



Project Progress Review (PPR) 1-2025

WP- 08: RF systems
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16 Janvier 2025



Needed RF systems for superconducting elliptic cavities used in Booster and ERL LINAC cryomodules and the buncher:

- Cavity qualification facility upgrade for testing @801.58MHz with 1kW max.
- Distributed Master Oscillator and Timing system for providing all Reference Phases & Timing signals to the Cavities, beam Diagnostics and probably experiments.
- 9 RF Power Amplifiers for providing the RF power needed by cavities (from 5kW to 50kW).
- 8 or 9 Low Level Radio Frequency feedback systems (Amplitude, Phase and Frequency)

Developments with contributions to all WP except n° 4 (magnets) and 9 (Vacuum)

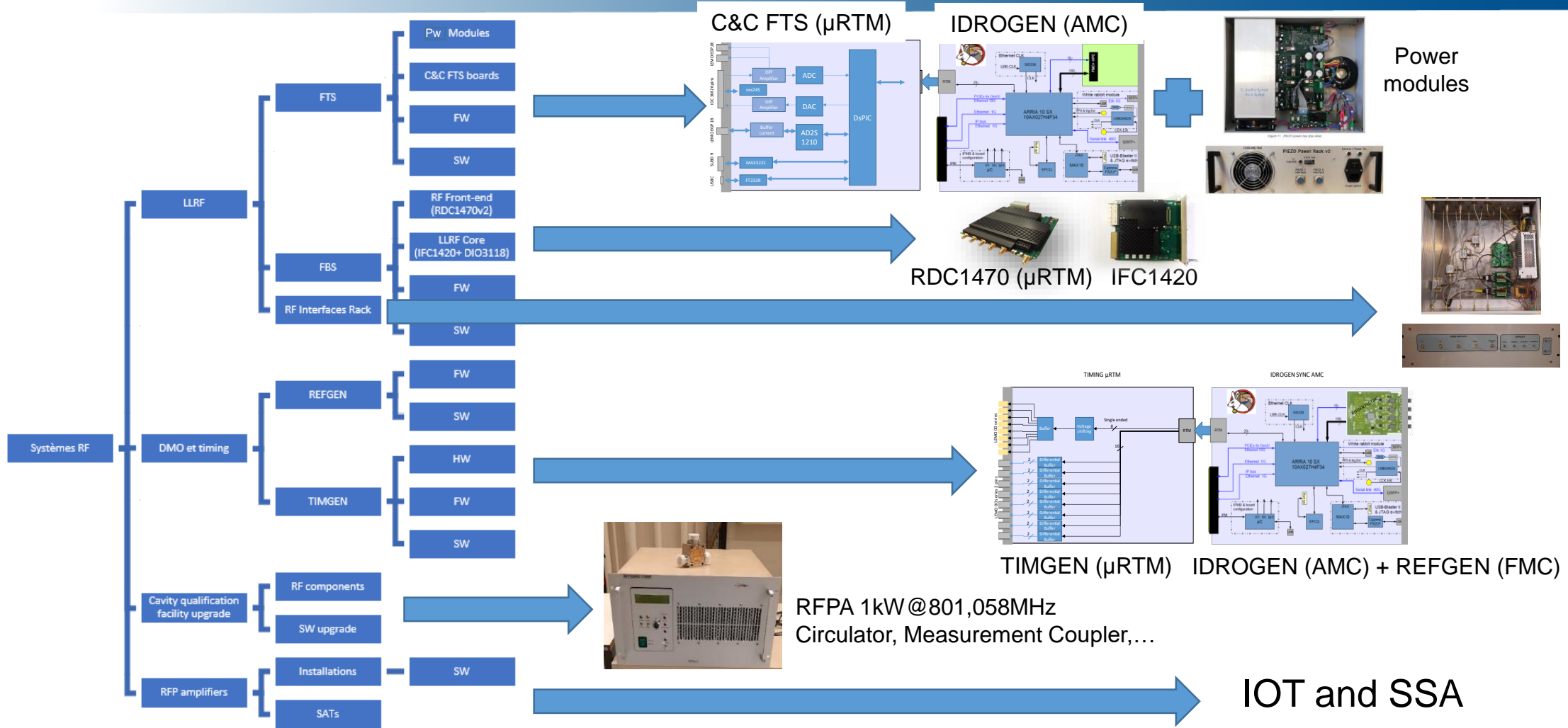


Etat d'Avancement

- Project definition (RH, WBS, Budget) in progress : Consolidation
- TDR part: first version with a global definition of the RF systems
- Cavity qualification facility upgrade : RFPA, circulator, RF measurements coupler and RF power load delivered in 2024. RFPA SAT realized Q4 of 2024
- MO & Timing : Use of IDROGEN board solution associated to one mezzanine board (FMC REFGEN) and a μ RTM board locally providing the timings signal. First REFGEN prototype realized end of Q4 2024 → available in end of February.
- RF powers Amplifiers : 4 IOT + 5 SSA strategy seems the best . First version of the SSA requirements done and project of collaboration with THALES and CERN for the IOT prototype.
- LLRF system : IOXOS based HW solution adapted at 801,58MHz. RF front-end prototype will be delivered Q1 2025. PhD student hiring for developing a superconducting cavity real time embedded simulator for PERLE and the optimization of LLRF firmware algorithms.



Structuration du WP-08

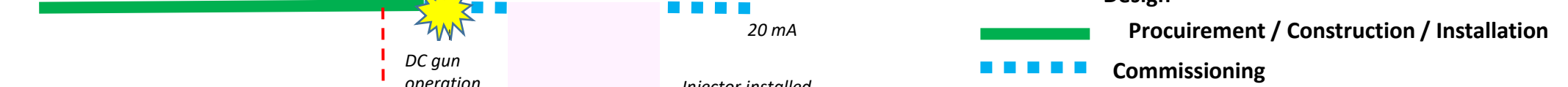


* in the framework of the new IOT project (CERN, THALES and IJCLab) : IDEMO

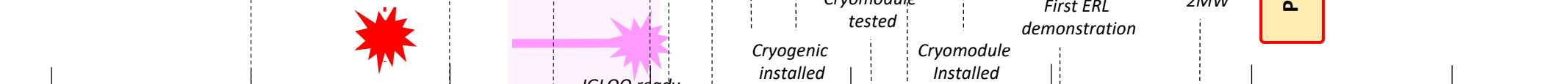


Planning et Principaux Jalons du WP-8 : RF systems

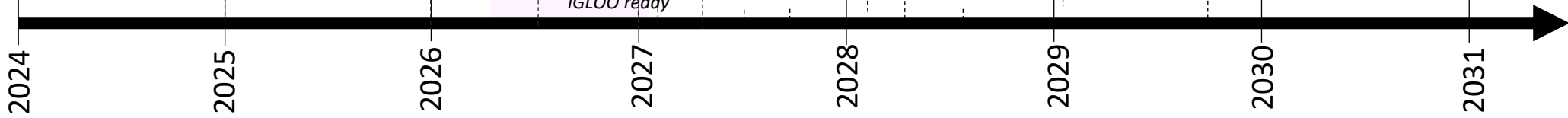
DC Gun @350 keV



Injector @ 7MeV



PERLE 1-LOOP 89MeV





RH engagés et besoins manquants (2024-2029)

WP8: RF systems ~19 FTE WITHOUT OTHERS WP CONTRIBUTIONS	LLRF	Christophe Joly
		Jean-François Yaniche
		Vir IR Conception carte
		virt T-AI CAO-suivi pro
		Xavier Lafay
		Francisco Campos
		Nicolas Gandolfo
		Sylvain Berthelot
		Olivier Frossard
		Frederic Bouly
	MO & Timing	Christophe Joly
		Daniel Charlet
		Antoine Back
		Vir IR Conception carte
		virt T-AI CAO-réal.
		virt T-AI CAO-suivi pro
	Cavity booster test bench	Xavier Lafay
		Sylvain Berthelot
	RF Amplifier	Christophe Joly
		CDD IR RF
Olivier Frossard		
Sylvain Berthelot		
Sylvain Berthelot		

~8 FTE including 1.25 FTE missing

~3.4 FTE including 1.75 FTE missing

~0.75 FTE

~6.6 FTE including 4.3 FTE missing



Points de vigilance

- Disponibilité des ressources:
 - Ing Conception, 2 T/AI CAO, routage , suivi de prod,
 - Départs à anticiper: F. Campos (à partir de fin 2025), D. Charlet (~ mi 2026 ?)
- Décision à prendre dans le court terme
 - Solution pour Timing et FTS → IDROGEN based

- Dépenses à prévoir (à consolider):

2025

- 6k€ pour développement des cartes proto (TIMGEN et C&C FTS)
- 40k€ pour réaliser la série des modules de puissance FTS
- 30k€ pour réaliser la série des châssis d'interfaces RF
- ? Câbles

2026

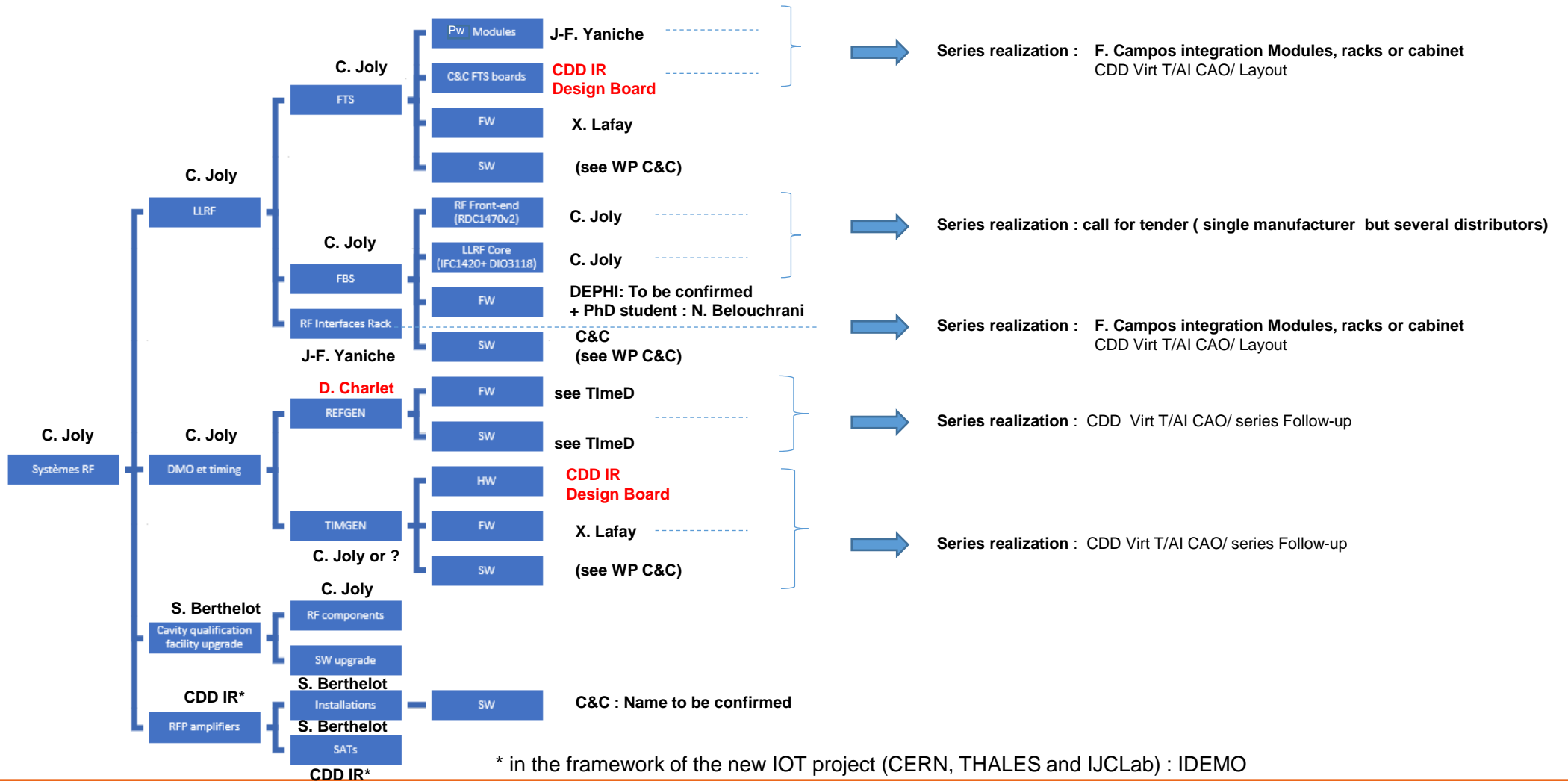
- 116k€ approvisionnements cartes IOXOS (8 + 2 spares)
- ? k€ Châssis MTCA (
- ? Lignes RF
- ? Circulateurs and Load (minimum 4 but perhaps 8)
- 400k€ Amplificateurs SSA (power 10kW)

2027

- 1.2M€ Amplificateurs IOT (50kW)
- ? Upgrade Amplificateurs SSA (power 20 kW to 50kW, bandwidth-dependent)



Annexe : RH engagés et besoins manquants



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