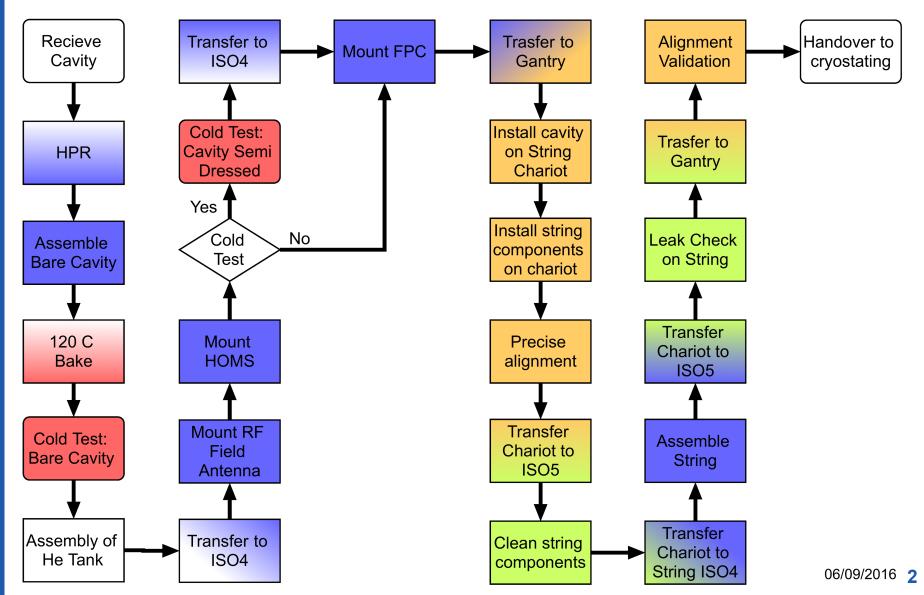
# Cleanroom workflow & Schedule Issues

A. Macpherson & Ilan Ben-Zvi



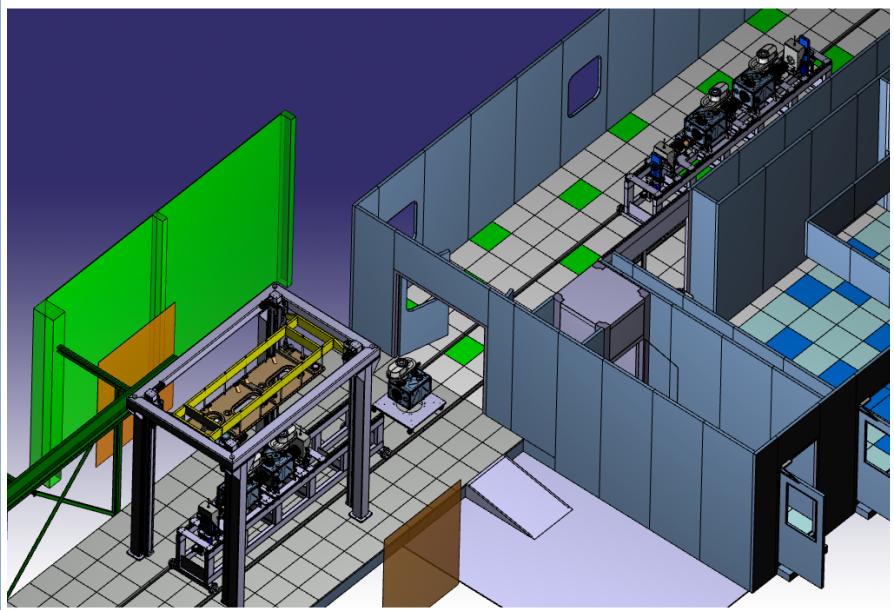
# **Overview of Cavity workflow at SM18**

#### **Cleamroom Assembly Workflow Critical Path**



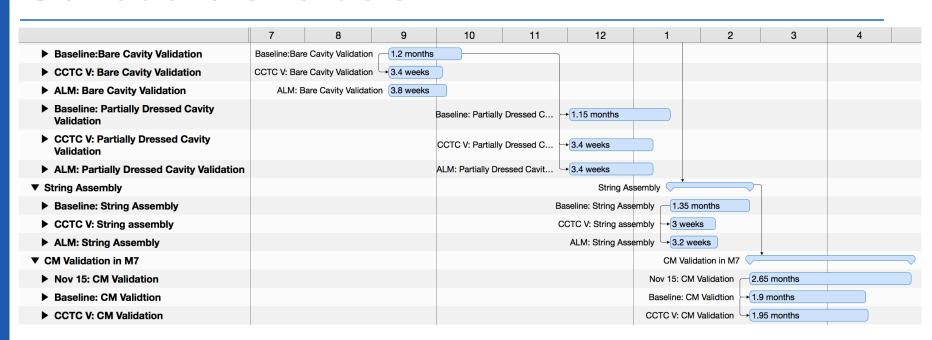


# String assembly workflow





#### Schedule evolution



#### Proposal for Schedule Overview

- Bare Cavity Validation: 3.8 weeks (was 1.2 months)
- Partially Dressed Cavity Validation: 3.4 wks (was 1.15 months)
- String Assembly: 3.2 weeks (was 1.35 months)
- CM Validation in M7:1.9 months (was 2.65 months)

#### Revised SM18 workflow:

No major reduction in time, but includes 1 wk contingency



# Simplified workflow

- Revision and clarification of workflow
  - after clean room tooling discussion on 23rd August

### Main changes proposed

- Alignment now entirely outside clean room
  - removes ~2 weeks from string assembly planning
- Gantry used for pre-assembly of string on chariot
- FPC now mounted in the HPR ISO4 area
- Simplified FPC mounting sequence.
  - reduced manipulations and reduced risk

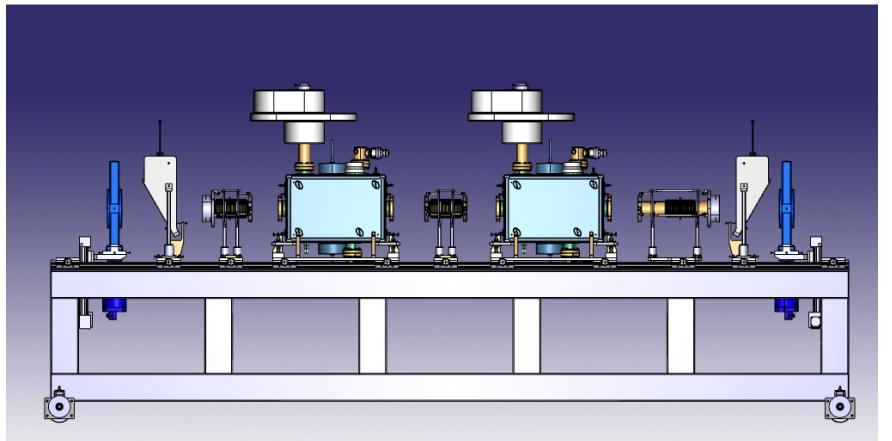
### Cryomodule testing

Reduced to 3 wks of RF tests (FPC conditioning: 1 wk)



# **String Assembly**

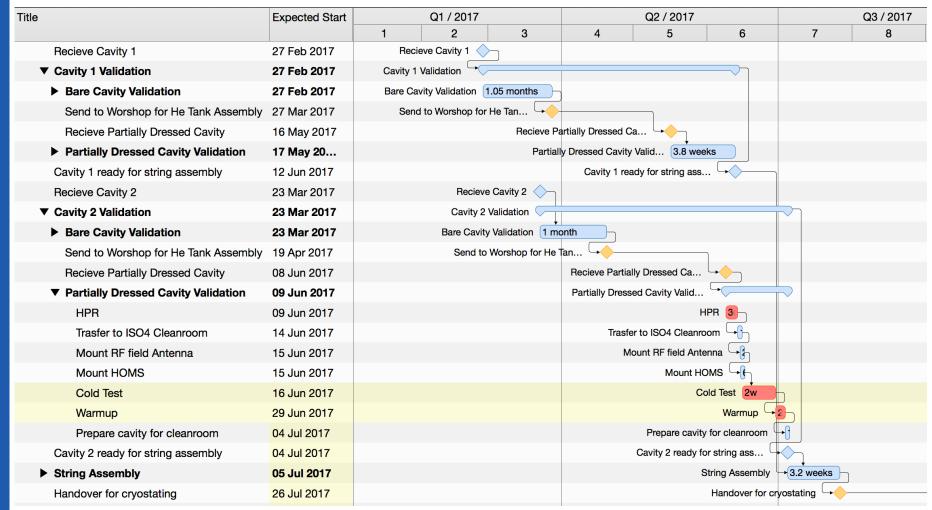
- Pre-assembly on string chariot in Gantry area
  - Requires Gantry area to be inside a ISO7/6 cleanroom
  - Full alignment with objects mounted on chariot rails
  - Once chariot loaded it is rolled into ISO5 for cleaning





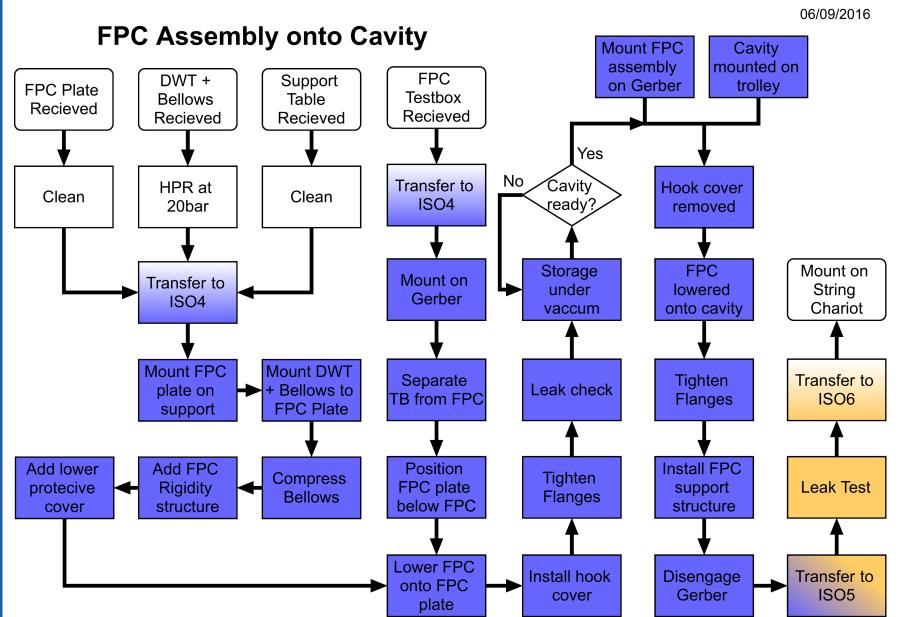
# Cavity Validation and String assembly

#### Still includes 2 cold tests per cavity





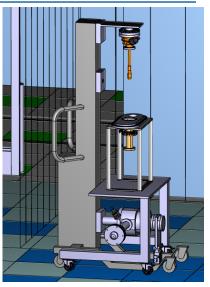
## String Assembly: after tooling meeting input





# **Proposed String Assembly**

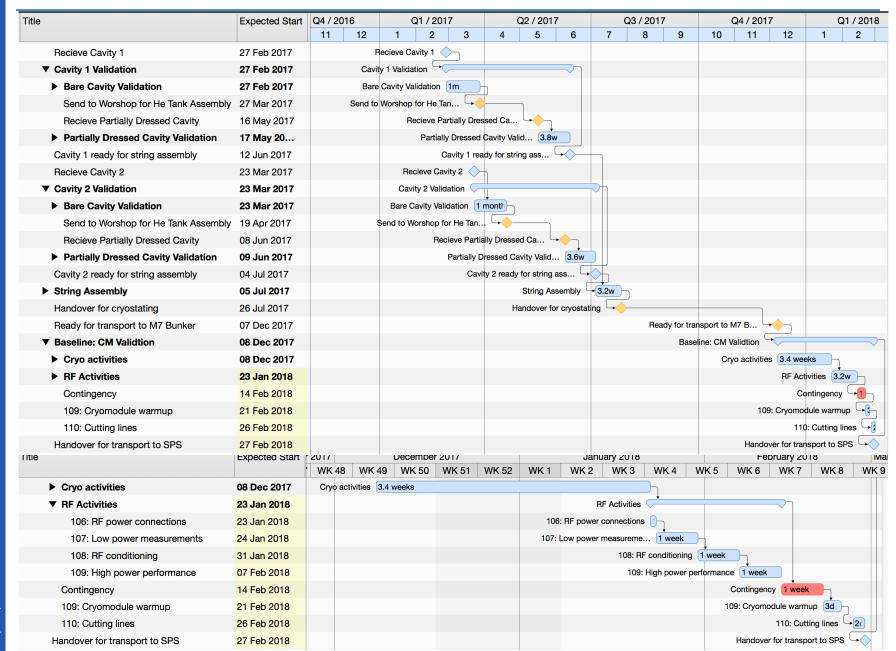
- Simplified FPC workflow
- Use Gantry to pre-assemble string
- No alignment in cleanroom
- Minimise lifter transfers



▼ String Assembly  Trasfer to ISO4 Cleanroom  Mount FPC  Transfer to Gantry  Install all components on String Chariot   4 WK 25 WK 26 WK 27 WK 28 WK 29 WK 30  String Assembly  Trasfer to ISO4 Cleanroom  Trasfer to ISO4 Cleanroom  Mount FPC  Transfer to Gantry  Install all components on String Chariot  Transfer to Gantry  Install all components on Strin		July 2017					ine 2017		Title	
Trasfer to ISO4 Cleanroom  O5 Jul 2017  Mount FPC  Transfer to Gantry  O7 Jul 2017  Transfer to Gantry  Trasfer to ISO4 Cleanroom  Trasfer to ISO4  Cleanroom  Trasfer to ISO4  Mount FPC  Transfer to Gantry	0	WK 3	WK 29	WK 28	WK 27	WK 26	WK 25			
Mount FPC 06 Jul 2017  Transfer to Gantry 07 Jul 2017  Transfer to Gantry Transfer to Gantry					ly •	String Asser		05 Jul 2017	▼ String Assembly	
Transfer to Gantry  07 Jul 2017  Transfer to Gantry					room 1c	Trasfer to ISO4 Cle		05 Jul 2017	Trasfer to ISO4 Cleanroom	
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Install all components on String Chariot 07 Jul 2017					to Gantry -	Transf		07 Jul 2017	Transfer to Gantry	
install all components on string charlot					s on Stri	Install all compone		07 Jul 2017	Install all components on String Chariot	
Full Alignment 10 Jul 2017 Full Alignment 2d				2d	Full Alignment			10 Jul 2017	Full Alignment	
Transfer chariot to ISO5 and clean 12 Jul 2017 Transfer chariot to ISO5 and				d	fer chariot to ISO5 and	Tra		12 Jul 2017	Transfer chariot to ISO5 and clean	
Transfer chariot to ISO4 13 Jul 2017 Transfer chariot to ISO4 10				SO4 →1c	Transfer chariot to			13 Jul 2017	Transfer chariot to ISO4	
Assemble String 14 Jul 2017 Assemble String 1 week				emble String 1 week	Ass			14 Jul 2017	Assemble String	
Tensfer chariot to ISO5 21 Jul 2017 Tensfer chariot to ISO5			ot to ISO5	Tensfer charic				21 Jul 2017	Tensfer chariot to ISO5	
Leak check 21 Jul 2017 Leak check 2 days			Leak check 2 days					21 Jul 2017	Leak check	
Transfer chariot to Gantry (string under vacuum)  25 Jul 2017  Transfer chariot to Gantry (st			er chariot to Gantry (st.	Transf				25 Jul 2017		
Alignment Vlaidation ( String under vacuum)  26 Jul 2017  Alignment Vlaidation ( String 1c)		g 1c	ment Vlaidation ( String	Align				26 Jul 2017	, ,	
Handover for cryostating 26 Jul 2017 Handover for cryostating		ating -	Handover for cryost					26 Jul 2017	Handover for cryostating	



# Schedule & Cryo module testing





#### Where can we reduce further?

- It is difficult to cut the SM18\_RF schedule much more
- Reduction of ~3 wks on Cavity 2
  - remove cold test of partially dressed cavity
- Suppress CM cold test in SM18\_M7
  - Increased risk
  - No point suppressing RF test and not cryo/leak tests
    - If suppress CM test => cryo/leak test in SPS
- Cavity 1 to Cavity 2 delay
  - Almost optimal, as interleaved in terms of SM18 team
    - => not sensible to advance Cavity 2 wrt Cavity 1
- May be able to trim a few days on partially dressed cavity assembly, as still have to work through the HOMS installation
  - => preparing for cleanroom tooling review on Oct 12th

