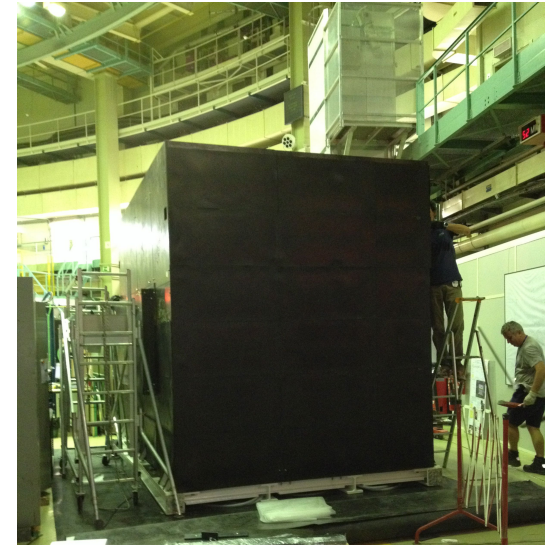
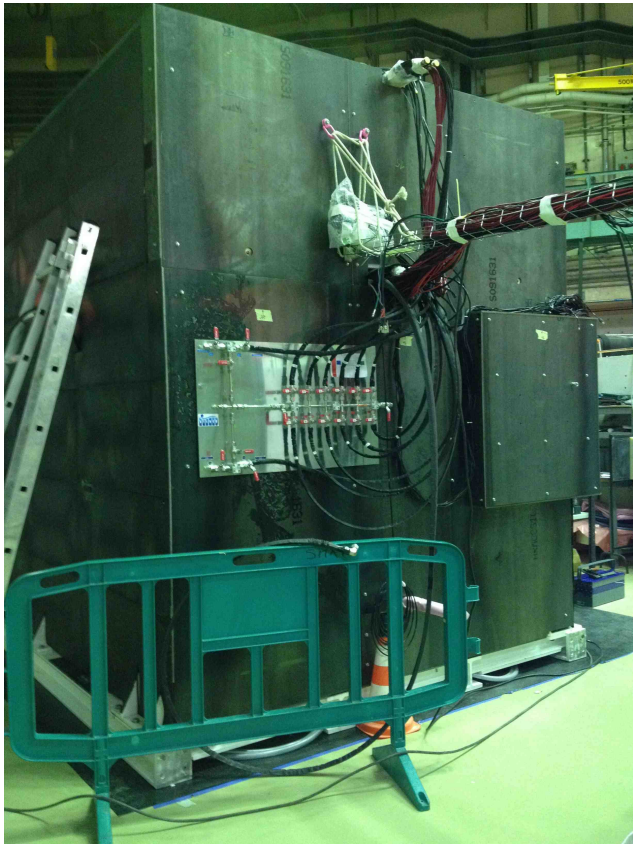
Installation of the muon veto (LPSC/ILL)

- Cabling the muon veto : PMT (x20) HV+Signal, optical fibers (x12), sensors (2 T and 4 level)
- Test all PMTs
 - One PMT broken during installation (evaporation of the photocathode) → change the PMT on site
 - The basis died 2 days latter → change the basis



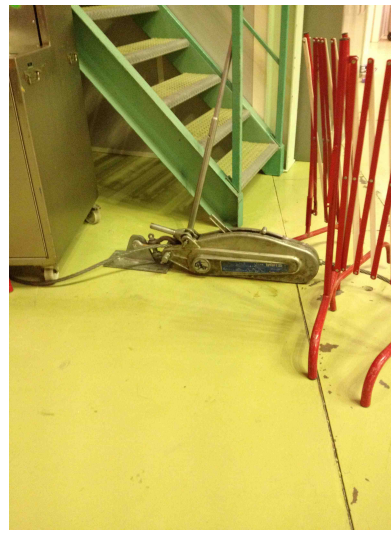
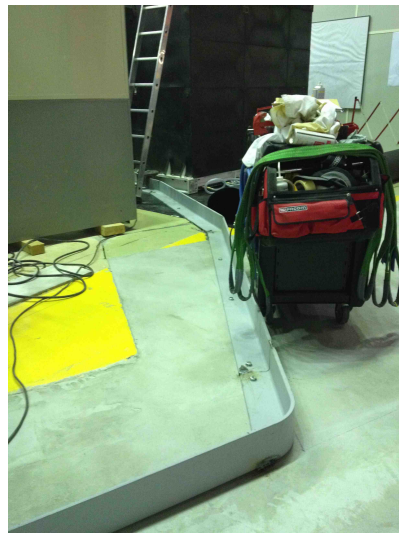
Soft iron shielding (LPSC/ILL/irfu)

- Installation of the soft iron + B4C shielding in the upper part of STEREO
 - Fixation around and above the veto with dedicated wedges
- Fixation of LED boxes



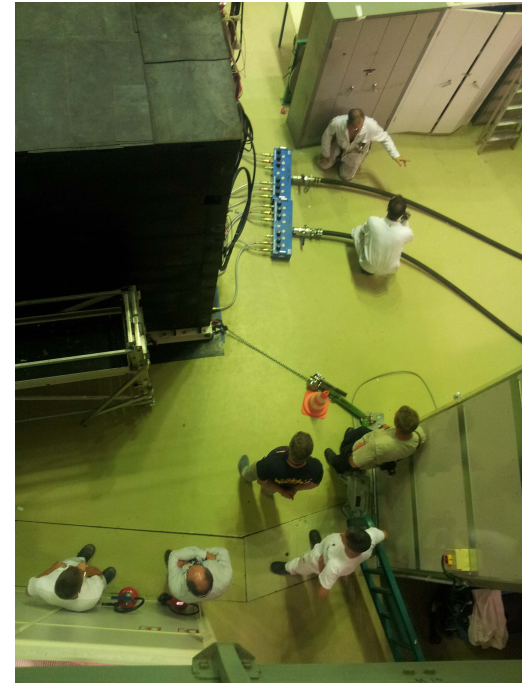
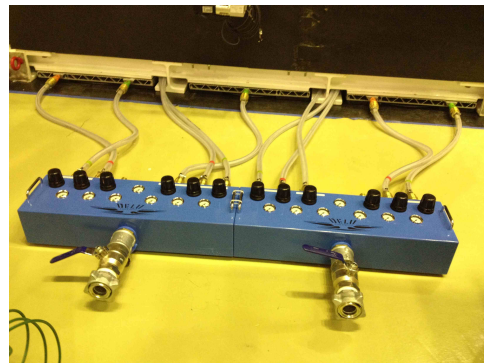
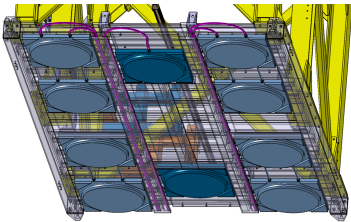
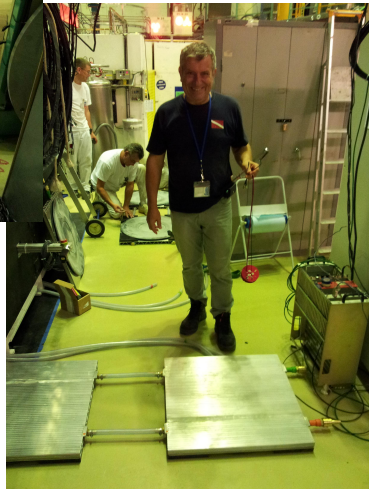
Preparation for detector move (ILL)

- Installation of the guiding systems:
 - on the structure (produced at MPIK workshop)
 - rails on the floor
 - anchorage points for winches
- Installation of the liner in the casemate
- Drilling the connector board for STEREO anchorage on floor



Preparation for detector move (ILL)

- Feed through for compressed air was already ready
- Air cushions delivered just in time on September 21th
 - Need to adjust the height
- Introduction and connection of air cushions (x10) underneath STEREO
- Connecting the 2 control desks to compressed air



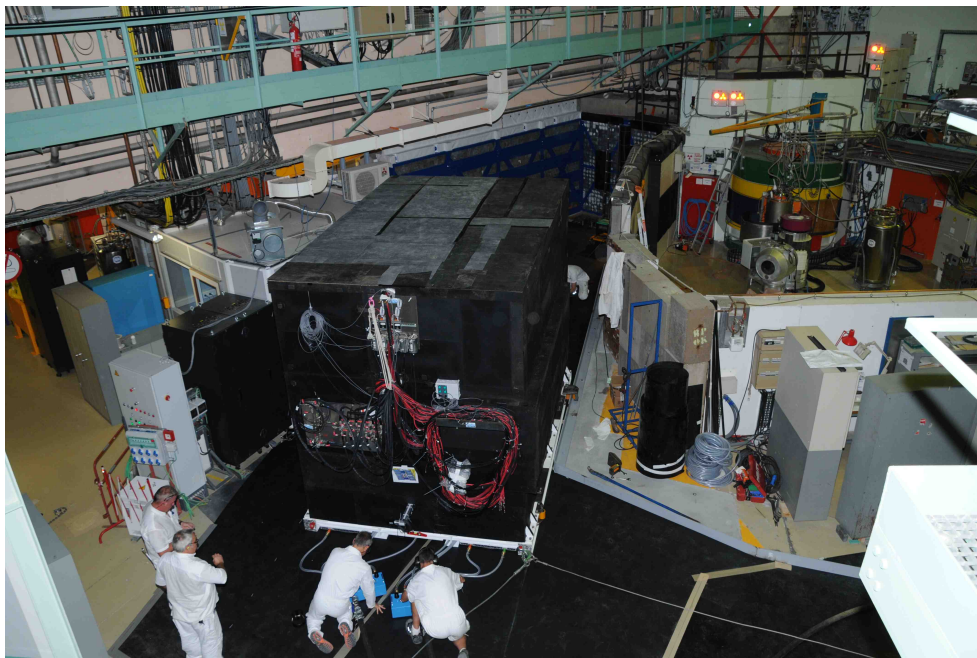
- First test on September 23th

Detector move (ILL)

- STEREO moved on September 26th
 - Evacuation of level C during the operation

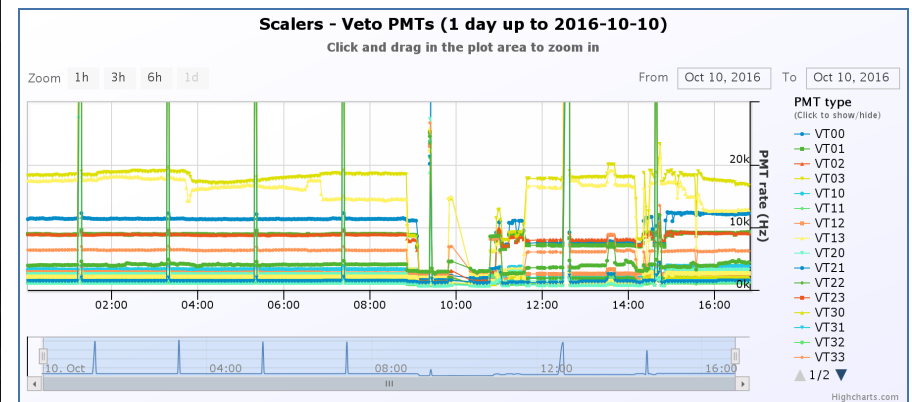
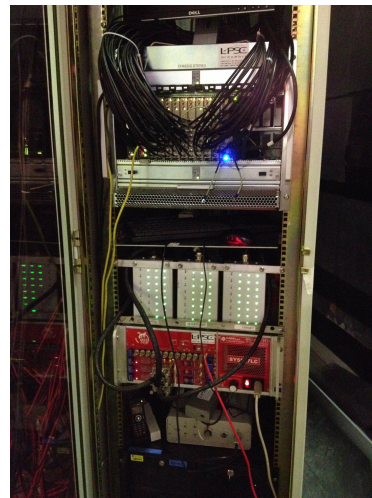
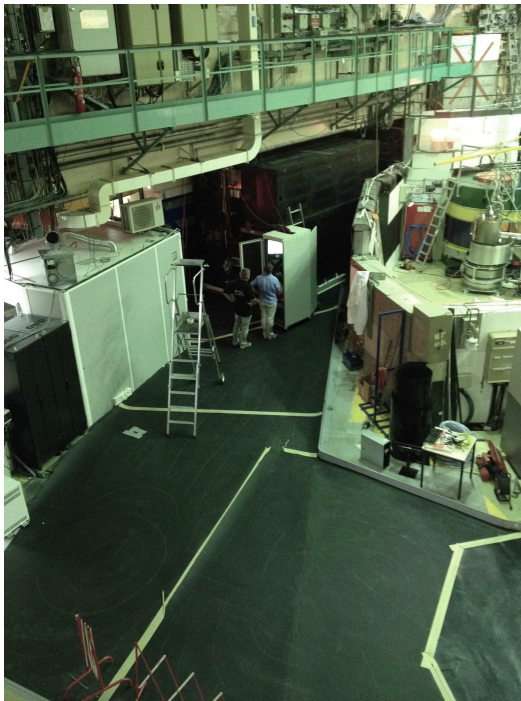
Many thanks to ILL team who took charge of the moving !!!

...and to all who worked so hard to make this possible and in time !



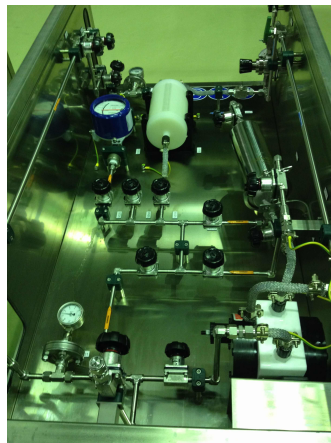
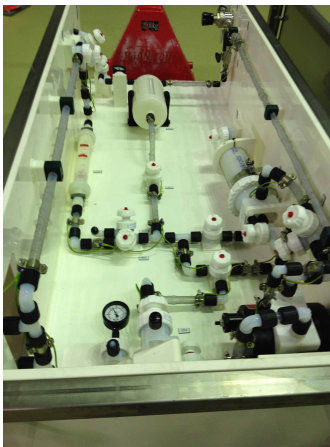
First Tests with STEREO in place (LPSC)

- After transportation and cabling on the electronics bay, all PMTs (detector and veto) and optical fibers work well
 - 1 day later one veto PMT died: VT23, middle of D19 side
- After muon veto filling with purified water and 4 MU 6 ppm
 - Single PMT rates and trigger rates are much larger than at LPSC
 - Identification of gamma and neutron sources from IN20 and D19 on the top of the casemate
 - More on F. Kandzia and J.S. Réal talks



Last preparation before filling (ILL/MPIK)

- Installation of D19 office wall (fire protection)
 - passage of cables through the wall and re-cabling
- Testing the 2 filling modules and the modified gas panel
- Flushing the detector with N2
- Commissioning the N2 sky regulation
- Delivery of 26 barrels of LS @ LPSC from MPIK
- Delivery of retention trays @ ILL from Saclay
- Definition of the filling procedure



Next TO DO List

- TO DO before filling:
 - Pursuing the flushing of the detector with N2: tomorrow
 - Anchor STEREO on floor: delivery of the new pieces at ILL next Friday
 - Anchor IN20 wall to STEREO: under fabrication at ILL → next week
 - Anchor D19 wall to STEREO: design under study at Irfu design office
 - Install last IN20 fire protection (placoflam): next week (reactor OFF)
 - Test the report of the alarms: next week
 - Install fire alarm in casemate
 - Get the ASN Authorization: next week

Fill the detector and TAKE DATA with FULL STEREO !!!

- TO DO when reactor is OFF (12/10 → 1/11):
 - Install STEREO power supply on the new support
 - Improve the shielding in the primary casemate STEREO/H13
 - Improve the shielding D19 side ?