CLIC work packages

CTF3-003
(TBL+)

CLICO-001
(CLIC DB injector)

CLICO-002
(photo injector option for CLIC DB injector

CTF3-003

WP: CTF3-003 TBL+	Purpose/Objectives/Goals: Contribute to high-power testing program of accelerating structures, understand break down behavior of PETS-structure system and conditioning scenarios (performance, cost)	Deliverables	Schedule
Upgrade of TBL drive beam line	Provide high-power slots for testing.	4 PETS with input couplers, waveguide network, supports and cables. M budget: 750 kCHF	2012 – 2013
RF Test stands	RF conditioning and high-power testing of structures.	waveguide network, supports and cables, instrumentation and control for 4 slots M budget: 750 kCHF	First slot: 2012 – 4Q Addit. 3 slots: 2013 – 4 Q
Operation	Support testing.	Maintenance, operating support. Annual reports on testing results. M budget: 1 MCHF	Distributed 2012-2016

Link to other WPs/activities: This WP is partly overlapping with WPs CTF3-000

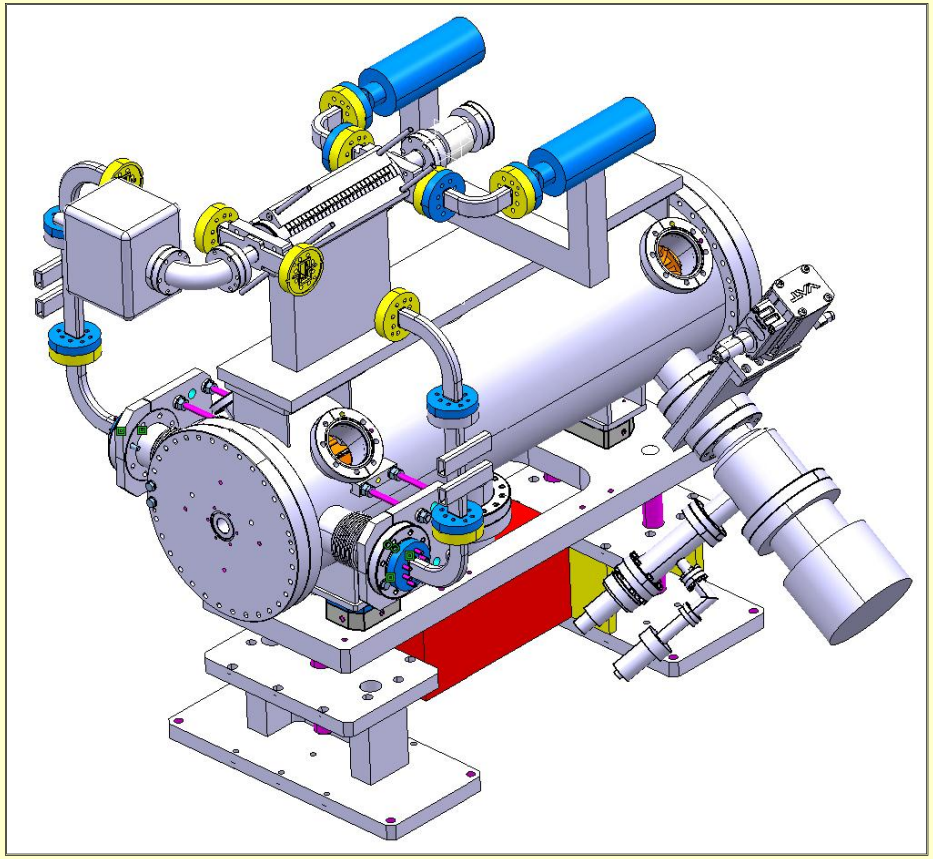
Lead collaborator(s): CERN: BE/RF, BE/BI, BE/ABP, BE/OP,

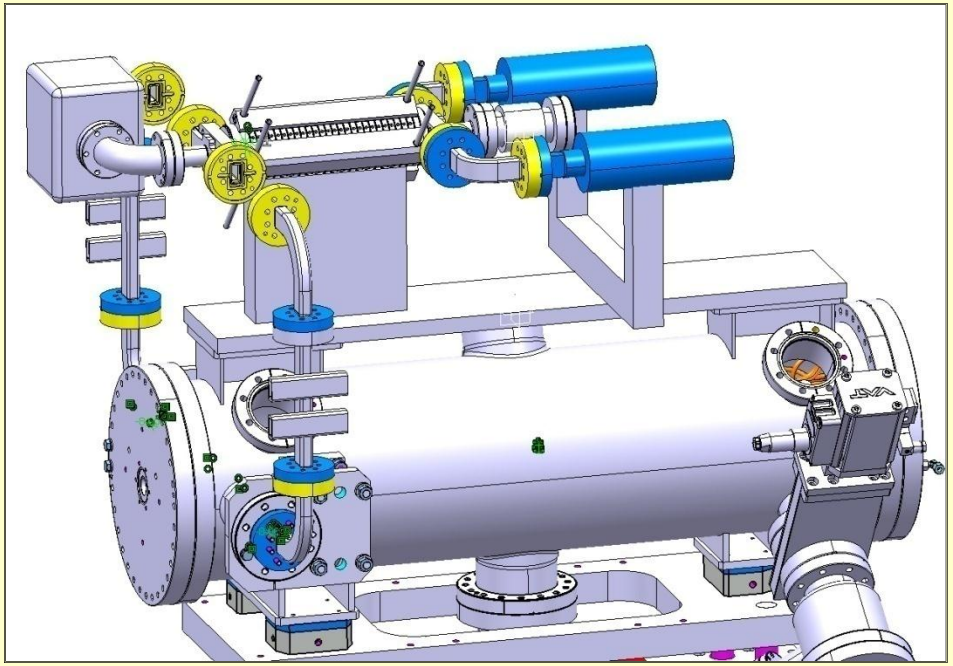
Resources:	2011	2012	2013	2014	2015	2016	Total
Material (kCHF):		950	950	200	200	200	2500
Personnel (FTE):		4	4	2	2	2	14

Resources comment: Material budget for full eight slots – (four slots ~1 MCHF less)

CTF3 future plans, TBL+

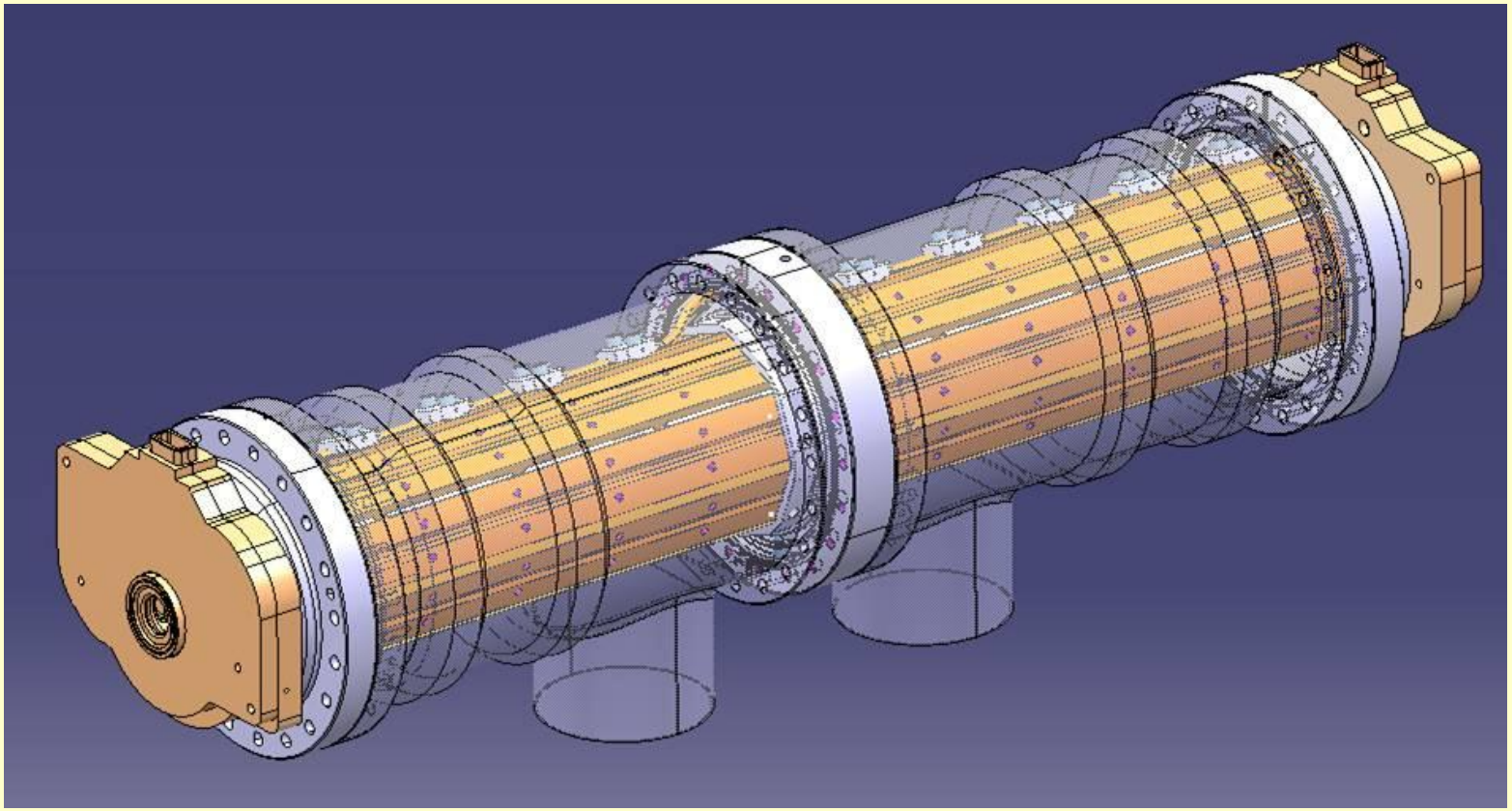
Using the TBL line for structure processing,
How could it look like, need modified tanks with an input coupler and testing infra structure (supports + waveguide components)





CTF3 future plans, TBL+

Modified tank with input coupler keeping 800 mm length PETS
'conceptual'



Plans for TBL beyond 2012

What can be done with TBL+

- **Develop conditioning scenario for CLIC**

  conditioning with beam / use of ON/OFF mechanism of PETS

  precondition with klystron and then with beam

  conditioning of PETS

- **Test bed for PETS development, ON/OFF, new designs, etc**
- **Power production as a function of beam parameters**

  alignment, stability, pulse shape, phase stability, beam loses, failure modes

- **Continue decelerator beam dynamics studies**

CLIC0-001

WP: CLIC0-001 Drive Beam Front-End	Purpose/Objectives/Goals: Assess CLIC drive beam injector/front-end performance, provide focus for development and industrialization of CLIC large series components (1 GHz MDKs and accelerating structures), constitute first building block of CLIC Zero (risk, cost)	Deliverables	Schedule
Design & preparation	Overall optimization of CLIC injector, study of implementation	Detailed design of facility, implementation plan	2012 – 4Q
Gun	Provide gun	Thermionic electron gun, HV deck and front-end controls M budget: 1 MCHF	2013 – 4Q
RF structures	Provide structures for bunching system and acceleration.	Three 500 MHz wide-band sub-harmonic bunchers, one single-cell pre-buncher, one travelling wave buncher, 6 (3) accelerating structures M budget: 1.7 MCHF (1 MCHF)	SHBs: 2014 – 2Q PB, buncher: 2014 – 4Q Structures: 2015 – 4Q
RF high-power system	Provide RF high-power system	500 MHz sources (TWTs?), 12 (Four) 15 MW 1 GHz Modulators-Klystrons, waveguide networks, operational support M budget: 16 MCHF (6 MCHF)	TWTs: 2014 – 2Q 2 MKS proto: 2014 – 4Q MKS series: 6 2015 – 4Q 6 in 2016 – 4Q
RF low-power system	Provide RF low-power system	low-power systems , 500 MHz and 1 GHz, timing system, diagnostics, operational support M budget: 1 MCHF (0.7 MCHF)	Protos: 2014- 2Q Series: 2015 – 4Q
Magnets	Provide magnets	Solenoids, quadrupoles (about 12), four bending magnets, H-V dipole correctors M budget: 2 MCHF	Solen./corr.: 2013 – 4Q Quadrupoles: 2015 – 4Q Bends: 2015 – 4Q

CLIC0-001

WP: CLIC0-001 Drive Beam Front-End **continued**	**Purpose/Objectives/Goals:** Assess CLIC drive beam injector performance, provide focus for development and industrialization of CLIC large series components (1 GHz MDKs and accelerating structures), constitute first building block of CLIC 0 (risk, cost)	**Deliverables**	**Schedule**
Diagnostics	Provide diagnostics	BPMs - electrostatic (~4), BPMs - magnetic (~ 5) - transverse profile monitors (3), time resolved energy spectrum measurement, operational support. M budget: 1.3 MCHF	BPM e: 2013 – 4Q BPM m: 2014 – 4Q Monitors: 2013 – 2015 Spectro: 2014 – 4Q
Controls	Provide controls	Injector control system, operational support. M budget: 1 MCHF	Distributed 2013 – 2016
Civil Engineering & infrastructure	Provide building and infrastructure	Shielded hall, Cooling and ventilation, electrical equipment, cabling. M budget: 4 MCHF	2013 – 4Q Cabling Distr. 2013 – 2016
Commissioning & operation	Provide commissioning and operation		Distributed 2012-2016

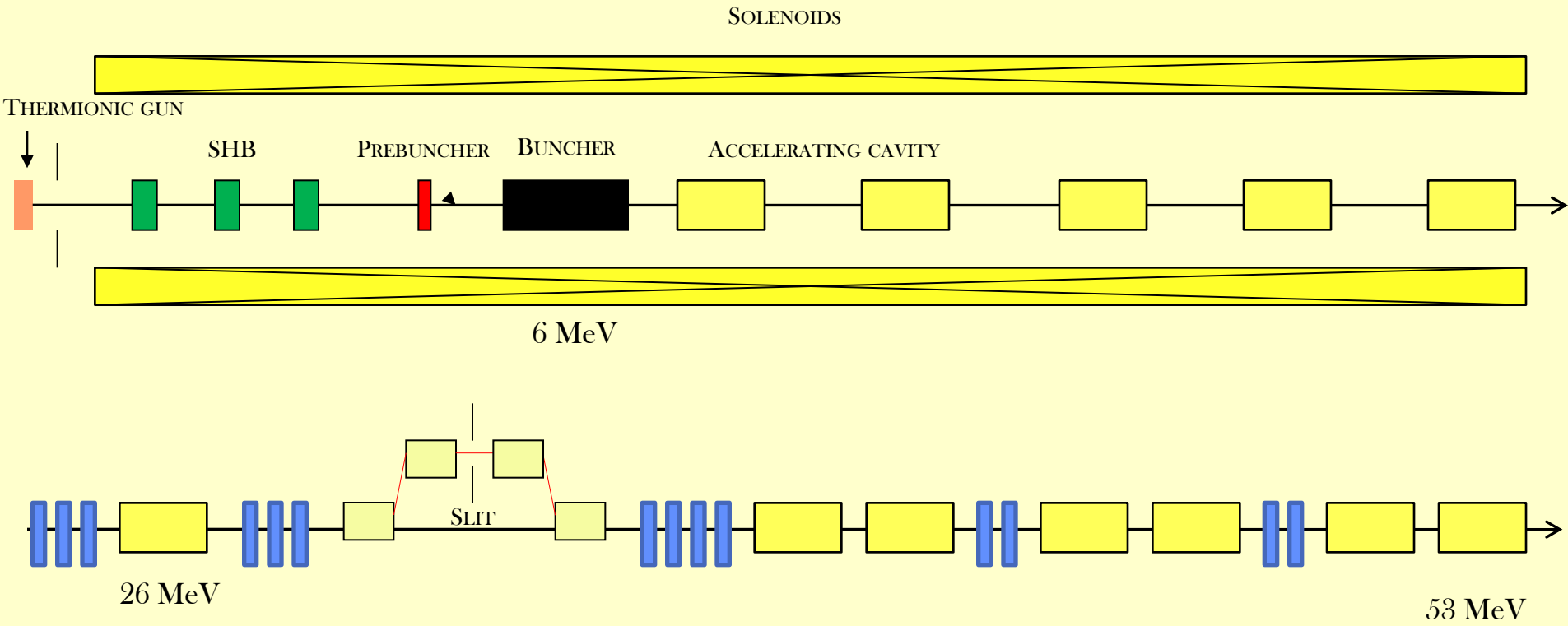
Link to other WPs/activities: This WP is linked to WP CTC-004

Lead collaborator(s): CERN: BE/RF, BE/BI, BE/ABP, BE/OP

Resources:	2011	2012	2013	2014	2015	2016	Total
Material (kCHF):		1000 **(500)**	4000 **(3000)**	8000 **(4750)**	9000 **(4750)**	8000 **(5000)**	30000 **(19000)**
Personnel (FTE):		5	10	15	20	20	70

Resources comment: technical manpower partly shared with CTF3

Future plans beyond CTF3
CLIC DB injector



Starting to build 'real' CLIC hardware with the right frequency and beam parameters

Test bed to develop, the 1 GHz power sources for the CLIC drive beam and to study the stability of the very long train

Very rough schedule

Task	2011	2012	2013	2014	2015	2016
Building	Identify building	prepare building +infrastructure	ready for first installations			
Gun	conceptual design	purchase gun and HV supply	Install and test	ready to use		
SHB Buncher	design	prototype	fabrication	installation		
500 MHz power source	Identify	purchase power source	reception	installation		
Buncher	design	design + purchase	fabrication	installation		
1 GHz structure	design	design + purchase	prototype+ fabrication	test prototype+series production		
Solenoids		design + purchase	fabrication	installation		
Quads+Dipoles		design + purchase	fabrication	ready to install		
Vacuum system		design + purchase	fabrication	installation		
Diagnostis		specs+design	fabrication	installation		
Controls		specs+design	preparation	installation		
LLRF		specs+design	fabrication	installation		
1 GHz klystrons	specification	purchase prototype	fabrication	Receive 1st prototype	Klystron 2+3	Klystron 4+5
1 GHz Modulator	specifiactions	purchase first MDK	fabrication	Receive 1st MD	MD 2+3	MD 4+5
			GUN	GUN + bunching system	7 MeV linac	13 MeV linac

CLIC01-002

WP: CLIC0-002 Drive Beam photo-injector option	Purpose/Objectives/Goals: Assess potential of photo-injector option as alternative for the CLIC drive beam front-end	Deliverables	Schedule
Laser and photocathode development	Continue working with PHIN set up, study increased bunch charge and cathode lifetime issues Try to generate CLIC-like laser pulses to study average power and train stability issues. Work on alternative (green) cathodes.	Reports	PHIN, 2012-2014 Laser, 2012-2014
RF & beam dynamics studies	Design 1 GHz RF gun, study of beam loading, beam dynamics, vacuum and cooling Option: build and test RF gun ? Resources not included…	Report	2012-2016

Link to other WPs/activities: This WP is linked to WP CLIC0-001

Lead collaborator(s): CERN: EN/STI, BE/RF, BE/BI, BE/ABP, BE/OP

Resources:	2011	2012	2013	2014	2015	2016	Total
Material (kCHF):		300	300	300	300	300	1500
Personnel (FTE):		2	2	2	2	2	10

Resources comment: Need review/discussion with EN/STI. Resources only for basic program – no RF gun + parallel installation in front-end

Need to provide laser operation and maintenance for CALIFES (operational budget)

Photo injector option

Advantages

- No satellites or tails, phase coding on the laser side
- No or less bunching needed, possibly better emittance
- Flexible time structure

Concerns

- Cathode lifetime
- Challenging laser, peak and average po
- Intensity stability
- Maintenance and operation