

ProtoDUNE-DP Construction and Installation schedule

- Main dates
- Detailed planning for each item



Integration Group Meeting
01/09/2017

Detector installation schedule revised to take into account new inputs from the different elements

what has been added: wrt v2

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=> updated schedule for CRP frame due to grid tooling preparation, in bld 185 (including reception of Invar and G10 end of September and LEMS + anodes)

=> SGFT availability => > 2 months delay on TCO closure

=> the Patch panels of the CRP which are on a critical path: design not ready and tests of design mid september to be done before ordering => 2 months

=> this is delaying the end of first CRP construction by 1 month = Dec 2017
it adds 1 more month delay on TCO closure

=> added the item about Internal cable trays to install before any other detector component

=> SGFT details (from IWG meeting of 16/06) are now added but lot of uncertainties on the real tasks schedule (need several discussions)

=> implemented the test installation of 9 modules of FC in the cryostat before the end of the year

=> implemented the VHV details on PSU, FT and Extension

=> implemented cryostat internal cables and instrumentation topics

ProtoDUNE-DP

Version 01/09/2017

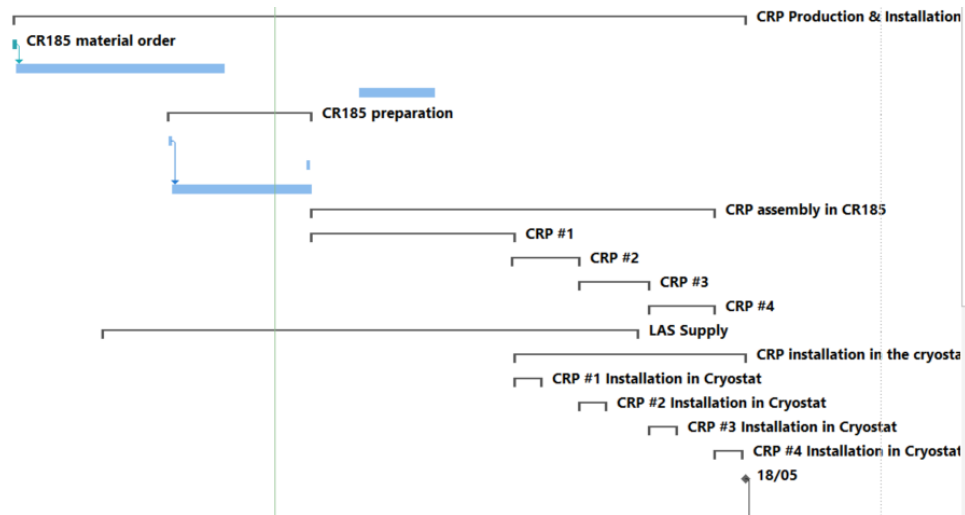
Task name	Duration	Start date (dd//mm/yy)	Finish date (dd//mm/yy)
1 ProtoDUNE-DP	423,71 days?	01/12/2016	31/07/2018
2 ▷ Cryostat preparation	134 days	08/03/2017	11/09/2017
8 ▷ Cryostat internal cables and instrumentation	228,71 days?	03/07/2017	31/05/2018
22			
24			
25 ▷ CRP Production & Installation	279,71 days?	10/04/2017	18/05/2018
201			
202 ▷ Chimneys and feedthroughs	231 days	19/06/2017	21/05/2018
227			
228 ▷ Drift Cage Production and Installation	315,71 days	01/05/2017	30/07/2018
257 Beam plug installation	5 days	19/06/2018	26/06/2018
258			
259 ▷ VHV system	279,71 days	08/05/2017	15/06/2018
273			
274 ▷ PMT and Light Read Out System	420,71 days?	01/12/2016	26/07/2018
290 Lower the Ground grid to its final position	2 days	26/07/2018	30/07/2018
291			
292 ▷ Front End electronics	314 days	08/03/2017	04/06/2018
295			
296			
297 Ready to seal TCO & cryostat	1 day	30/07/2018	31/07/2018
298			
299 ▷ Large Area Trigger Counters	30 days	04/06/2018	13/07/2018
302 ▷ External cabling, roof layout and Racks	223,71 days	04/09/2017	26/07/2018

The end of installation is July 31, 2018

GANTT CHART

CRP Production and Installation

CRP Production & Installation	279,71 days?	10/04/2017	18/05/2018
CR185 material order	1 day	10/04/2017	10/04/2017
Clean Room Material reception	83 days	11/04/2017	03/08/2017
Patch panel design and production	30 days	17/10/2017	27/11/2017
CR185 preparation	57 days	04/07/2017	20/09/2017
Furnishing integration	2 days	04/07/2017	05/07/2017
Initial cleaning	2 days	18/09/2017	19/09/2017
Grid tooling preparation	55 days	06/07/2017	20/09/2017
CRP assembly in CR185	148,71 days	21/09/2017	01/05/2018
CRP #1	70 days	21/09/2017	10/01/2018
CRP #2	26,57 days	10/01/2018	15/02/2018
CRP #3	26,57 days	15/02/2018	26/03/2018
CRP #4	26,57 days	26/03/2018	01/05/2018
LAS Supply	201 days?	29/05/2017	19/03/2018
CRP installation in the cryostat	91,71 days	11/01/2018	18/05/2018
CRP #1 Installation in Cryostat	11 days	11/01/2018	25/01/2018
CRP #2 Installation in Cryostat	11 days	15/02/2018	02/03/2018
CRP #3 Installation in Cryostat	11 days	26/03/2018	10/04/2018
CRP #4 Installation in Cryostat	11 days	01/05/2018	16/05/2018
CRP lateral position adjustment (warm conditions)	2 days	16/05/2018	18/05/2018



Installation

assembly

CRP installation in the cryostat	91,71 days	11/01/2018	18/05/2018
CRP #1 Installation in Cryostat	11 days	11/01/2018	25/01/2018
CRP Transportation from Meyrin to	1 day	11/01/2018	11/01/2018
Unpacking and preparation in the	1 day	12/01/2018	12/01/2018
Insertion in the Cryostat	1 day	15/01/2018	15/01/2018
Metrology & Connections operation	5 days	16/01/2018	22/01/2018
Electrical and signal tests	3 days	23/01/2018	25/01/2018
CRP is ready	0 days	25/01/2018	25/01/2018

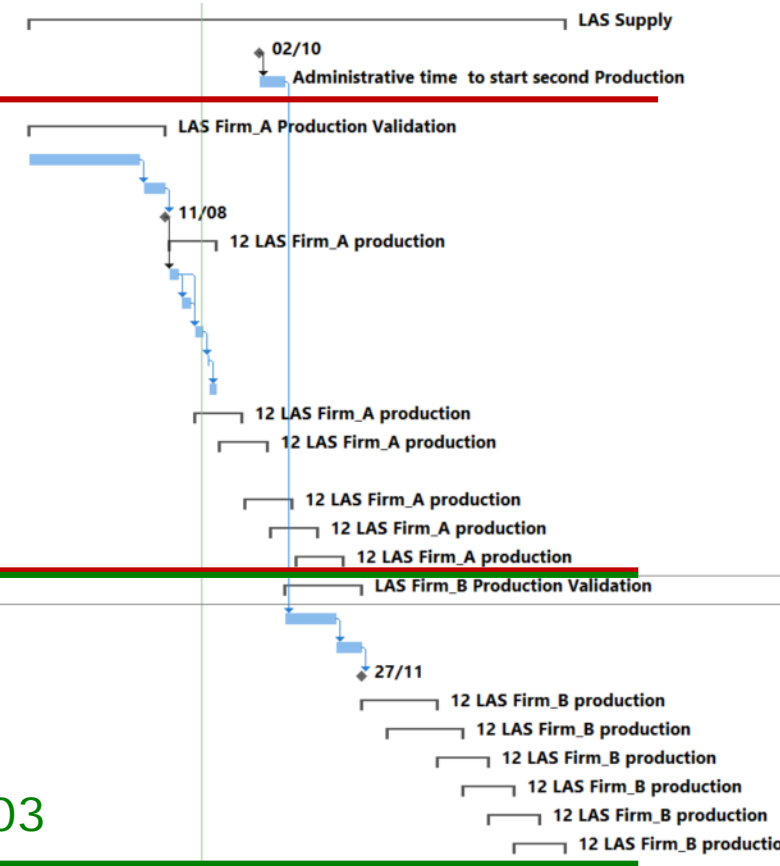
CRP assembly in CR185	148,71 days	21/09/2017	01/05/2018
CRP #1	70 days	21/09/2017	10/01/2018
Parts reception in CR185	10 days	21/09/2017	04/10/2017
Supporting structure assembly	1 day	05/10/2017	05/10/2017
Invar frame on supporting structure	4 hrs	06/10/2017	06/10/2017
G10 assembly on optical table	1 day	05/10/2017	05/10/2017
G10 and Invar connection	1 day	06/10/2017	09/10/2017
LAS assembly and cabling on CRP	10 days	09/10/2017	23/10/2017
Instrumentation assembly	2 days	28/11/2017	29/11/2017
Grid weaving	5 days	30/11/2017	06/12/2017
Grid Installation	5 days	30/11/2017	06/12/2017
Planarity tuning	4 days	07/12/2017	12/12/2017
Electrical Tests	10 days	13/12/2017	09/01/2018
Packing in transport box	1 day	10/01/2018	10/01/2018

LEM Anode production

Task	201 days?	29/05/2017	19/03/2018
Green Light full LEM production	1 day?	02/10/2017	02/10/2017
Administrative time to start second Production	10 days	03/10/2017	16/10/2017
LAS Firm_A Production Validation	55 days	29/05/2017	11/08/2017
LEM production (Preserie 6 LEMs)	45 days	29/05/2017	28/07/2017
LEM Preserie Tests	10 days	31/07/2017	11/08/2017
LEM Production Validated	0 days	11/08/2017	11/08/2017
12 LAS Firm_A production	20 days	14/08/2017	08/09/2017
6 LEM Batch production	5 days	14/08/2017	18/08/2017
6 LEM Batch production	5 days	21/08/2017	25/08/2017
12 LAS Processing at Saclay	5 days	28/08/2017	01/09/2017
12 LAS send to CERN	1 day	04/09/2017	04/09/2017
12 LAS Assembly at CERN	4 days	05/09/2017	08/09/2017
12 LAS Firm_A production	20 days	28/08/2017	22/09/2017
12 LAS Firm_A production	20 days	11/09/2017	06/10/2017
second half at Firm_A	0 days	22/09/2017	22/09/2017
12 LAS Firm_A production	20 days	25/09/2017	20/10/2017
12 LAS Firm_A production	20 days	09/10/2017	03/11/2017
12 LAS Firm_A production	20 days	23/10/2017	17/11/2017
LAS Firm_B Production Validation	30 days	17/10/2017	27/11/2017
LEM production (Preserie 6 LEMs)	20 days	17/10/2017	13/11/2017
LEM Preserie Tests	10 days	14/11/2017	27/11/2017
LEM Production Validated	0 days	27/11/2017	27/11/2017
12 LAS Firm_B production	20 days	28/11/2017	08/01/2018
12 LAS Firm_B production	20 days	12/12/2017	22/01/2018
12 LAS Firm_B production	20 days	09/01/2018	05/02/2018
12 LAS Firm_B production	20 days	23/01/2018	19/02/2018
12 LAS Firm_B production	20 days	06/02/2018	05/03/2018
12 LAS Firm_B production	20 days	20/02/2018	19/03/2018

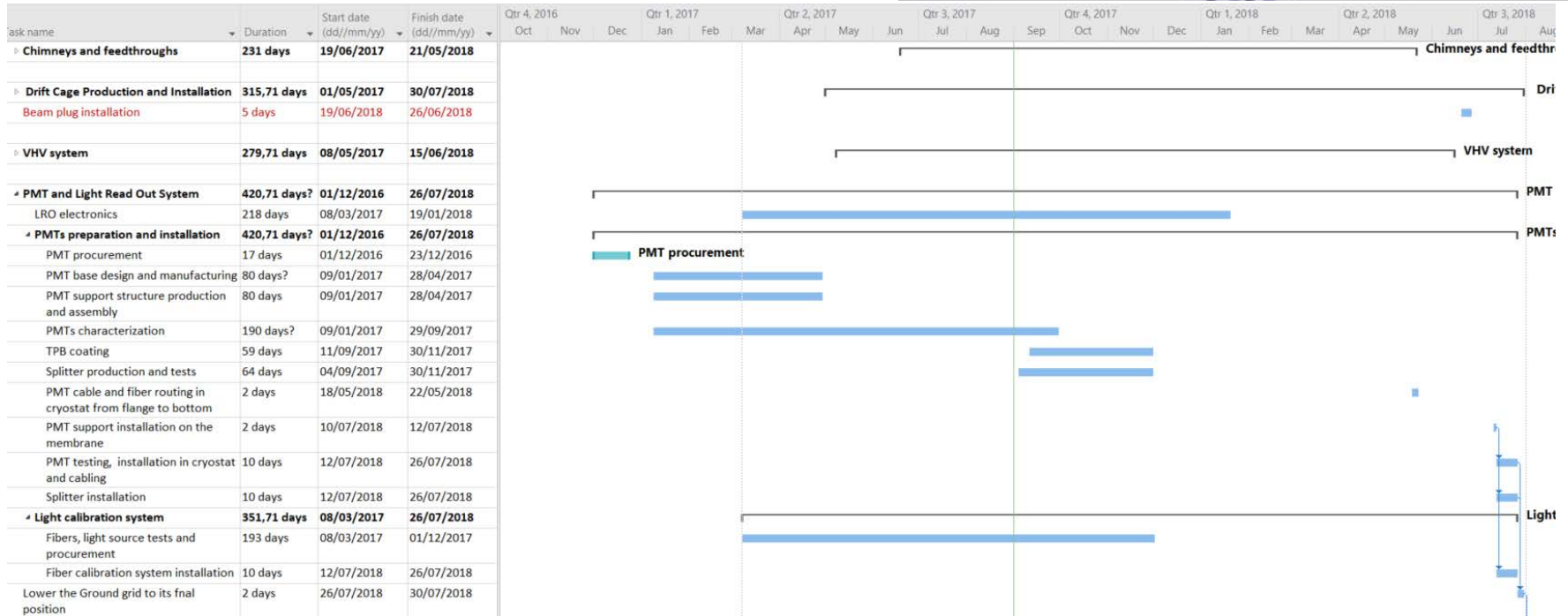
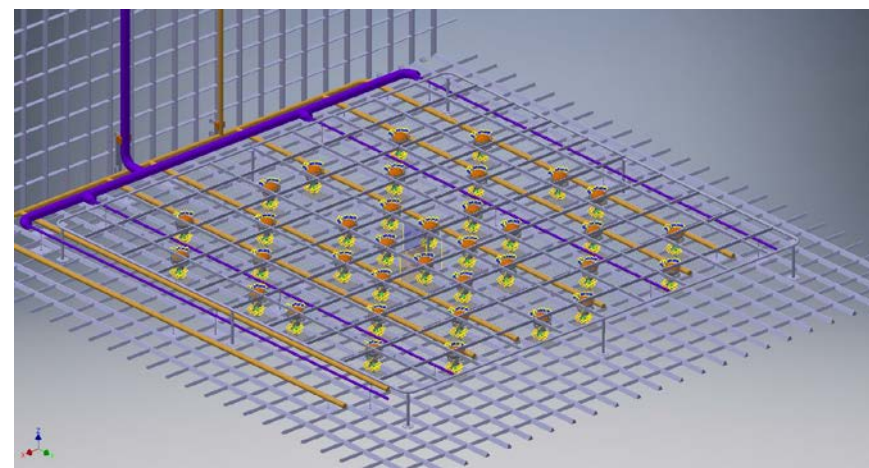
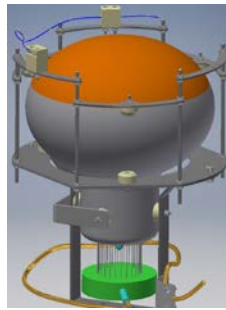
80 LEMS Firm A
29/05–17/11

+80 LEMS Firm B
17/10–19/03



However the green light to produce the second half of LEM + anode is not given: hypothesis is that it is given in October 2017

Light Readout System



Installation and cabling in cryostat July 2018

Very High Voltage system

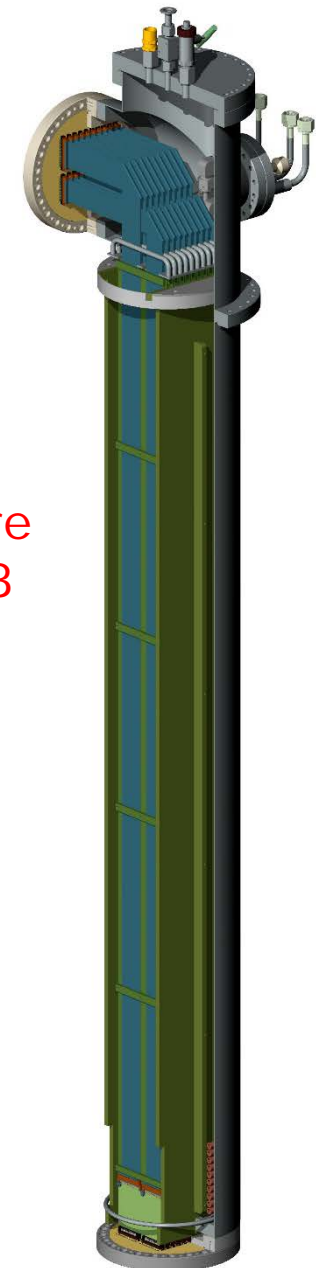
259	▸ VHV system	279,71 days	08/05/2017	15/06/2018
260	▸ 300 kV PSU	215 days	08/05/2017	16/03/2018
261	procurement and reception	2 days	08/05/2017	09/05/2017
262	QA/QC test in Bld 182	10 days	06/11/2017	17/11/2017
263	sent to EHN1	10 days	05/03/2018	16/03/2018
264	▸ 300 kV FT	166 days	03/07/2017	05/03/2018
265	Production (3 FT)	96 days	03/07/2017	13/11/2017
266	Test with 300 kV in upgraded setup in Bldg 182	38 days	08/01/2018	28/02/2018
267	Sent to EHN1	3 days	01/03/2018	05/03/2018
268	▸ Extension	63 days	09/10/2017	17/01/2018
269	final design and validation	10 days	09/10/2017	20/10/2017
270	Procurement and production follow up	33 days	23/10/2017	06/12/2017
271	QA/QC	20 days	07/12/2017	17/01/2018
272	Insertion and assembly in cryostat	10 days	01/06/2018	15/06/2018
273				

Chimneys and Feedthroughs

SGFT: Signal Feedthroughs => 12 elements

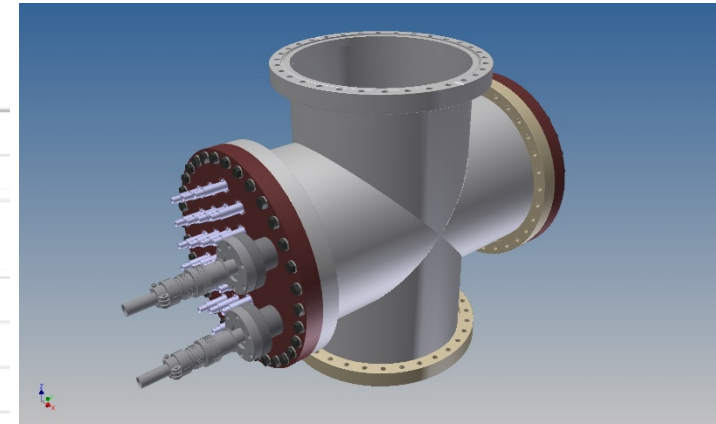
◦ Chimneys and feedthroughs	231 days	19/06/2017	21/05/2018
◦ SPFT Production & Installation	45 days	02/10/2017	01/12/2017
SPFT production	30 days	02/10/2017	10/11/2017
SPFT Pre-Assembly	2 days	13/11/2017	14/11/2017
SPFT Assembly on Cryostat Roof	1 day	01/12/2017	01/12/2017
◦ Signal Feedthrough SGFT	231 days	19/06/2017	21/05/2018
Final design	56 days	19/06/2017	04/09/2017
Tender and Procurement (2 firms in parallel)	30 days	05/09/2017	16/10/2017
Flanges for prototype (gerber, prod, test)	46 days	04/09/2017	06/11/2017
Protoype for design validation with blade and cable	10 days	07/11/2017	20/11/2017
Reception of all SGFT	60 days	21/11/2017	26/02/2018
Warm flange: gerber +production + connector soldering+testing	80 days	21/11/2017	26/03/2018
Cold flange: gerber + production + connector soldering+testing	80 days	21/11/2017	26/03/2018
All blade + cable preparation:	20 days	08/01/2018	02/02/2018
Chimney internal cabling (blade insertion,...) and electrical continuity tests	20 days	27/03/2018	23/04/2018
Chimney closure and vacuum certification of each assembled chimney	10 days	24/04/2018	07/05/2018
Bring to EHN1 and installation on top of cryostat	10 days	08/05/2018	21/05/2018

Not before
May 2018
in EHN1



Chimneys and Feedthroughs

TANK_INST: PMTs HV+optical fibers + slow control=> 2 elements



◄ TANK_INST	146 days	31/07/2017	05/03/2018
Final design	28 days	31/07/2017	06/09/2017
Procurement, fabrication and QA/QC	30 days	07/09/2017	18/10/2017
Fabrication of chimney separator	15 days	07/09/2017	27/09/2017
ship to CERN	3 days	28/09/2017	02/10/2017
Installation on top of cryostat	3 days	01/03/2018	05/03/2018

CRP_INST: not yet designed

◄ Chimneys and feedthroughs	231 days	19/06/2017	21/05/2018
◄ SPFT Production & Installation	45 days	02/10/2017	01/12/2017
SPFT production	30 days	02/10/2017	10/11/2017
SPFT Pre-Assembly	2 days	13/11/2017	14/11/2017
SPFT Assembly on Cryostat Roof	1 day	01/12/2017	01/12/2017
▸ Signal Feedthrough SGFT	231 days	19/06/2017	21/05/2018
◄ TANK_INST	146 days	31/07/2017	05/03/2018
Final design	28 days	31/07/2017	06/09/2017
Procurement, fabrication and QA/QC	30 days	07/09/2017	18/10/2017
Fabrication of chimney separator	15 days	07/09/2017	27/09/2017
ship to CERN	3 days	28/09/2017	02/10/2017
Installation on top of cryostat	3 days	01/03/2018	05/03/2018
◄ CRP_INST	26 days	11/09/2017	16/10/2017
Design	26 days	11/09/2017	16/10/2017

EHN1 infrastructure:

Task name	Duration	Start date (dd//mm//yy)	Finish date (dd//mm//yy)	Comment
↳ ProtoDUNE-DP	423,71 days?	01/12/2016	31/07/2018	
↳ Cryostat preparation	134 days	08/03/2017	11/09/2017	waiting NP update
Cryostat with penetrations is ready	56 days	08/03/2017	24/05/2017	delayed
CRB and insertion rail preparation	10 days	24/07/2017	04/08/2017	
CRB ready	0 days	04/08/2017	04/08/2017	
Internal cryogenic piping	15 days	15/08/2017	04/09/2017	
Floor installation	5 days	05/09/2017	11/09/2017	

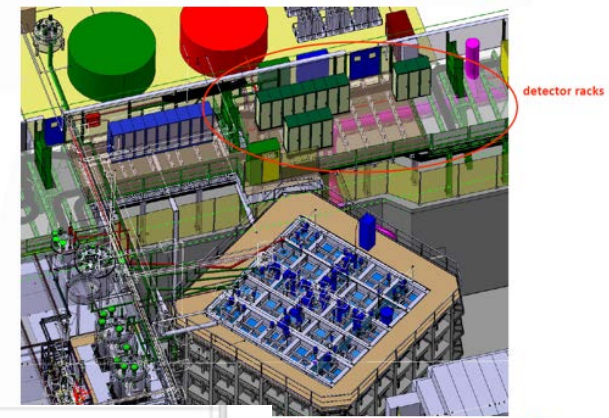


01/09/2017



D. Duchesneau / S. Murphy

External cabling, roof layout and Racks



Many items have to be confirmed with NP



302	External cabling, roof layout and Racks	223,71 days	04/09/2017	26/07/2018	
303	▸ cable trays and roof piping	1 day	11/09/2017	<u>11/09/2017</u>	
304	design and 3D layout	16 days	11/09/2017	02/10/2017	to be clarified with NP an
305	external trays purchase and installation	40 days	02/10/2017	<u>24/11/2017</u>	
306	Warm cryogenic piping installation	20 days	09/04/2018	<u>04/05/2018</u>	to be clarified with NP if
307	▸ External cables and optical fibers	72 days	06/11/2017	27/02/2018	
308	Manufacturing and QA/QC	53 days	06/11/2017	31/01/2018	
309	Installation	19 days	01/02/2018	27/02/2018	
310	▸ Roof crates	37,71 days	05/06/2018	26/07/2018	
311	Low voltage	3 days	05/06/2018	07/06/2018	
312	PMT calibration	10 days	12/07/2018	26/07/2018	
313	Cameras	3 days	05/06/2018	07/06/2018	
314	▸ Racks	209 days	04/09/2017	05/07/2018	
315	Define rack position	4 days	04/09/2017	07/09/2017	clarify with NP
316	Move rack 0 in position	6 days	20/09/2017	27/09/2017	
317	Ship Racks from 182 to EHN1	19 days	06/11/2017	30/11/2017	
318	Rack cabling and connection to external cabling	20 days	01/12/2017	11/01/2018	
319	General slow control testing	20 days	08/06/2018	05/07/2018	

A few elements need to be added:

- Update with the EHN1 latest news
- Cathode and ground grid tasks
- Electronic connection of ground grid
- HV system details

Foresee those in 1 week time