

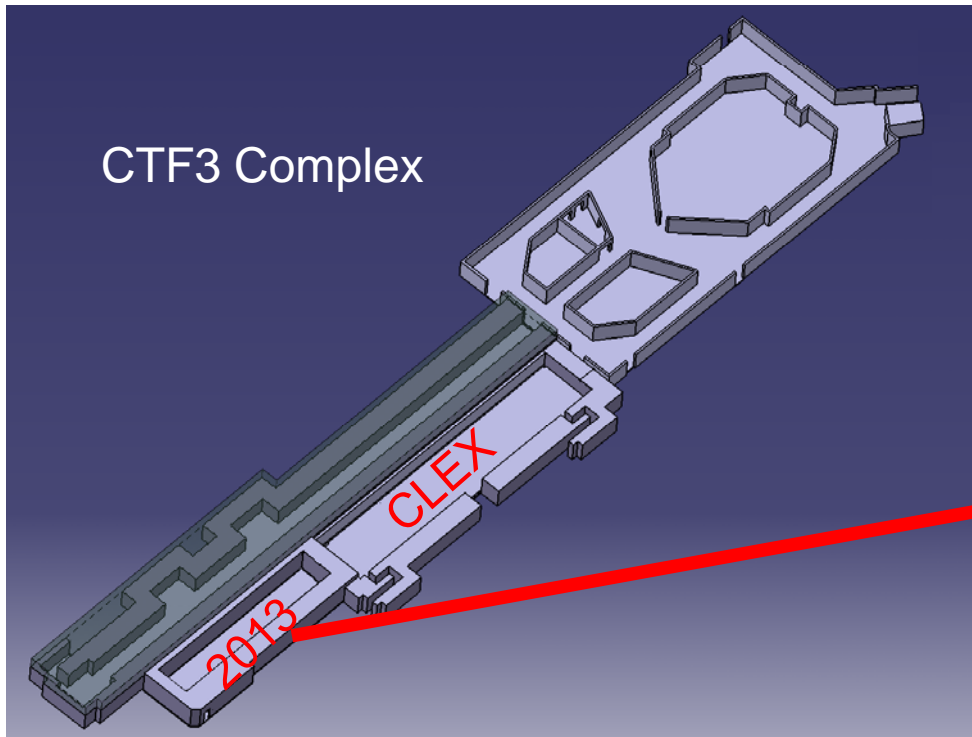
12 GHz Stand alone power source at CERN

G.McMonagle AB/RF

Objectives

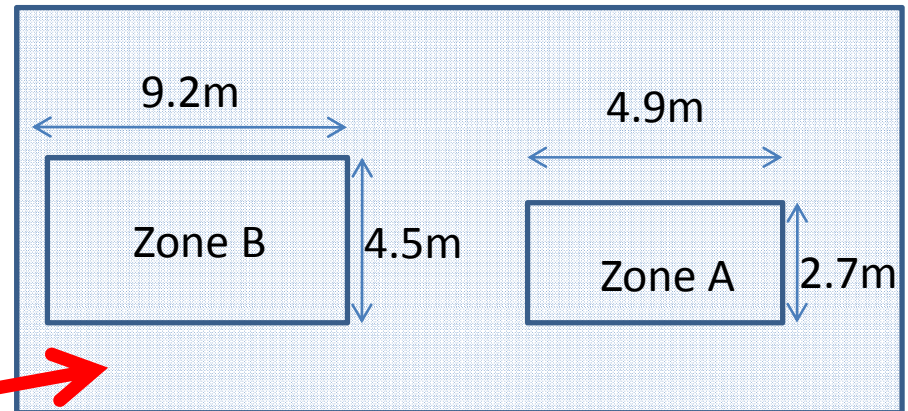
- Install a 12GHz power source at CERN as soon as possible to allow high gradient structure testing independent from the CTF3 machine operations
- GOAL is for early 2009

Where ?



CTF3 Complex

1st Floor B 2013



Installing the klystron modulator in 2013 allows for a stand alone test area below in the CTF2 area but also allows the possibility to provide 12GHz RF power to the CLEX area

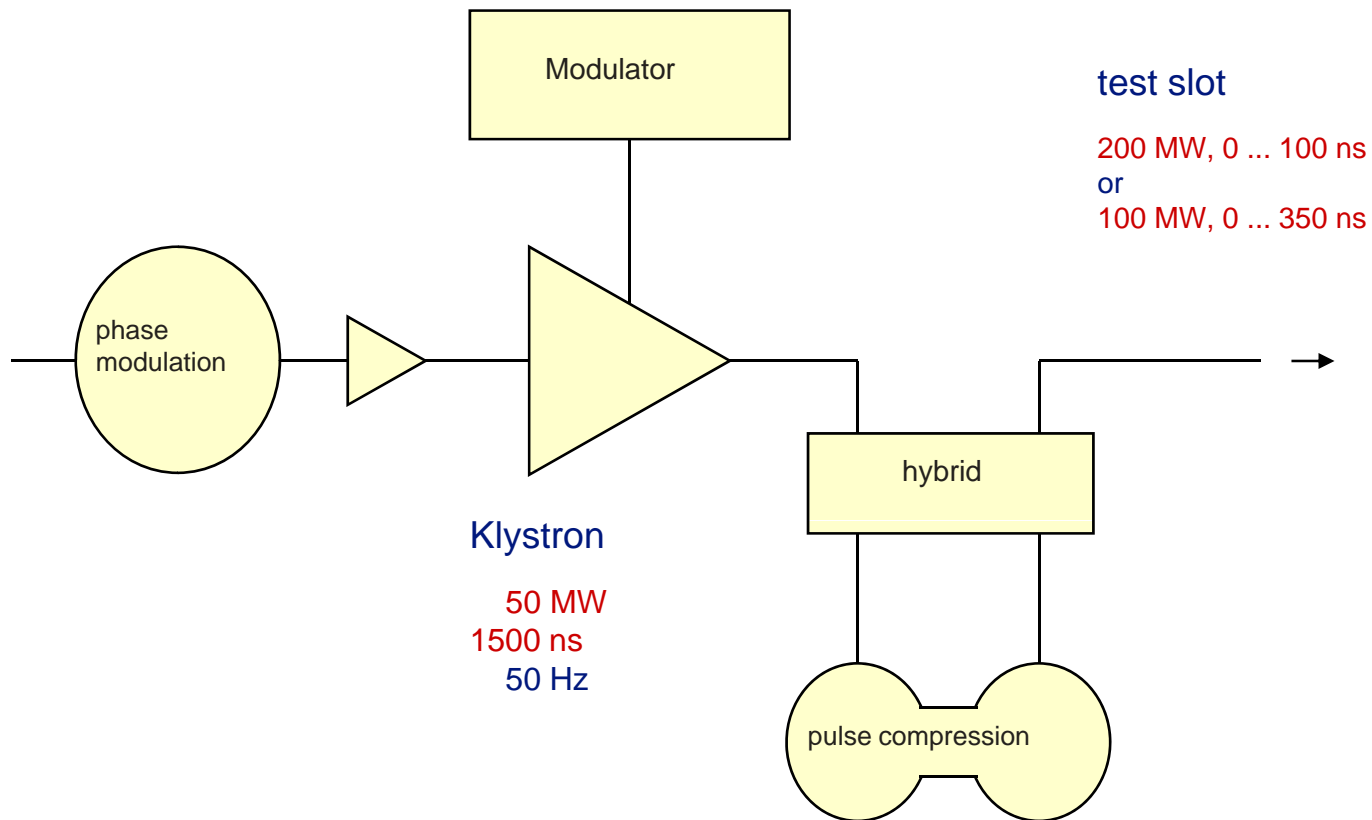
Zone A

Old CTF2 Streak Camera area
Space available now
suitable for 1 klystron modulator

Zone B

CTF3 Laser Room
Space **NOT** available immediately
suitable for 2 klystrons and modulator

Requirements for 2009 in zone A



Klystron Specification

Parameter	Value	Units
RF Frequency	11994.2	MHz
Peak RF power	≥ 50	MW
RF Pulse Width	1.5	μs
HV pulse width	Approx 3 to 3.5	μs
Repetition Rate	50	Hz

- No existing klystron to this specification
- Klystron will probably be scaled from 11.4 GHz model with solenoid focussing
- Already in consultation with klystron manufacturers to see if parameters and time delay for manufacture are achievable
- Other european laboratories are interested in similar klystron (PSI, Trieste, Frascati)

Provisional Modulator Specification based on SLAC XL4 tube at 50 MW

Parameter	Value	Units
Peak Klystron Voltage	410	kV
Peal Klystron Current	310	A
HV flat top	1.5	μ S
Max HV pulse width	Approx 3 to 3.5	μ S
Repetition Rate	50	Hz

- Final paramaters for modulator only after klystron model is chosen
- Some size restraints on individual modulator components will be necessary due to the chosen location
- Open to choice of line type thyratron switch or solid state development
- Possible collaboration with other labs depending on thier timescale

Additional requirements

- Lead shielding of klystron
- water cooling distribution
- Preparation of test area
- 3 phase power requirements (TS/EL)
- Low level RF including klystron driver
- Waveguide network including high power loads, measurement couplers, hybrid and pulse compressor.
- Apart from pulse compressor, development already underway for CLEX two team test stand

Strategy

- Finish consultation with klystron manufacturers and prepare costing and delivery timetable in order to present a collaboration proposal to FC in December 2007 for approval
- Order klystron
- Finish modulator specification with respect to above decisions
- Price enquiry for modulator
- Cost analysis for infrastructure in B.2013
- Prepare test area in parallel to klystron and modulator orders
- Price enquiries for low level equipment necessary and for manufacture of high power waveguide network

Ball park cost estimates for single klystron power source

DESCRIPTION	COST ESTIMATE (kCHF)	DELAY
Klystron	640	12-18 months
Modulator	650	12-14 months
Water cooling	25	
3 phase supply	25	
Zone preparation	40	
Klystron driver (~300 to 500 watts)	50	8-12 months
Low level electronics	30	
Low level controls	30	
General infrastructure	50	
Vacuum tanks	50	
High power RF components	200	
Vacuum equipment	50	
Process control system	100	
TOTAL material estimate	1940	

Optimistic Planning

	2007		2008										2009									
	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	
Klystron feasibility and costing enquiry	Yellow																					
Finance Committee Approval (for klystron collaboration and project approval)		Blue																				
Order Klystron			Green																			
Klystron Manufacture and Delivery				Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow						
Modulator Price Enquiry			Green	Green																		
Modulator Manufacture and Delivery				Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow						
Preparation of Modulator area			Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue						
Procurement and preparation of auxiliaries			Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green						
Preparation of test area			Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red						
Procurement and manufacture of test area equipment			Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow					
Low level RF			Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue						
START TEST STAND COMISSIONING (single klystron)																	Red	Red	Red	Red	Red	Red

Summary

- We have a very tight and optimistic programme to deliver a 12 GHz RF power setup at CERN for early to mid 2009
- Only workable if we get immediate CERN approval or external funding
- Suggestions and HELP (financial or in-kind contributions) in achieving these goals would be welcome