



CLIC Spain collaboration

- **CIEMAT: AC structures and Dipoles magnets**
- **CELLS - ALBA: Stripline kickers, Impedance and Collective effects, Beam size measurements and 1.5GHz RF system**
- **IFIC (CSIC-UV): HG-RF and BPMs**



CLIC - CIEMAT collaboration agreement

Just signed by CIEMAT, pending to be signed by CERN

WP1: CLIC structure TD26CC.

Ongoing activities...

Implementation of a new cleaning process with organic solvents

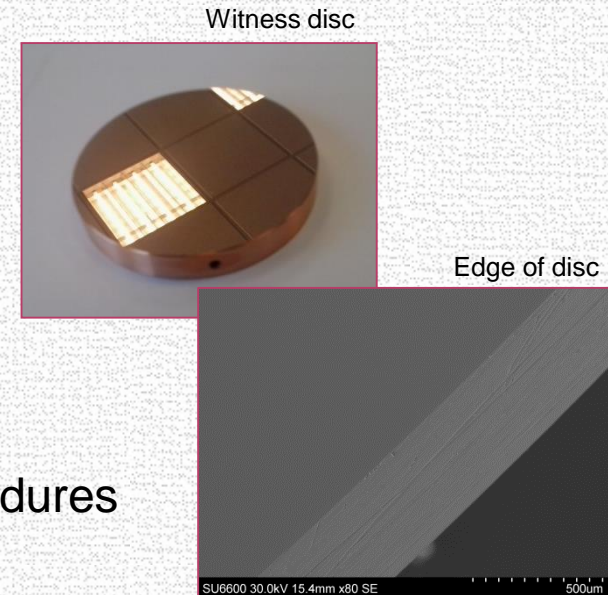
Furnace qualification for bonding:

Witness discs already machined and SEM characterized to study pollution before thermal cycle

Week 24. Thermal cycle for furnace qualification at Ceit (SP)

Drawings of TD26CC structure under elaboration:

Slight fabrication changes in respect to CERN procedures



WP2: Dipole magnet with longitudinally variable field.

Task not started yet. The process to hire a new engineer has been launched.

CLIC- CELLS collaboration agreement

Just signed by CELLS, pending to be signed by CERN

WP1: Test with beam of the CLIC DR Stripline Kicker:

- Installation of the CLIC DR Stripline and Pulser in the ALBA Storage Ring
- Measurement of the stripline impedance
- Measurement of the longitudinal field stability of the pulser

WP2: - Modeling of beam impedances and collective effects in accelerator impedances

- Measurements and benchmarking at the ALBA Storage Ring

WP3: Beam size measurements simulations and instrumentation development. Measurements and benchmarking at the ALBA Storage Ring

WP4: Design study of an active 1.5 GHz RF system , including:

- Electromagnetic and mechanical design of the cavity
- Beam loading simulations
- LLRF design
- High Power Amplifier proposal

CLIC- IFIC collaboration agreement

Signed by IFIC and CERN

Ongoing activities

WP1: Commissioning and beam tests of two Drive Beam (DB) Stripline Beam Position Monitors (BPM), including read-out electronics and data acquisition in the CLIC module at CLEX at CERN.

WP2: Contribution to the laboratory tests at the so-called XBOX facilities at CERN. Design, construction and commissioning of a data acquisition system and of an operational control system for HG-RF lab at IFIC

WP3: Contribution to the laboratory tests at the so-called XBOX facilities at CERN. Design and construction of equipment and installations for HG accelerator structure testing in the HG-RF lab at IFIC

WP4: Contribution to the laboratory tests, analysis of the results, including relevant beam dynamics aspects, linac optimization and future developments of HG accelerator structures at XBOX at CERN and in the HG-RF lab at IFIC. The process to hire a new physicist has been launched.

High-Gradient RF Test Stand Status at IFIC

IFIC-IFIMED, Valencia



A. Faus-Golfe

IFIC, GAP (Group of Accelerator Physics)

<http://gap.ific.uv.es>

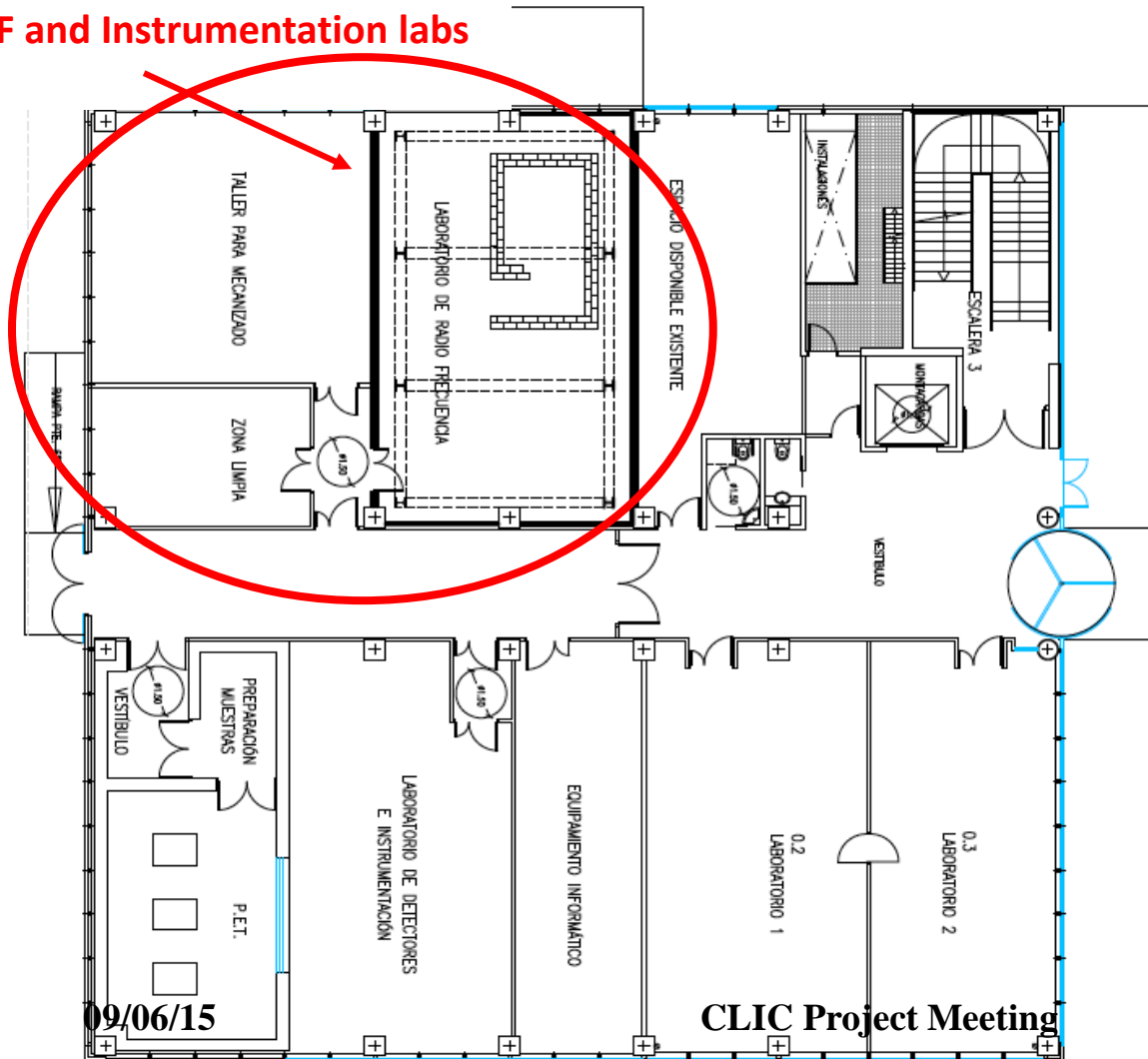


Location and Drawings



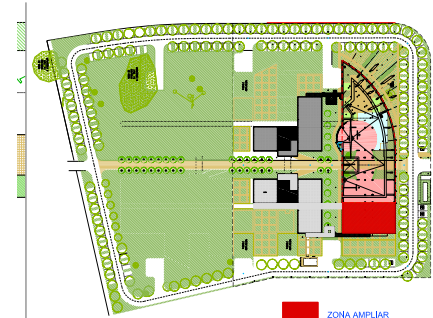
IFIMED R&D labs integrated in the Scientific Park of the UV

RF and Instrumentation labs

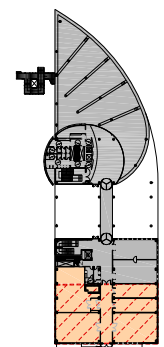


09/06/15

CLIC Project Meeting



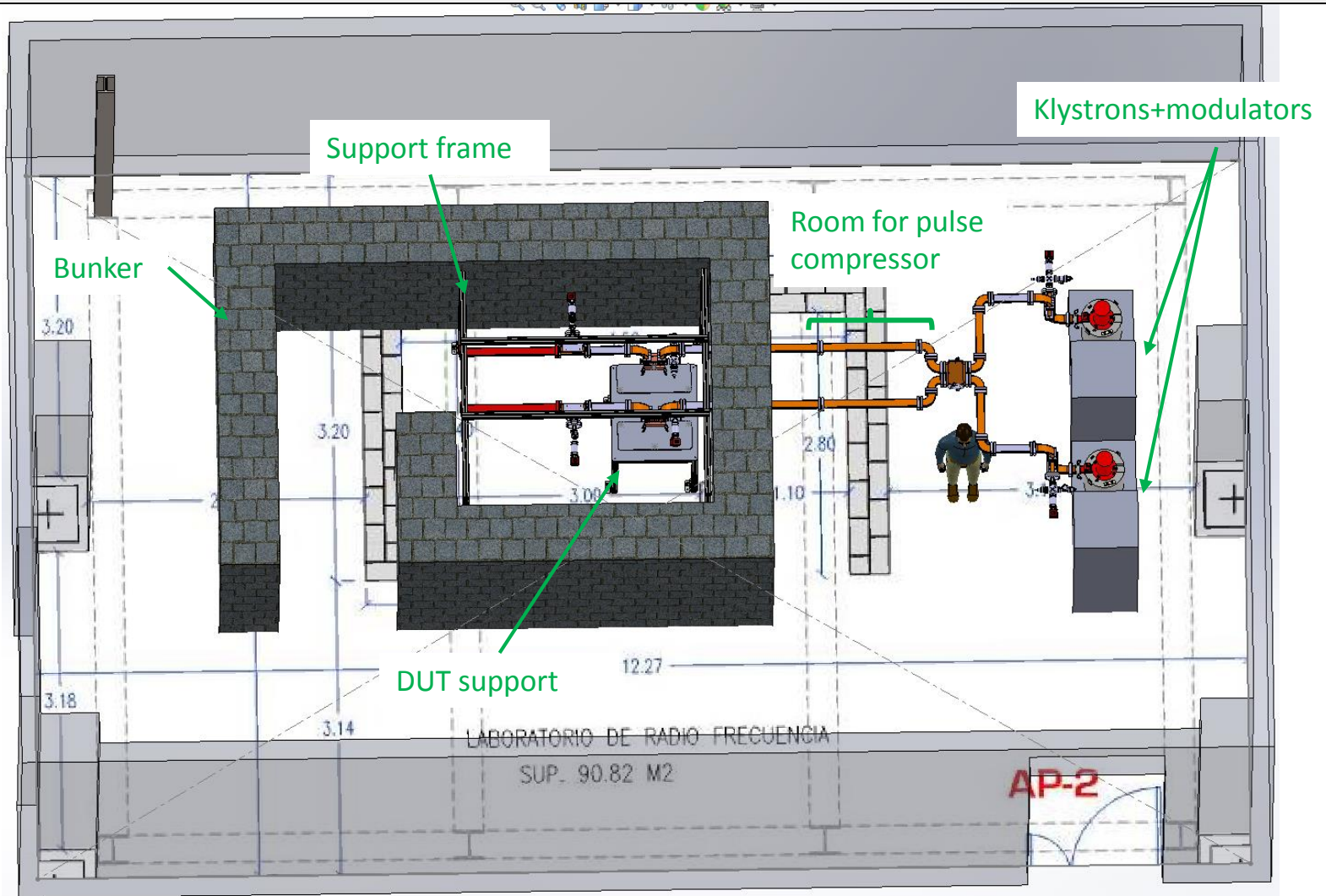
SITUACION EN EL PARQUE CIENTIFICO - ESCALA 1:1000



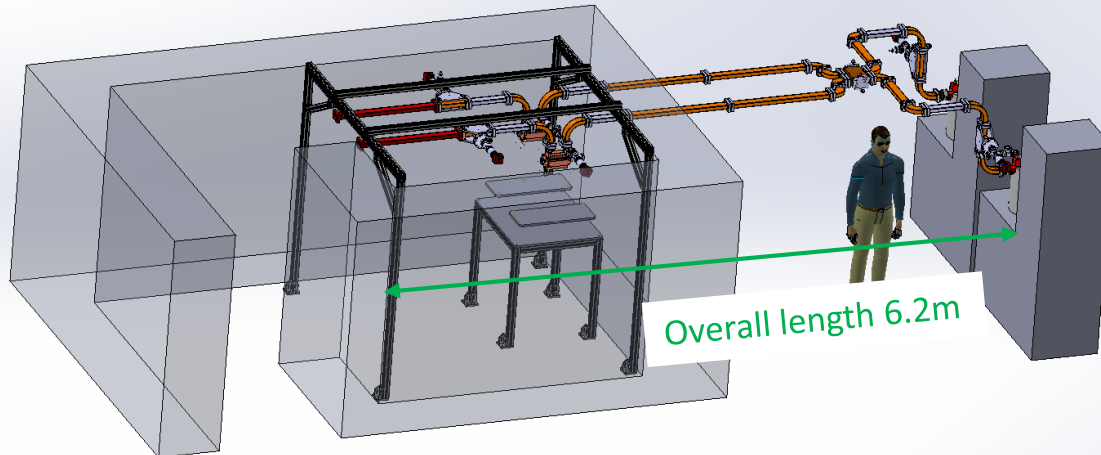
EDIFICIO 1. ESQUEMA DE PLANTA BAJA

PROYECTO MODIFICADO AMPLIACION EDIFICIO 1 DEL PARC CIENTIFIC DE LA UNIVERSITAT DE VALENCIA		Referencia:
Nombre: EDIFICIO 1 PLANTA BAJA (IFIMED - AMPLIACION EDIFICIO 1)	Propietario: UNIVERSITAT DE VALENCIA	Fecha: 09/06/2015
Situación: CAMPUS DE PATENA	Director: Ricardo Pérez Martínez	Escala: 1:100
Director: Ricardo Pérez Martínez	Sub-Director: Vicente Tarazona Izquierdo	

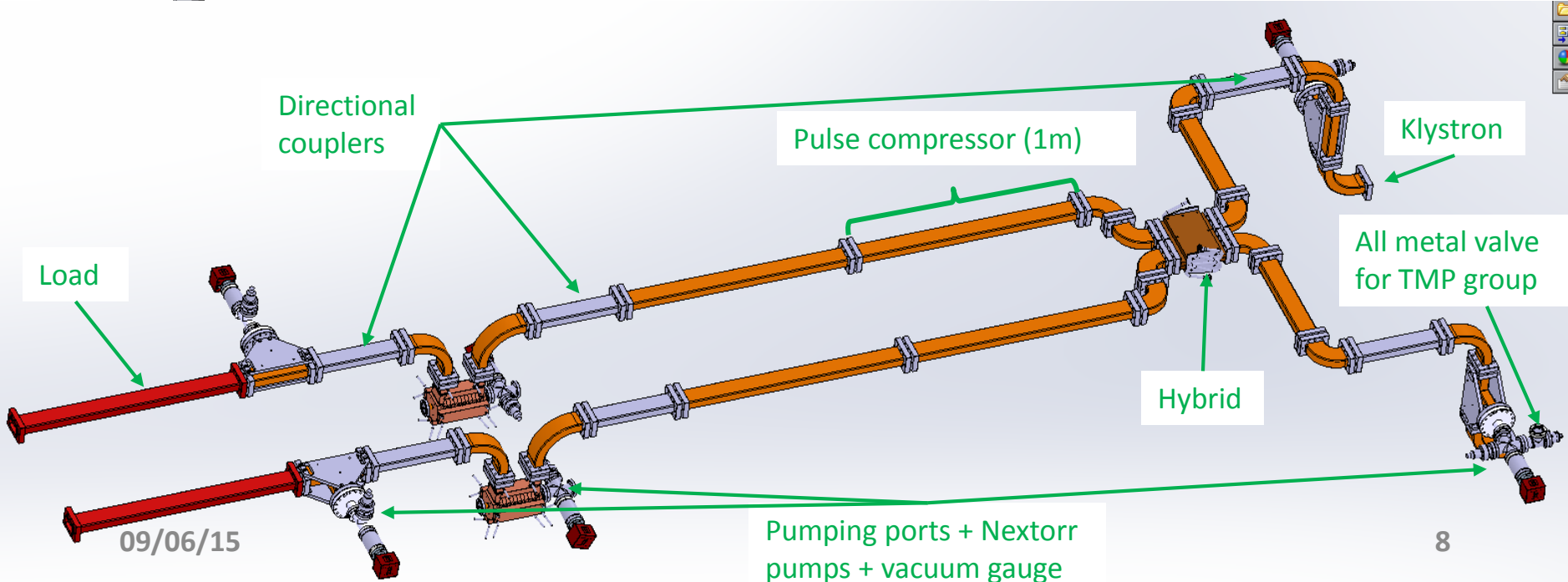
INTEGRATION: Distribution



INTEGRATION: RF & vacuum layout



- Overall length : ~ 6.2m
- Wave guides length : (2x)~ 3m (+ bends)
- 3 pumping ports per line
- 1 Angle all metal valve for TMP per line
- 3 Nextorr D100-5 pumps per line
- Support frame and DUT adjustable support currently under design

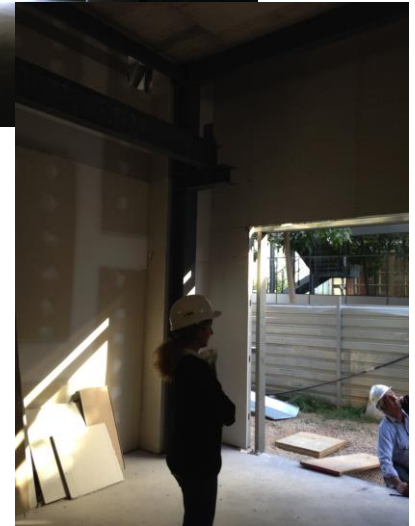


STATUS: construction



IFIMED R&D labs integrated in the Scientific Park of the UV

RF lab



29 April 2015

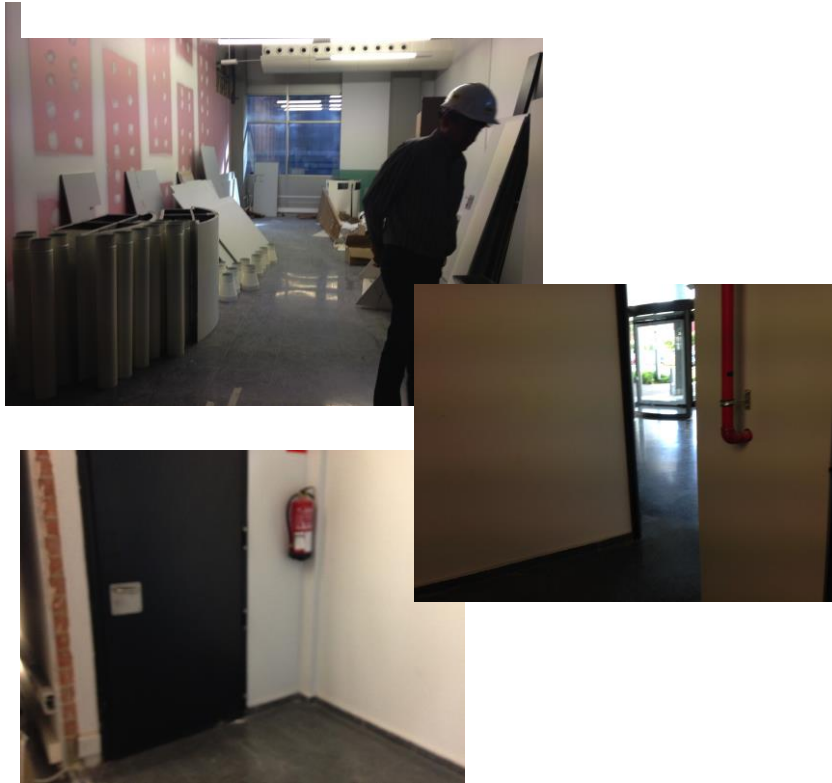
HG-RF Valencia

STATUS: construction



IFIMED R&D labs integrated in the Scientific Park of the UV

Multipurpose space and access to services



Mechanical workshop and control room



29 April 2015

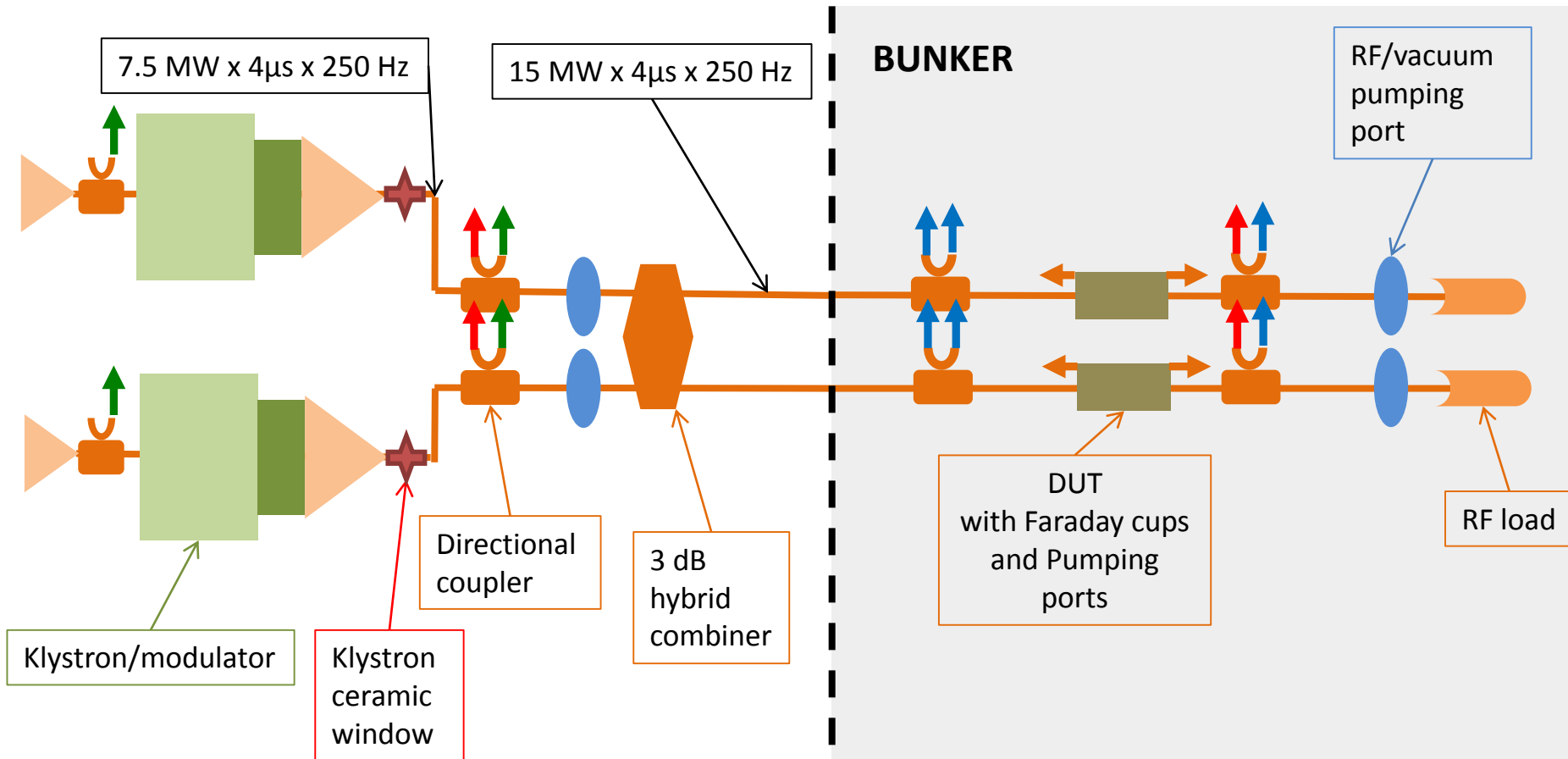
HG-RF Valencia

STATUS: construction



- The construction of building will be finished on 20 July 2015
- The Instrumentation lab at IFIC now, has to be moved from this date to the new location

Valencia 3 GHz test stand layout



- Vacuum: 10^{-9} mbar
- No circulator, fast interlock instead.
- Vacuum not segmented.
- Space allocated for a pulse compressor.
- Equipment procurement subdivided in different tenders: HPRF, LLRF, Vacuum, Lab equipment, TX-lines

Components

- High power RF (Klystron, modulator, amplifier)
- Low level RF (PXI acquisition system, mixing stages, PLL board, log amps)
- Lab equipment (VNA, oscilloscopes, RF generator, RF multiplexer, RF power meter, temperature controller, RF cables, racks)
- Vacuum and cooling (Primary pumps, Ion pumps, gauges, leak detector, chiller, vacuum mechanics)
- TX-Lines (Waveguides and passive components)

- Klystron:
 - Provider: CPI
 - Output port flange for UHV (LIL type as agreed). Provided by Gerry and already sent.
 - Acceptance tests by mid-summer.
- Modulator:
 - JEMA
 - Contact with CPI established.
- Amplifier:
 - Solid-state: Microwave amplifiers:
 - AM10 S-Band 400W Power Amplifier.
 - Tender ongoing.

- Controls, PXI system: **Tender ongoing**

Chasis	1	NI PXIe-1085, 18 slots
Controller PXI	1	NI PXIe-8135
Trigger+interlock card	1	NI 6583 + FPGA
RF Generator (4.4 GHz)	2	NI 5793 + FPGA
8 ch 250 MSPS ADC	5	NI 5171. 4xAC(RF signals) + 1xDC (Faraday cup)
RS232, RS485 gauge det.	2	NI PXI-8432/8 (RS232) and NI PXI-8433/4 (RS485). Vacuum gauges
Slow monitoring	1	NI 6363. Voltage signals like vacuum, temperature and flowmeter
Fast acq 4 ch 2.5 GSPS	1	NI 5160. Not needed for S-band: cell binning resolution of 20 ns

- **Miscellaneous : to be developed**

Log Amp	1	To be redesigned. Different freq. Range. Detailed shopping list needed soon
Mixing stage	1	To be redesigned. Implement only the downmixing
PLL crate box	1	To be redesigned.

Lab equipment

- Equipment to work in the lab: **tender ongoing**

RF function generator (6 GHz)	1		
Computer	3		
VNA	1		100 KHz - 20 GHz, time domain
Spectrum analyzer	1		Already bought
Oscilloscopes	2		4 GHz (10 GSPS) and 500 MHz
RF switches for powermeter	1		To multiplex the power measurements into the powermeter. R&S.
Power head and power meter	1		
RF kit			(conectors/cables/adapters, lemo N, BNC, sma)
RF Cables			Need to work on this. If we get high quality RF cables the cost can go high. 3 important channels (per AS) should be good quality cables: PSI PSR PEI
Racks and crates	2-3		

Vacuum + cooling

- Vacuum: **tender ongoing**

Ultra high vacuum pump: ion pump +NEG	6	http://www.saesgetters.com/products/nextorr-pumps
Primary pump	1	Rotative + turbo.
Primary pump valve	2	
Crosses for valves and gauges	6	
Gauges penning + pirani	6	One per port. A combined one.
Gauge controller	4	
Leak detector	1	

- Cooling:
 - Chillers => **tender ongoing**
 - Demineralized water => **installation ongoing**

- Waveguides: **to be done**
 - Looking for providers for standard pieces. Drawings of the components provided by Gerry.
 - UPV can provide us 3dB – Hybrid. To be redesigned from Gerry’s drawings from 4.5dB one.

Hybrid 3dB mixer		1	Drawing provided for 4.5 dB
Waveguides 18WR-284			
	straight segments	18	Drawing provided
	bends	16	
	60 dB Couplers	6	Home made? Drawing?
	Flanges	??	Drawing provided
Loads		2	
Pumping ports		4	Drawing provided

STATUS: purchase



- The purchase process is ongoing
- The process has to be finished in September 2015 !!!!

Outlook and Conclusion



High-Gradient RF Technology is crucial for the development, among other applications, of the linacs for proton and carbon therapy.

In the framework of the **IFIMED project** a **High-Gradient RF test facility** is being created and will be ready to be operated at the end of 2016.

The collaboration with CLIC RF structure development group is very useful from the scientific and technical point of view as well as training of the young staff.

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Thanks to CLIC RF team for their help in this task