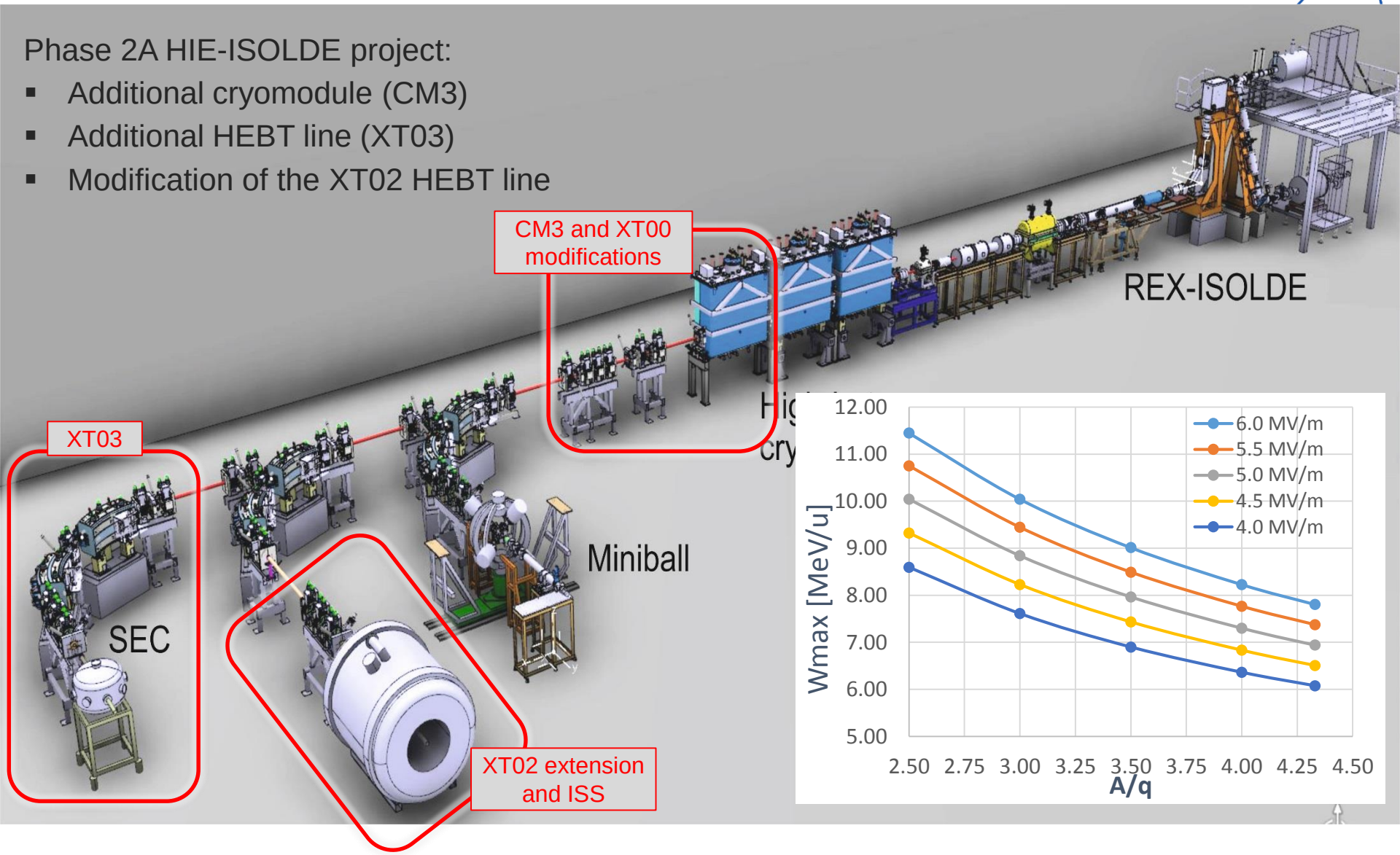
Status and Planning of HIE-ISOLDE phase 2

Y. Kadi for the HIE-ISOLDE project team

Phase2 Installation

Phase 2A HIE-ISOLDE project:

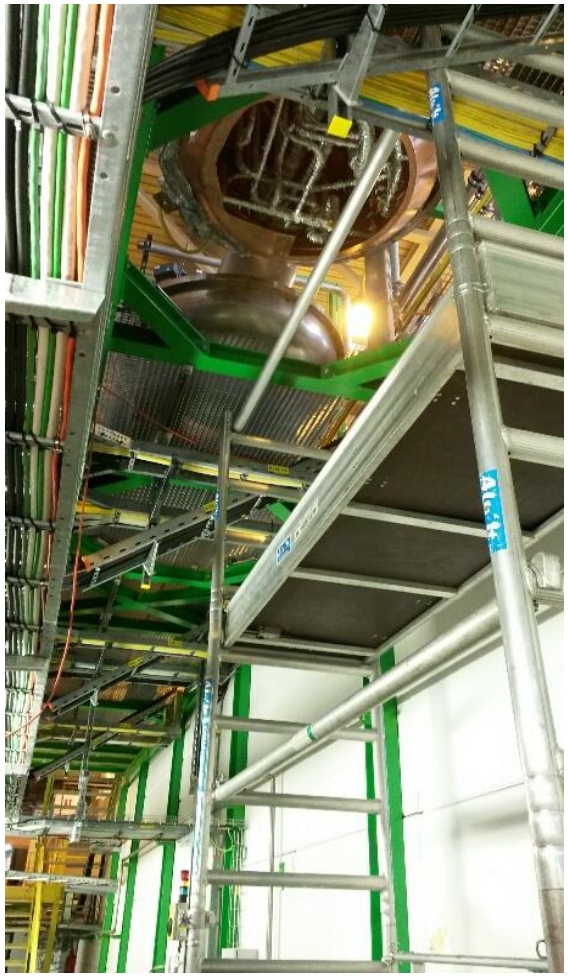
- Additional cryomodule (CM3)
- Additional HEBT line (XT03)
- Modification of the XT02 HEBT line

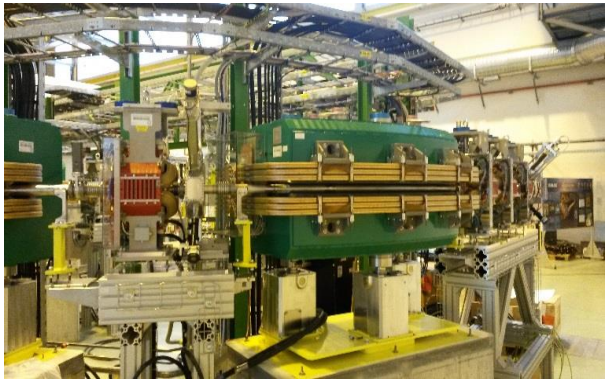


2016/2017 Shutdown works

Third Cryomodule (CM3)
January – February

Cryo Maintenance & Repair

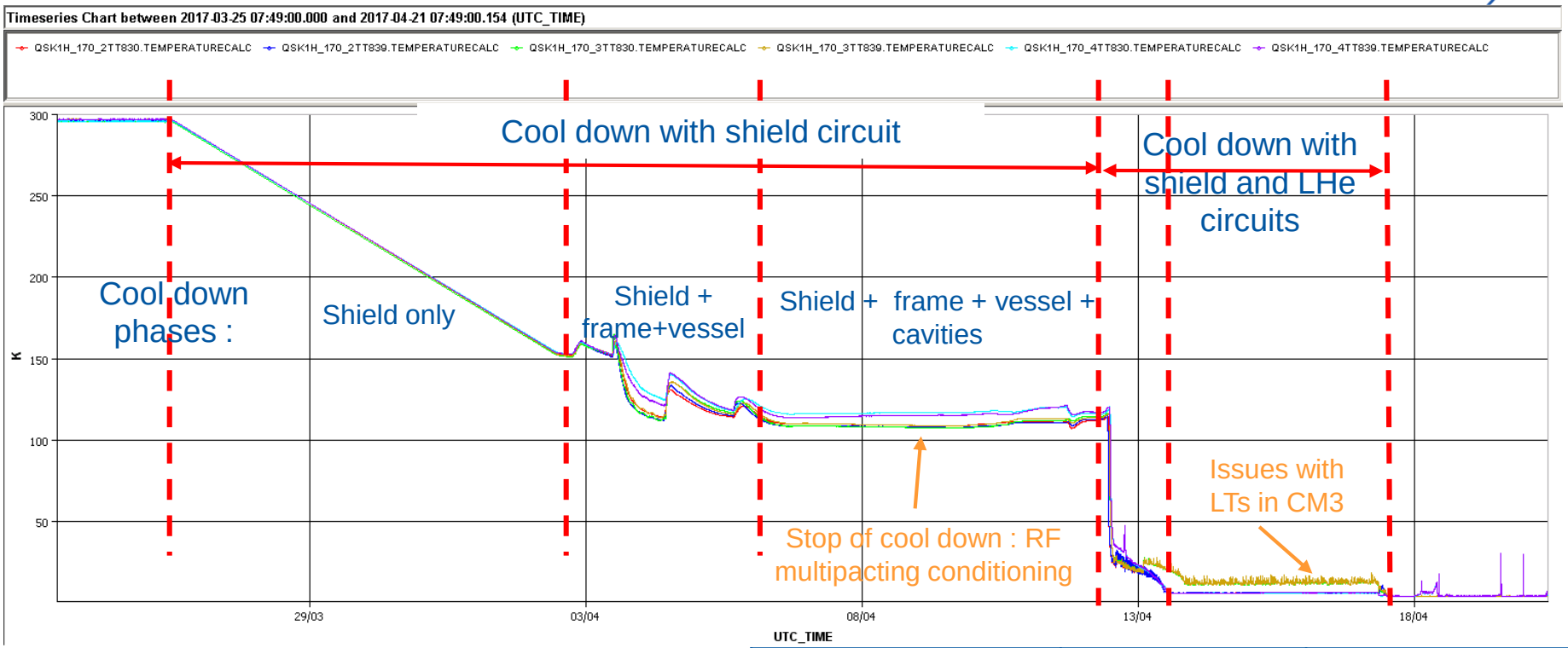




Third HEBT line (XT03)
& ISS installation

Courtesy of E. Siesling (BE/OP)

Cryo Plant Performance:



Cooldown: LHe filling of cryomodules achieved much quicker wrt 2016 and via the frame circuit only ⇒ proof of better LHe «quality»

Operation: ~ 100% available (one LHe loss event in CM1 caused 12 hrs downtime)

Phases	2016 *2 CMs*	2017 *3 CMs*
300K → 5K	≈ 15 days	≈ 9 days
LHe Filling (stable)	5 days	4h for CM1&2 + 4h for CM3

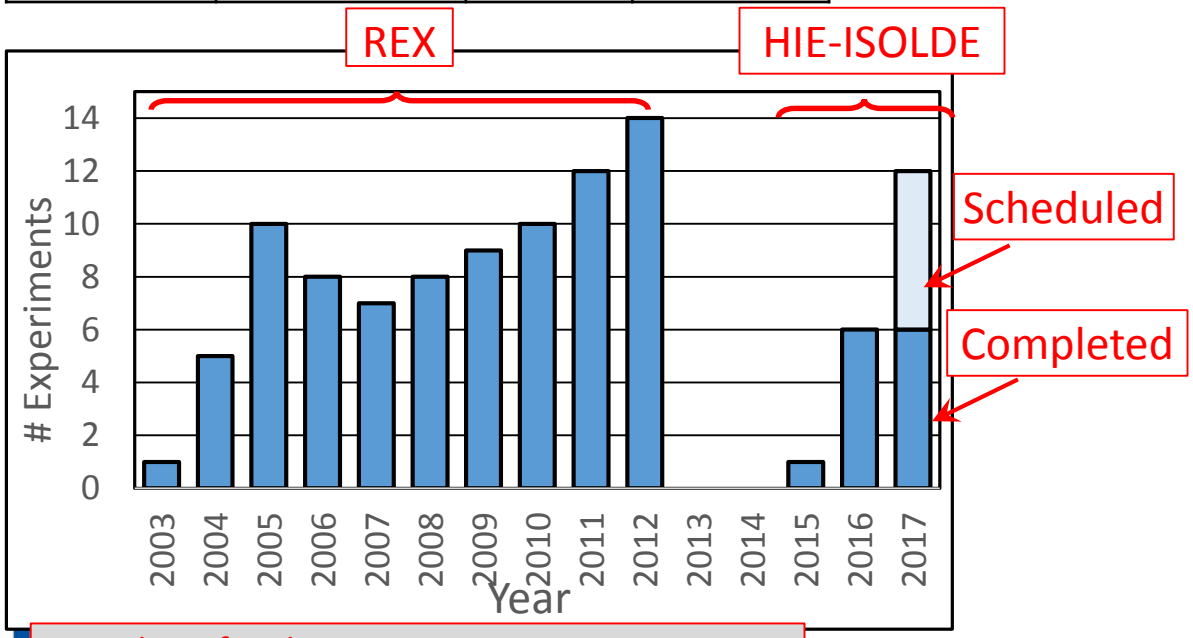
Courtesy of O. Pirotte (TE/CRG

REX/HIE-ISOLDE Physics Campaign:

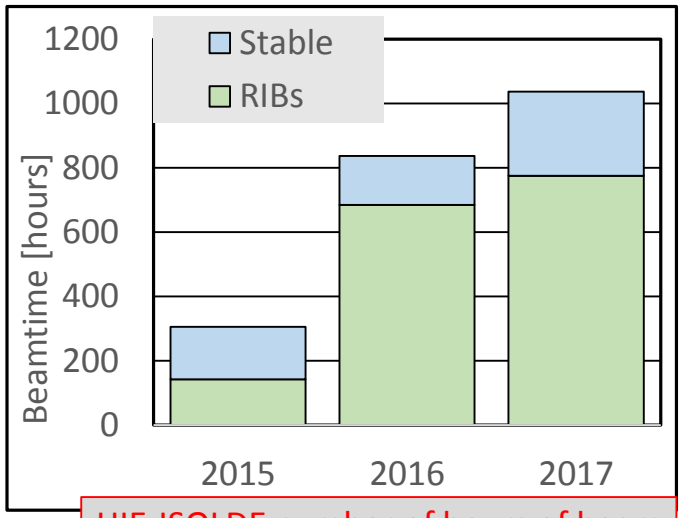
Experiment number	Beam	Energy [MeV/u]	Beamtime [hours]
IS572	$^{94}Rb^{23+}$	6.21	140
IS619	$^{15}C^{5+} \rightarrow {}^{15}C^{6+}$	4.35	245
IS558	$^{140}Sm^{34+}$	4.65	112.5
IS553	$^{142}Ba^{33+}$	3.40	23
	$^{144}Ba^{33+}$	3.40	39.5
	$^{144}Ba^{33+}$	4.20	84.5
IS659	$^{66}Ge^{16+}$	4.40	84.25
	$^{70}Se^{17+}$	4.40	13.1
IS597	$^{72}Se^{19+}$	4.40	33.5

- First stable beam delivered to the Miniball experimental station (end wk. 25)
- First radioactive ion beam (RIB) delivered (end wk. 27)
- Despite the short Physics campaign:
  - ✓ Six experiments already completed
  - ✓ Six additional experiments planned for the rest of the year

Courtesy of J.A. Rodrigez (BE/OP)



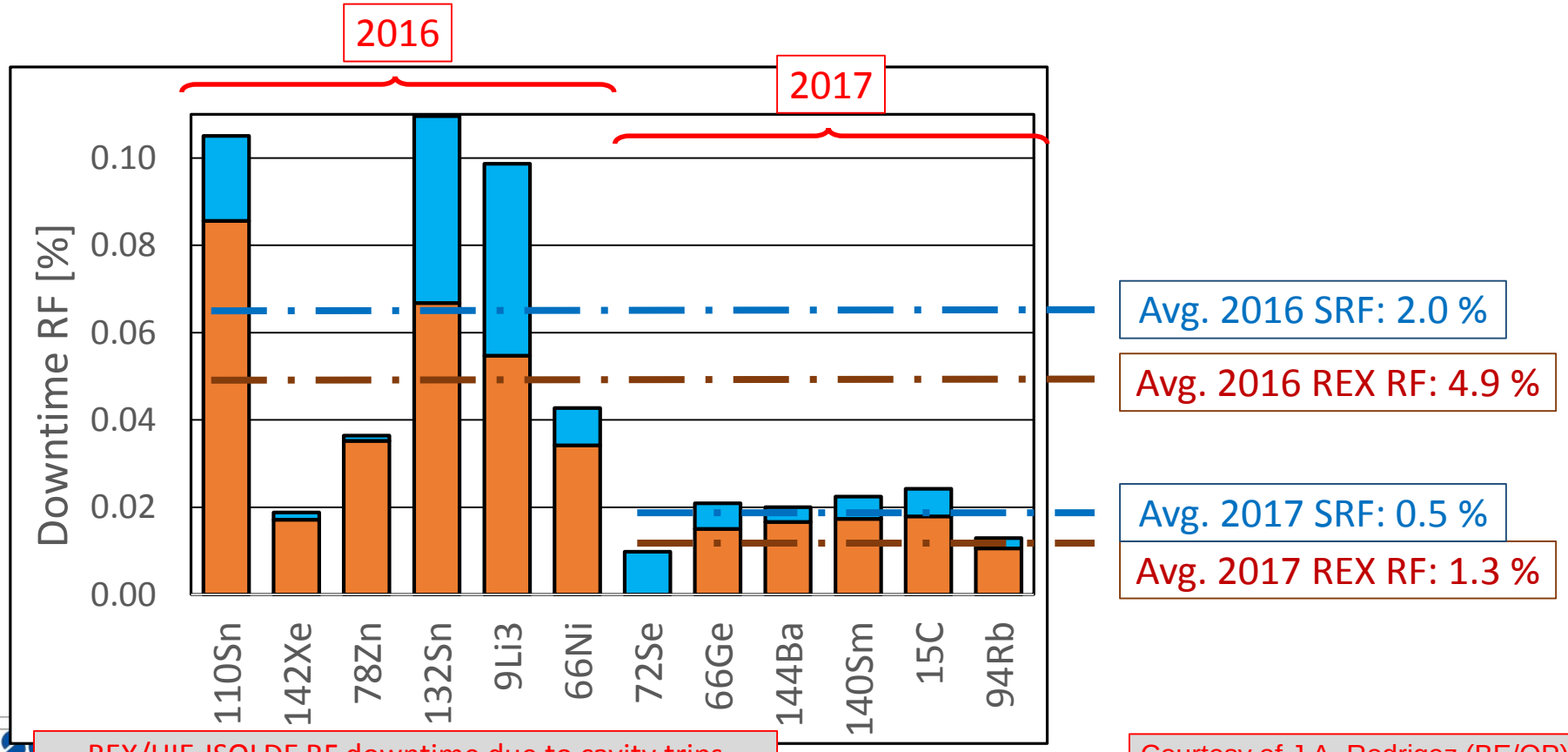
Number of High Energy experiments at ISOLDE



HIE-ISOLDE number of hours of beam

REX/HIE-ISOLDE Reliability:

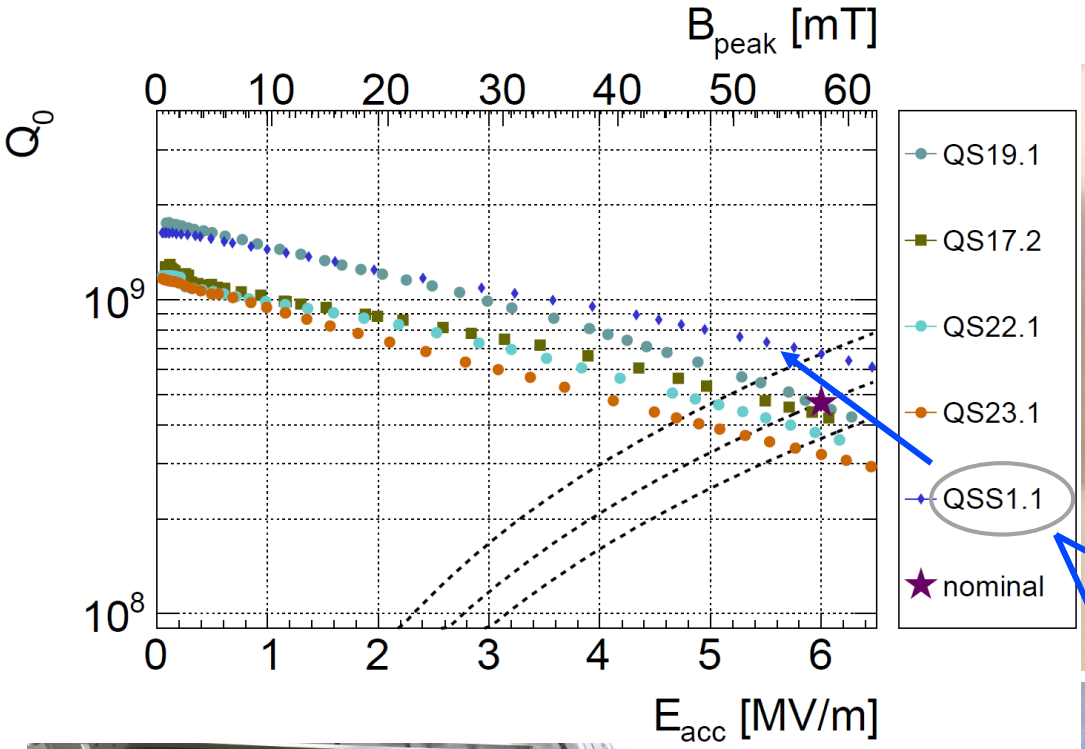
- Big improvement of the reliability of the linac:
  - REX RF 2016: 8 days down because of failure of the 9gap amplifier + 4.9 % cavity trips
  - REX RF 2017: 1.3 % cavity trips
  - SRF 2016: 2.0 % cavity trips
  - SRF 2017: 12 hours because of LHe loss in CM1 + 0.5 % cavity trips

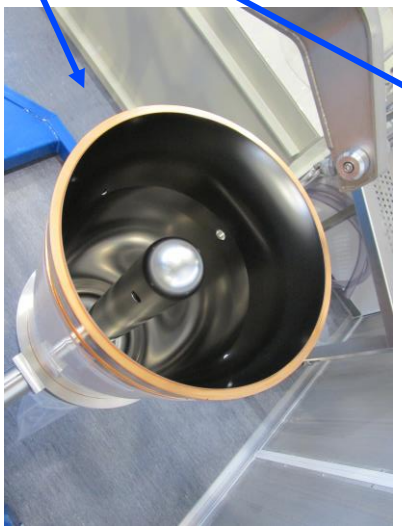


REX/HIE-ISOLDE RF downtime due to cavity trips

Courtesy of J.A. Rodrigez (BE/OP)

CM4 Assembly work

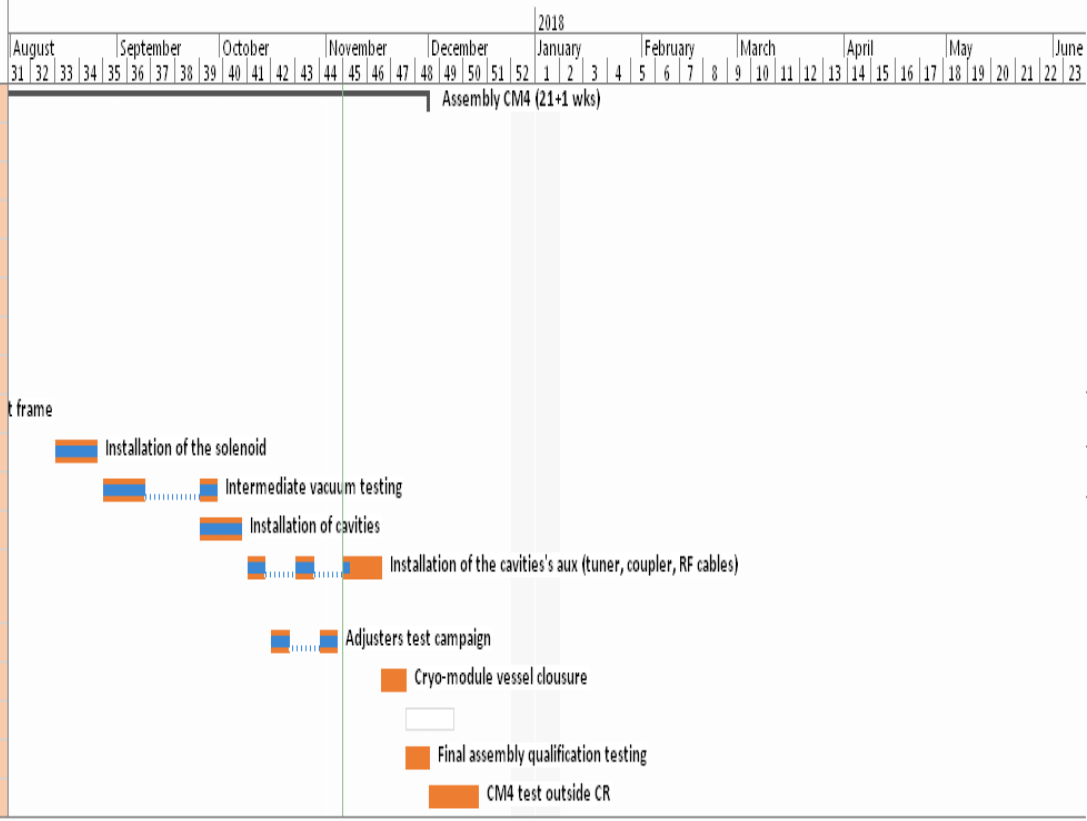




Courtesy of W. Delsolaro Venturini (BE/RF)

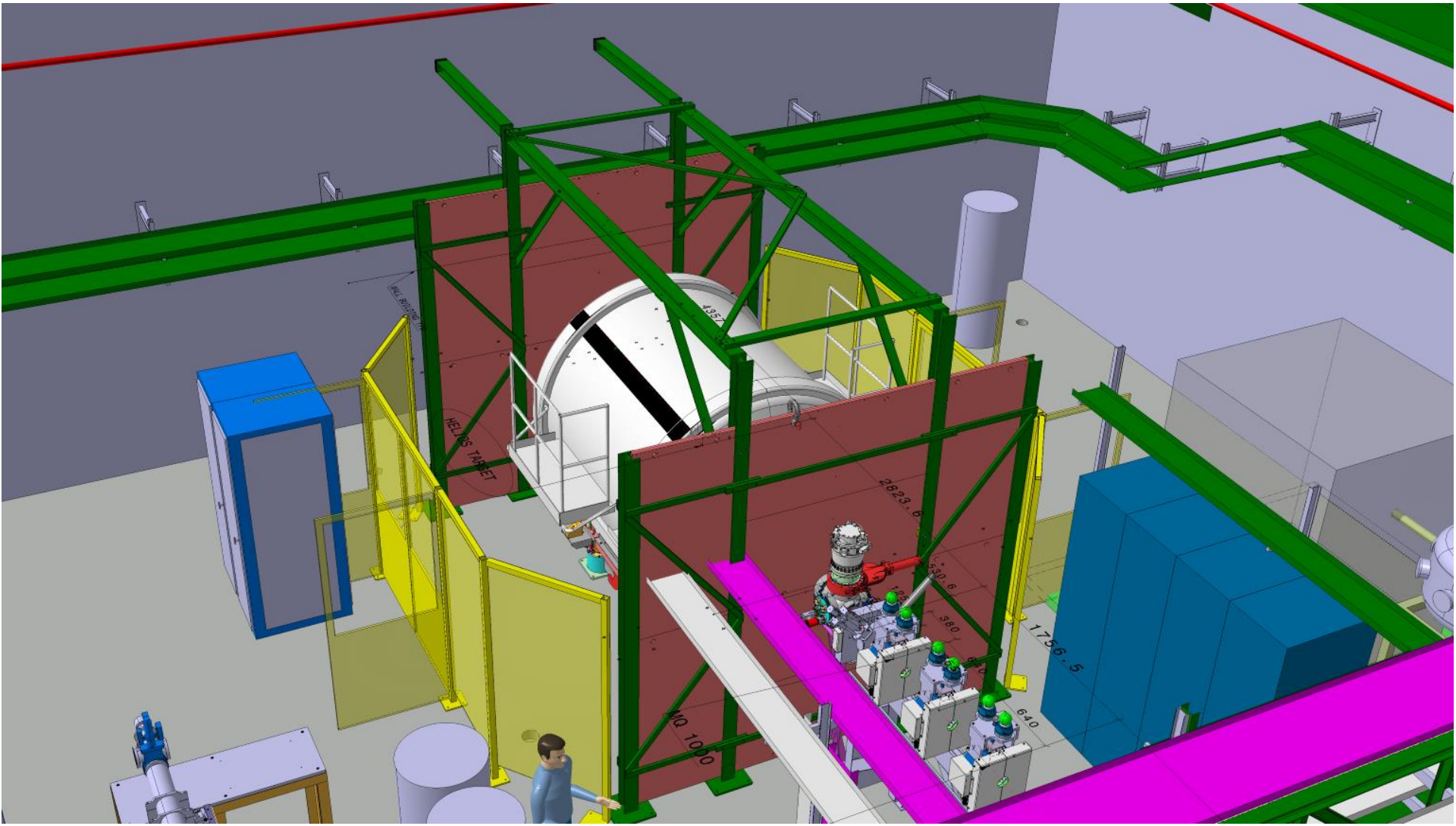
CM4 Assembly work

ID	% Compl		Task Name	Duration	Start
715	89%		**Assembly CM4 [21+1 wks]**	**216 days**	**Wed 25/01/17**
716	100%	✓	Housekeeping	18 days	Wed 25/01/17
717	100%	✓	Vacuum vessel assembly	4 wks	Mon 13/02/17
718	100%	✓	Thermal shield and vacuum vessel assembly	3 wks	Mon 06/03/17
719	100%	✓	Chimney assembly	1 wk	Mon 27/03/17
720	100%	✓	Top plate assembly	2 wks	Mon 03/04/17
721	100%	✓	Upper thermal shield and helium tank	3.4 wks	Wed 19/04/17
722	100%	✓	Insertion of chimney	1 wk	Mon 15/05/17
723	100%	✓	Installation of the support frame	3 wks	Mon 22/05/17
724	100%	✓	Installation of the solenoid	2 wks	Mon 14/08/17
725	100%	✓	Intermediate vacuum testing	4.8 wks	Mon 28/08/17
726	100%	✓	Installation of cavities	2 wks	Mon 25/09/17
727	60%		Installation of the cavities's aux (tuner, coupler, RF cables)	5.8 wks	Mon 09/10/17
728	100%	✓	Adjusters test campaign	3 wks	Mon 16/10/17
729	0%		Cryo-module vessel clousure	1 wk	Fri 17/11/17
730	0%		~~Contingency~~	~~2 wks~~	~~Fri 24/11/17~~
731	0%		Final assembly qualification testing	1 wk	Fri 24/11/17
732	0%		CM4 test outside CR	2 wks	Fri 01/12/17



Courtesy of F. Formenti (EN/EA)

ISS Magnetic Shielding



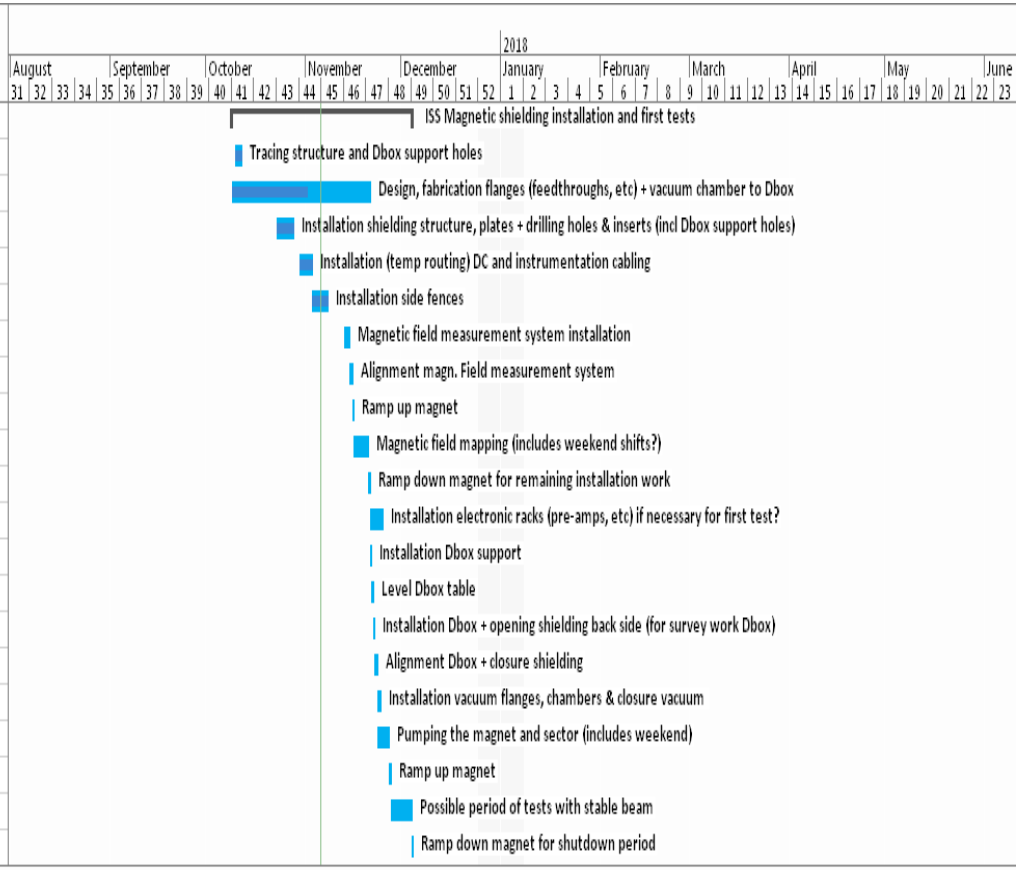
Courtesy of S. Maridor (EN/ACE)

ISS Magnetic Shielding

Courtesy of K. J. Buffet (EN/EA)

ISS Magnetic Shielding

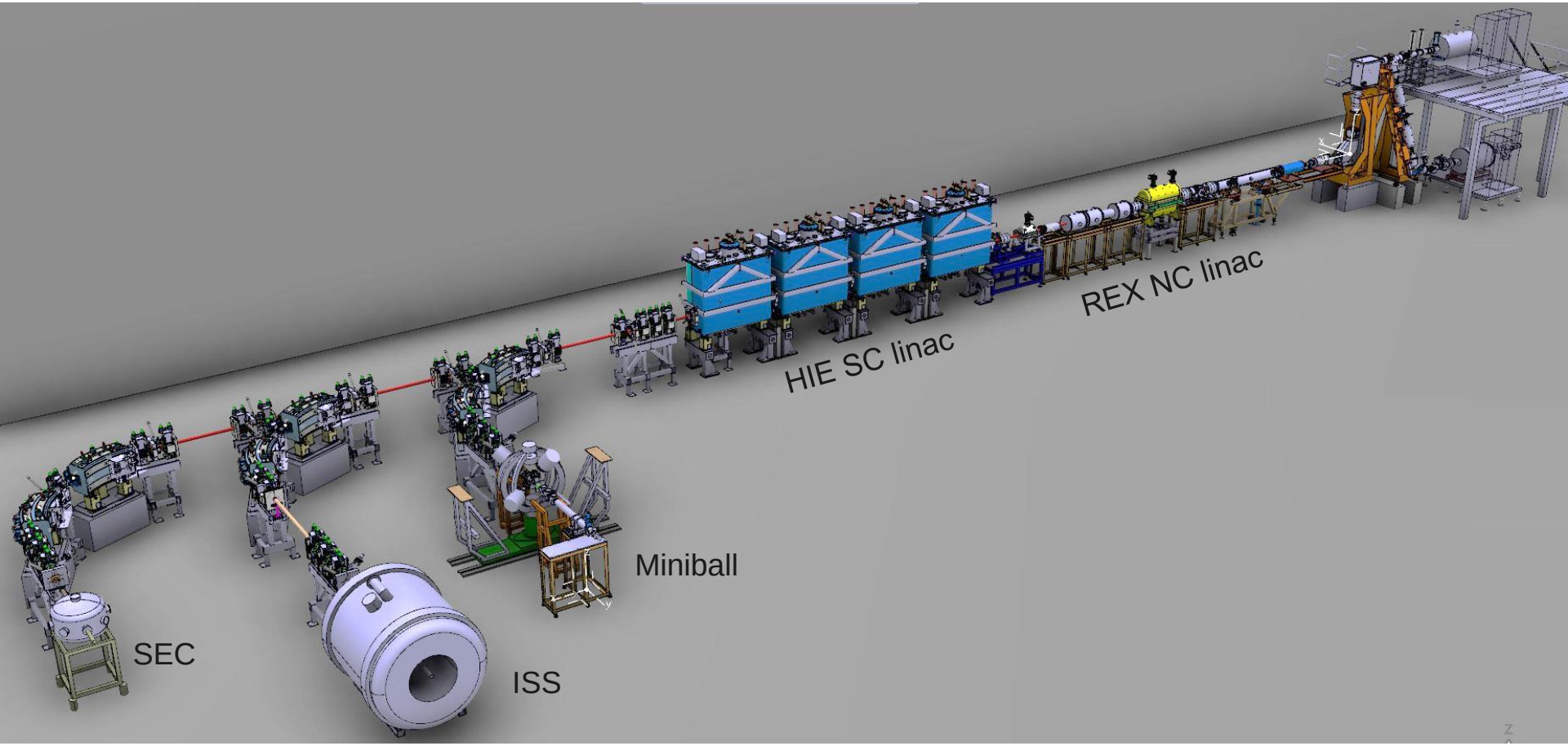
ID	% Comp		Task Name	Duration	Start	Finish
473	47%		**ISS Magnetic shielding installation and first tests**	**40.5 days**	**Mon 09/10/17**	**Mon 04/12/17**
474	10...	✓	Tracing structure and Dbox support holes	2 days	Tue 10/10/17	Wed 11/10/17
475	55%		Design, fabrication flanges (feedthroughs, etc) + vacuum chamber t	31 days	Mon 09/10/17	Mon 20/11/17
476	10...	✓	Installation shielding structure, plates + drilling holes & inserts (incl	5 days	Mon 23/10/17	Fri 27/10/17
477	10...	✓	Installation (temp routing) DC and instrumentation cabling	4 days	Mon 30/10/17	Thu 02/11/17
478	10...	✓	Installation side fences	3 days	Fri 03/11/17	Tue 07/11/17
479	0%		Magnetic field measurement system installation	1.5 days	Mon 13/11/17	Tue 14/11/17
480	0%		Alignment magn. Field measurement system	1 day	Tue 14/11/17	Wed 15/11/17
481	0%		Ramp up magnet	0.5 days	Wed 15/11/17	Wed 15/11/17
482	0%		Magnetic field mapping (includes weekend shifts?)	2.5 days	Thu 16/11/17	Mon 20/11/17
483	0%		Ramp down magnet for remaining installation work	0.5 days	Mon 20/11/17	Mon 20/11/17
484	0%		Installation electronic racks (pre-amps, etc) if necessary for first tes	4 days	Tue 21/11/17	Fri 24/11/17
485	0%		Installation Dbox support	0.5 days	Tue 21/11/17	Tue 21/11/17
486	0%		Level Dbox table	0.5 days	Tue 21/11/17	Tue 21/11/17
487	0%		Installation Dbox + opening shielding back side (for survey work Db	0.5 days	Wed 22/11/17	Wed 22/11/17
488	0%		Alignment Dbox + closure shielding	1 day	Wed 22/11/17	Thu 23/11/17
489	0%		Installation vacuum flanges, chambers & closure vacuum	1 day	Thu 23/11/17	Fri 24/11/17
490	0%		Pumping the magnet and sector (includes weekend)	1.5 days	Thu 23/11/17	Sun 26/11/17
491	0%		Ramp up magnet	0.5 days	Mon 27/11/17	Mon 27/11/17
492	0%		Possible period of tests with stable beam	4.5 days	Mon 27/11/17	Sun 03/12/17
493	0%		Ramp down magnet for shutdown period	0.5 days	Mon 04/12/17	Mon 04/12/17



Courtesy of F. Formenti (EN/EA)

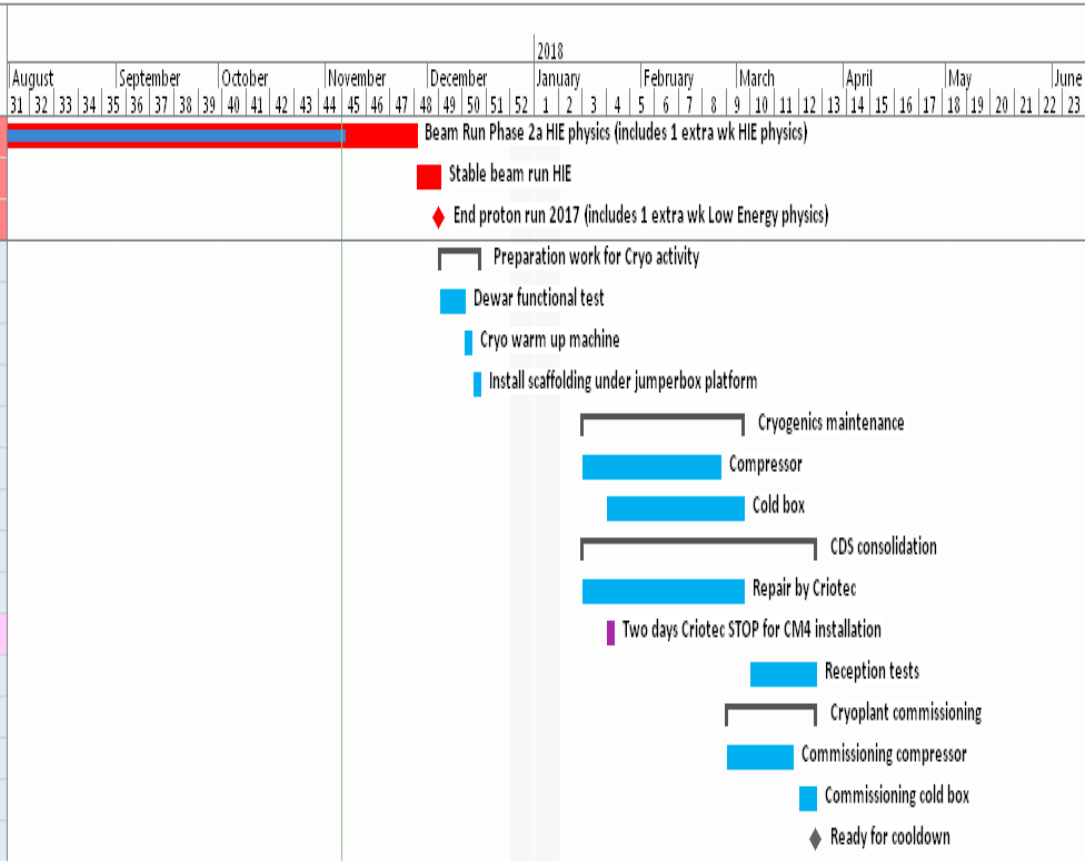
Phase2 Completion YETS 2017/2018

- Additional cryomodule (CM4)



Cryo Plant Maintenance

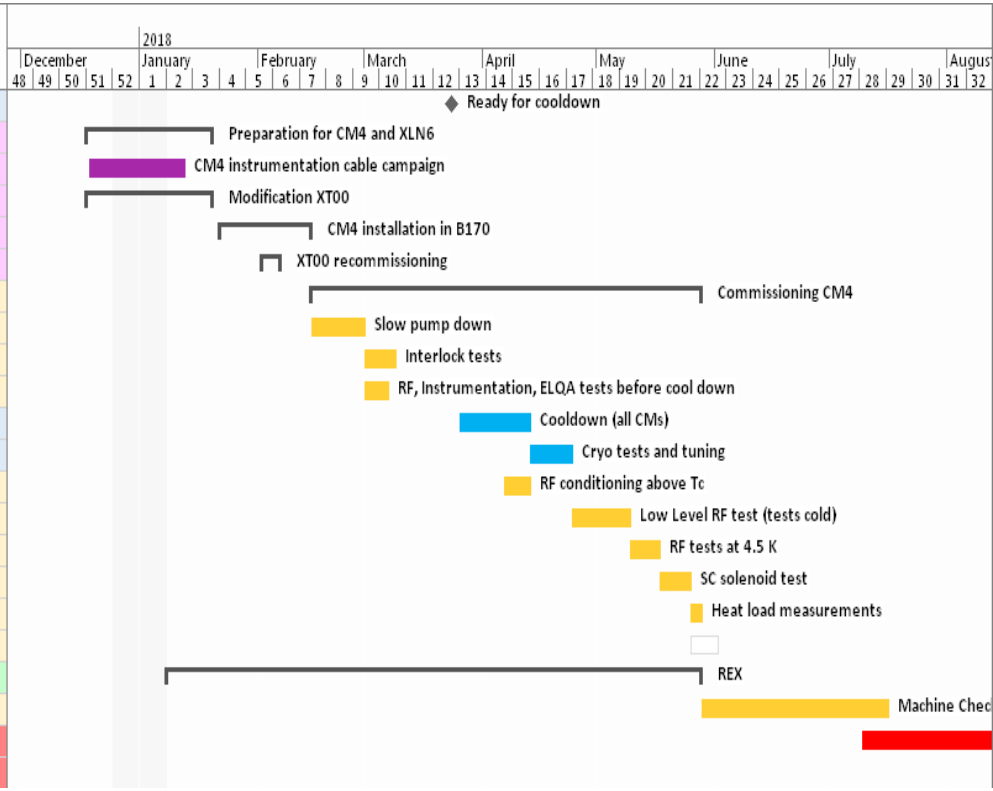
ID	% Compl	Task Name	Duration	Start
653	85%	Beam Run Phase 2a HIE physics (includes 1 extra wk HIE physics)	20 wks	Fri 07/07/17
654	0%	Stable beam run HIE	1 wk	Mon 27/11/17
655	0%	End proton run 2017 (includes 1 extra wk Low Energy physics)	0 days	Mon 04/12/17
743	0%	**Preparation work for Cryo activity**	**9.5 days**	**Mon 04/12/17**
744	0%	Dewar functional test	1 wk	Mon 04/12/17
745	0%	Cryo warm up machine	2 days	Mon 11/12/17
746	0%	Install scaffolding under jumperbox platform	2 days	Thu 14/12/17
747	0%	**Cryogenics maintenance**	**35 days**	**Mon 15/01/18**
748	0%	Compressor	6 wks	Mon 15/01/18
749	0%	Cold box	6 wks	Mon 22/01/18
750	0%	**CDS consolidation**	**50 days**	**Mon 15/01/18**
751	0%	Repair by Criotec	7 wks	Mon 15/01/18
752	0%	Two days Criotec STOP for CM4 installation	2 days	Mon 22/01/18
753	0%	Reception tests	3 wks	Mon 05/03/18
754	0%	**Cryoplant commissioning**	**20 days**	**Mon 26/02/18**
755	0%	Commissioning compressor	3 wks	Mon 26/02/18
756	0%	Commissioning cold box	1 wk	Mon 19/03/18
757	0%	Ready for cooldown	0 days	Fri 23/03/18



Courtesy of F. Formenti (EN/EA)

CM4 Installation & Commissioning

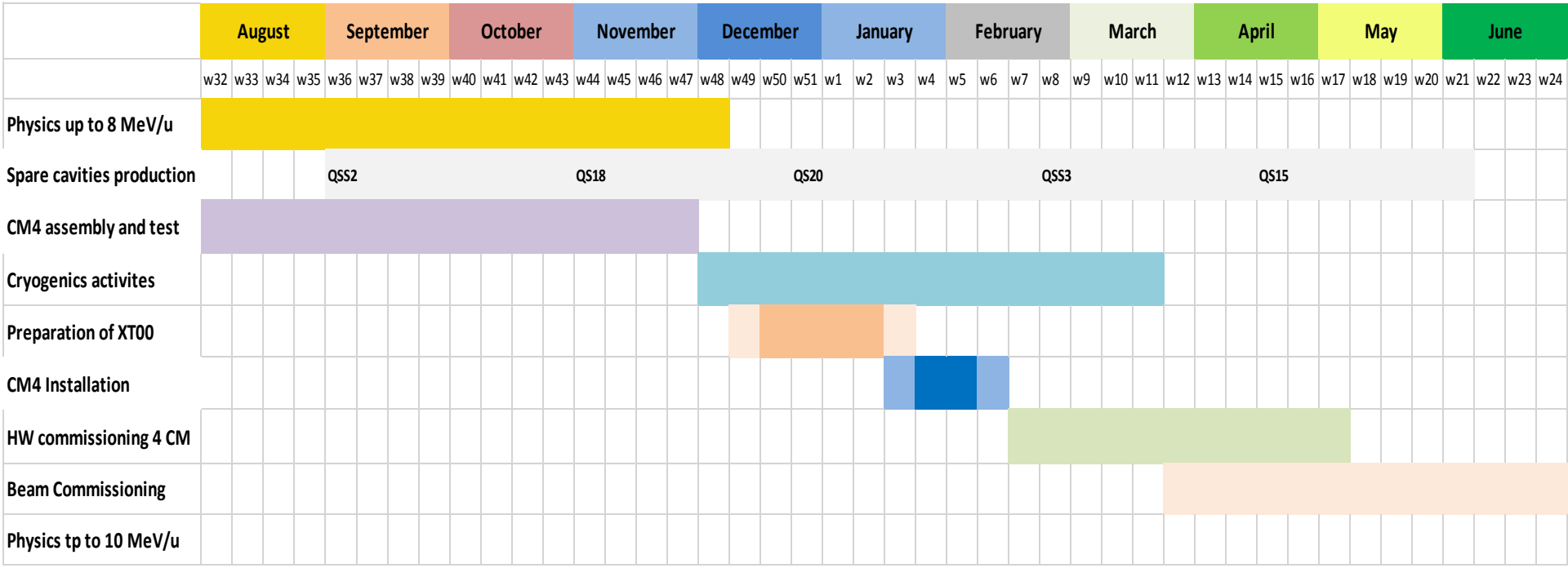
ID	% Compl	Task Name	Duration	Start
757	0%	Ready for cooldown	0 days	Fri 23/03/18
758	0%	**Preparation for CM4 and XLN6**	**15 days**	**Mon 18/12/17**
759	0%	CM4 instrumentation cable campaign	1.8 wks	Mon 18/12/17
760	0%	**Modification XT00**	**15 days**	**Mon 18/12/17**
776	0%	**CM4 installation in B170**	**18 days**	**Mon 22/01/18**
797	0%	**XT00 recommissioning**	**3 days**	**Fri 02/02/18**
800	0%	**Commissioning CM4**	**67.5 days**	**Thu 15/02/18**
801	0%	Slow pump down	2 wks	Thu 15/02/18
802	0%	Interlock tests	1.2 wks	Thu 01/03/18
803	0%	RF, Instrumentation, ELQA tests before cool down	4 days	Thu 01/03/18
804	0%	Cooldown (all CMs)	2.5 wks	Mon 26/03/18
805	0%	Cryo tests and tuning	7 days	Fri 13/04/18
806	0%	RF conditioning above Tc	1 wk	Fri 06/04/18
807	0%	Low Level RF test (tests cold)	2 wks	Tue 24/04/18
808	0%	RF tests at 4.5 K	1 wk	Wed 09/05/18
809	0%	SC solenoid test	1 wk	Thu 17/05/18
810	0%	Heat load measurements	1 day	Fri 25/05/18
811	0%	~~Thermal cycles~~	~~1 wk~~	~~Fri 25/05/18~~
812	0%	**REX**	**95.5 days**	**Mon 08/01/18**
815	0%	Machine Check out and beam commissioning	7 wks	Mon 28/05/18
816	0%	Beam run Phase 2b	18.6 wks	Mon 09/07/18
817	0%	End proton run 2018	0 days	Fri 16/11/18



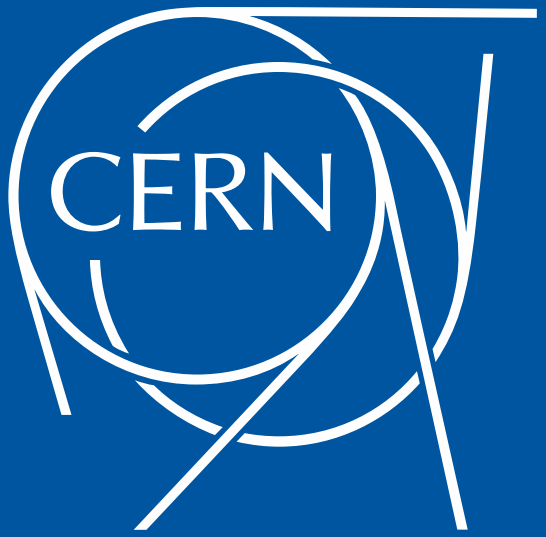
Detailed planning on:
https://espace.cern.ch/HIE-ISOLDE-mgt/Presentations/Forms/AllItems.aspx

Courtesy of F. Formenti (EN/EA)

Spare Cavities



Courtesy of W. Delsolaro Venturini (BE/RF)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