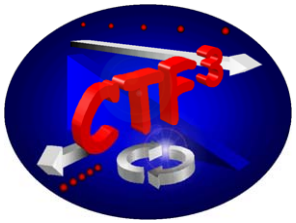
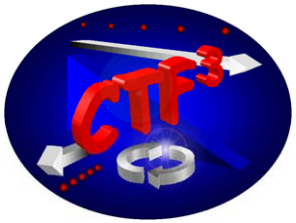


Status of CTF3

G.Geschonke
CERN

Welcome / news



Meeting programme:

report ongoing work

new:
- Review of existing hardware
- What do we need to demonstrate for CLIC technology by 2010?
- Upgrade possibilities

Not all partners present their work:

Turkey: change focus, because operation is now from CCC

Pakistan: beam diagnostic equipment

Russia IAP JINR : wiggler, fatigue tests

PSI: stand-alone x-band power source, PhD student

UK: ITB removed from FP7, work on radiation effects

News

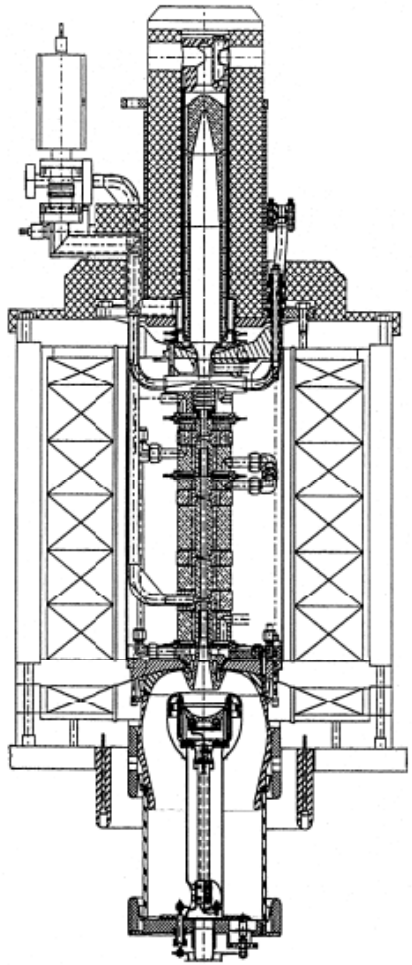
12 GHz stand-alone power source approved

klystron being ordered

Operating April 09 (at the earliest)

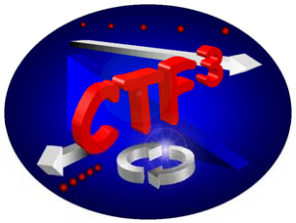
Independent 24/7 testing with fast turn around
Variable pulse length
High repetition rate
Easier to operate

30 GHz programme nevertheless continues in 2008



Derived from NLC 11.4 GHz klystron

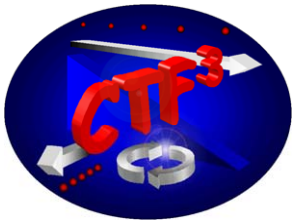
News



news from CERN:
"White Paper" has been approved by Council

		2008	2009	2010	Total
Material budget (kCHF)	**Present MTP**	**4180**	**3550**	**3500**	**11230**
	Additional LTP (White Paper)	**4000**	**4000**	**4000**	**12000**
	12 GHz power test stand	**1050**	**1350**	**100**	**2500**
	Total resources	**9230**	**8900**	**7600**	**25730**
Man-Power (kCHF/FTE)	**Present MTP (175 kCHF/FTE)**	**8480/48.5**	**5355/30.6**	**5565/31.8**	**19400/110.9**
	Add. White Paper (125 kCHF/FTE)	**1250/10**	**3250/26**	**3000/24**	**7500/60**
	12 GHz test stand	**375/3**	**250/2**	**125/1**	**750/6**
	Total resources	**10105/61.5**	**8855/58.6**	**8690/56.8**	**27650/176.9**
	Present staff (APT)	**6055/33**	**6145/33**	**5923/31**	**18123/97**
	New staff position	**4050/28.5**	**2710/25.6**	**2767/25.8**	**9527/79.9**

Collaborating institutes



Countries	*Funding Agencies*	*Laboratory*
	CERN	CERN
FINLAND		Helsinki Inst of Phys (HIP)
FRANCE	CEA	DAPNIA Saclay
	CNRS/IN2P3	LAL
		LAPP
		LURE
INDIA*	Indian DAE	RRCAT, Indore
ITALY	INFN	LNF
PAKISTAN	PAEC	NCP
RUSSIA		Budker Inst (BINP)
		IAP
	Dubna	JINR
SPAIN	Ministry of Education & Science (MEC)	CIEMAT
		UPC
		IFIC
SWEDEN	Swedish Research Council Wallenberg Foundation	Uppsala University
		TSL
SWITZERLAND		Paul Scherrer Inst (PSI)
TURKEY		Ankara Univ Group (2)
UNITED KINGDOM	STFC	J.Adams Institute
USA	DOE	Northwestern Univ Illinois (NWU)
		SLAC
		JLAB

18 members involving 24 Institutes

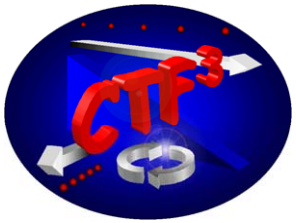
3 new institutes

* India and Pakistan have not signed the CTF3 MoU, but have an agreement with CERN

Discussions with : UK (Cockcroft Institute), EPFL, INFN Milan, Ukraine, Oslo

Past collaboration with RAL within PHIN

Collaboration issues



In its last meeting on June 22. the CTF3 collaboration Board
has approved to extend the CTF3 collaboration to the whole of CLIC.

CLIC machine Advisory Committee has been installed (ACE)

ACE reports to DG and Collaboration Board.

(T. Raubenheimer (SLAC, Chair), M. Huening (DESY),
A.Mosnier (CEA), V. Shiltsev (FERMILAB), L. Evans (CERN),
T. Shintake (RIKEN/Harima Inst), P.Raimondi/INFN , N.Toge/KEK.)

first meeting in June, 20 – 22. 2007

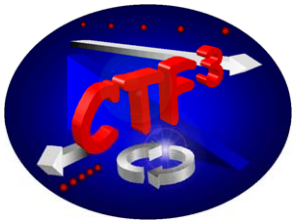
CTF3 – CLIC Test Facility

- CTF3 will demonstrate critical part the CLIC concept
- Very impressive facility!
  - Will be largest LC test facility constructed
  - Already demonstrated many critical issues
    - Heavily loaded acceleration
    - Delay loop and recombination
    - Commissioning combiner ring
  - Need to ensure this is an operational facility not just a test demonstration
    - Reliable routine operation with stable beams
  - Two significant differences:
    - Average power and pulse length
    - Need to consider how to deal with these
- Clearly need additional support to finish and operate facility

Final Comments

- Very impressed with CLIC effort
  - Large amount of progress over the last decade
  - Has the potential to offer a real path to multi-TeV e+/e- LC
- CTF3 will demonstrate most of the critical issues
  - Potential to create an 800 MeV test linac using CTF3 TBL
    - Clearly needed for TDR but likely possible well before
- Like to have the next meeting focused on the structure and PETS development program
  - Dates TBD but probably January
- Excellent presentations
  - Thanks to all participants (extra thanks to Sonia!)

More CLIC ACE comments on CTF3



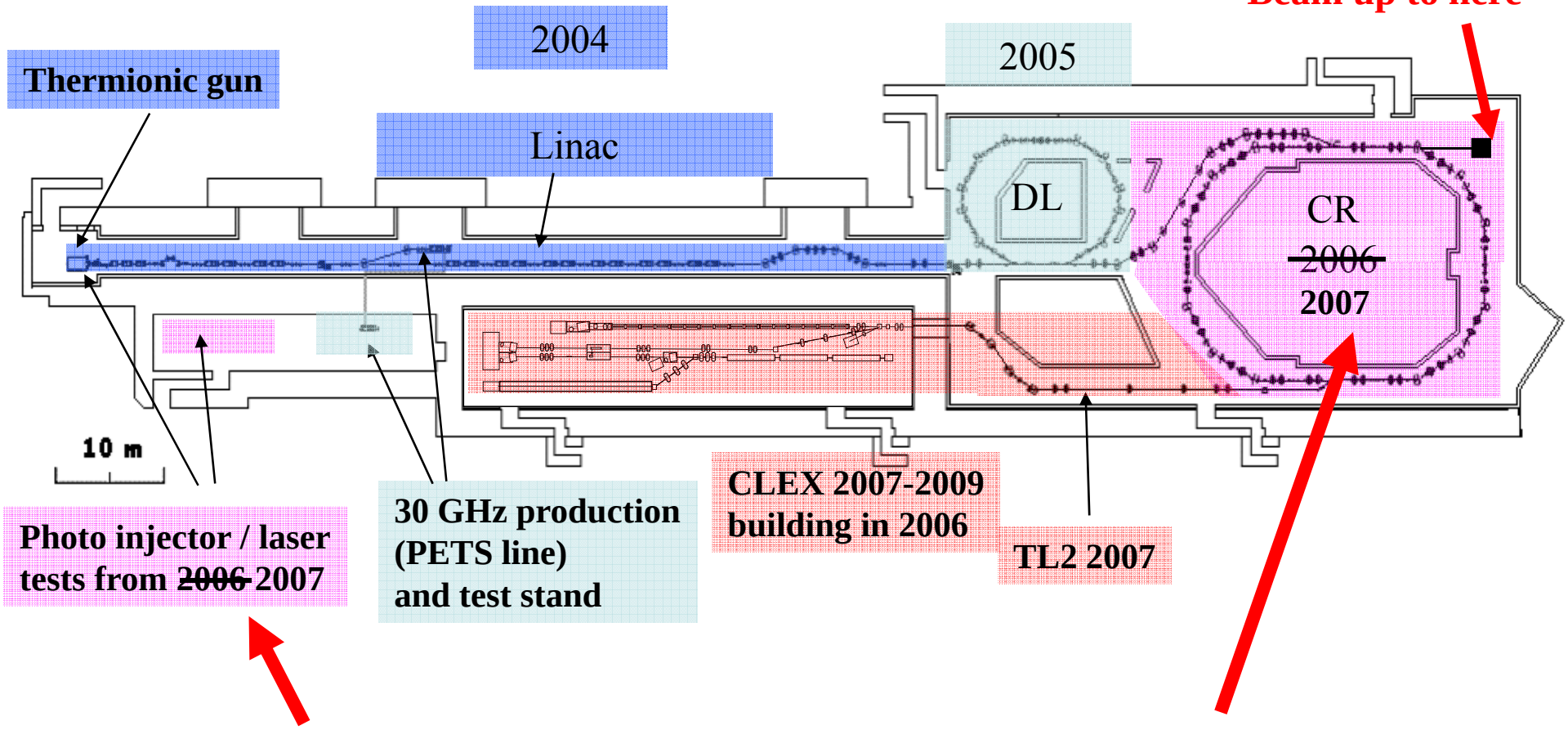
....The facility should also be used to demonstrate the drive beam stability which is necessary for reliable operation of a CLIC linear collider. On a longer timescale, the committee thought it important to develop plans for a significant two-beam accelerator demonstration; connecting the multiple PETS which are planned for the CTF-3 to accelerator structures could provide roughly 1 GeV of acceleration .....

.....In particular, the low beam energy may make it impossible to reach the CLIC goal of converting 90% of the beam energy into rf power; the present goal for the CTF-3 is beam→rf 50% conversion. Simulations studies should be performed and operational considerations should be given to such implementation specific limitations.

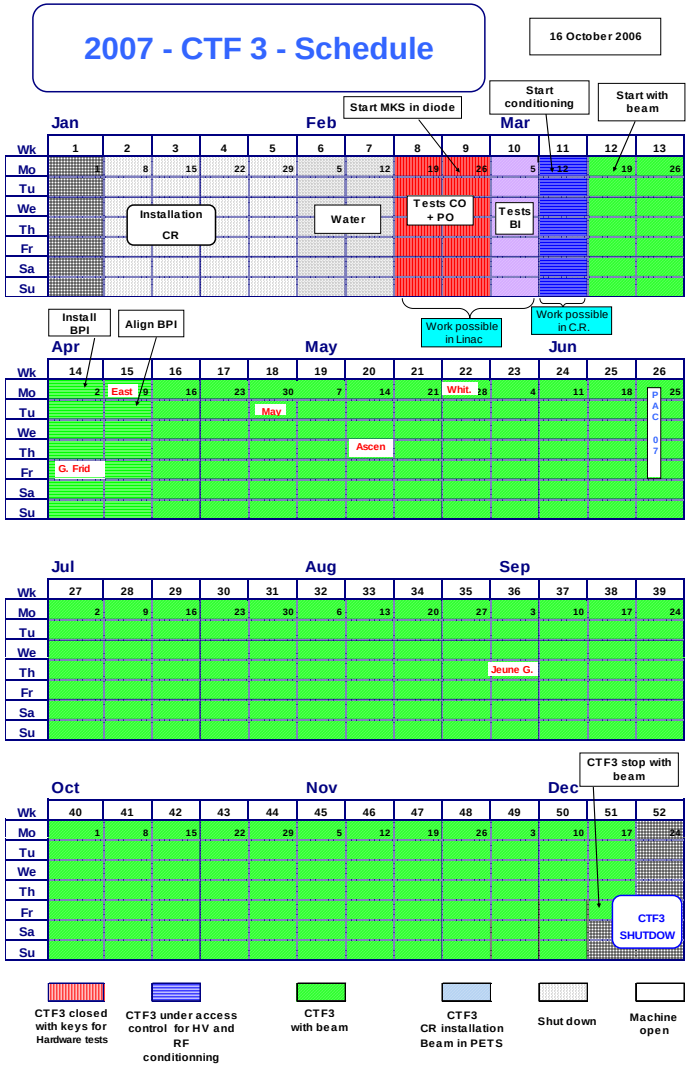
..... The CLIC drive beam has a current of roughly **100 Amps**, a pulse length of 300 ns, and an energy of roughly 2.5 GeV, while CTF-3 will operate with roughly **35 Amps**, 140 ns, and an energy of **100 MeV**. Since CTF-3 will likely be the only two-beam accelerator demonstration on the CLIC CDR timescale, it is important to **understand how to interpret the results**

.....Finally, the committee felt that the CTF-3 should be designed with sufficient overhead to test rf components well beyond the nominal design parameters.

Conclusion of Jan 2007 meeting



Plan for 2007



Install vacuum system for Combiner Ring ✓

start with beam 2. half March,
Commission Combiner Ring operation ✓

operate for 30 GHz production
like in 2006:
nights and weekends, supervised by CCC
full-time during installation of TL2 ✓

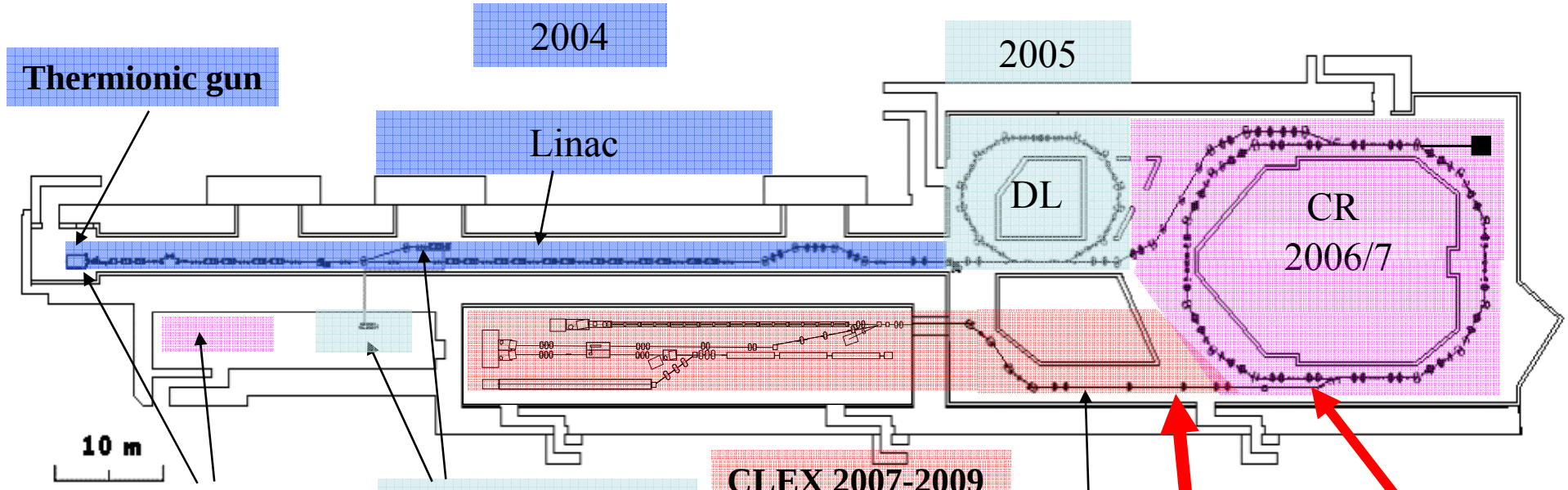
Install TL2:

- Finish optics, detailed layout ✓
- produce all vacuum elements **- ongoing**
- produce magnets, power converters **-ongoing**

Very ambitious, spill over into 2008 ? ✓

Install equipment in CLEX from May 2007 ✓

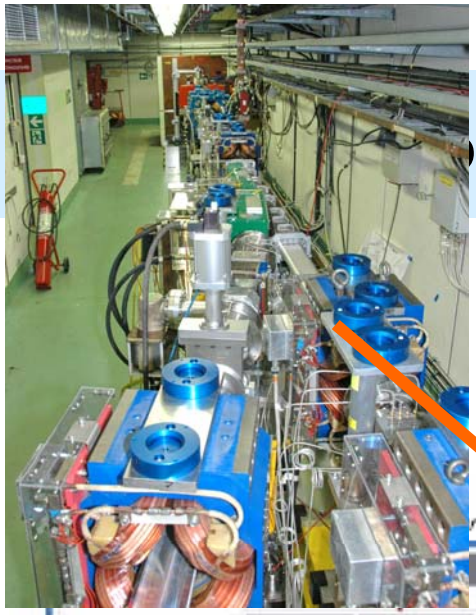
Present CTF3 status

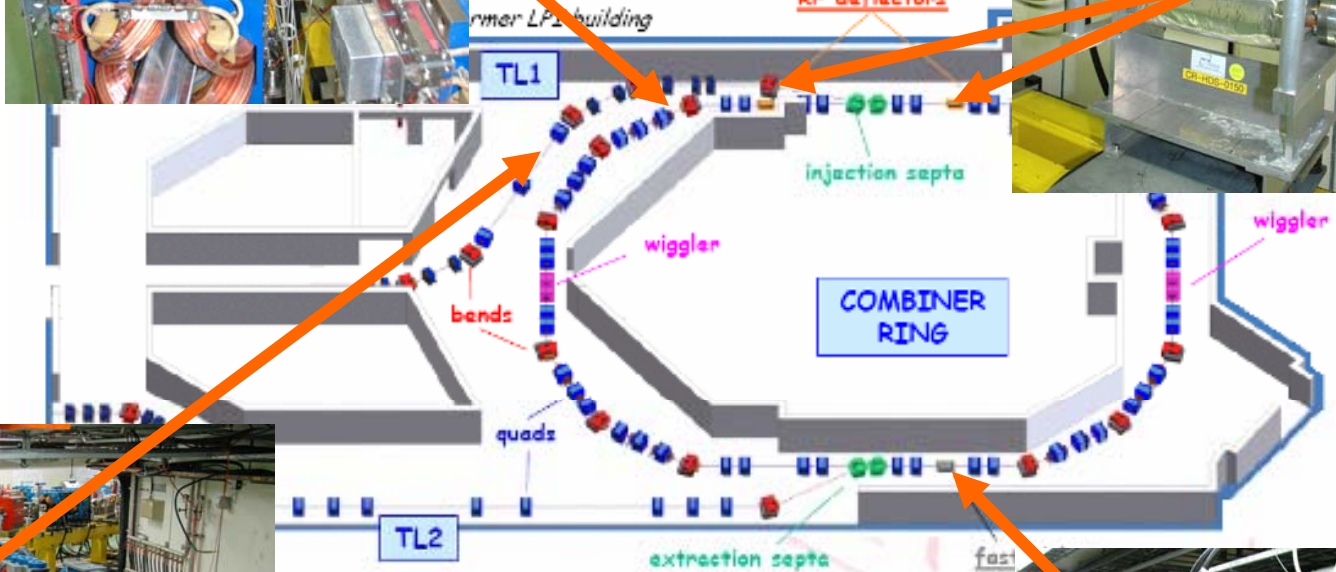


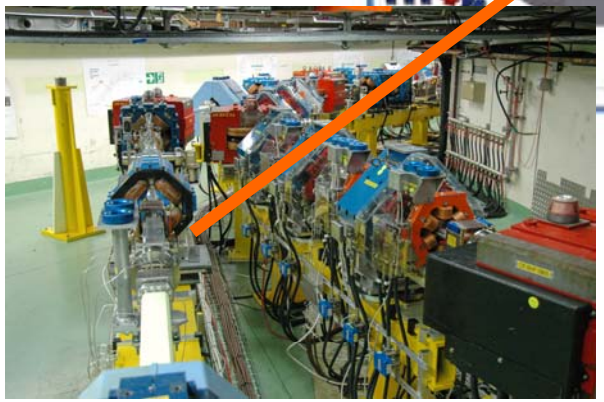
Laser at CERN, not finished
RF gun under construction

TL2 / TL2' installation ongoing, commissioning start in April 2008

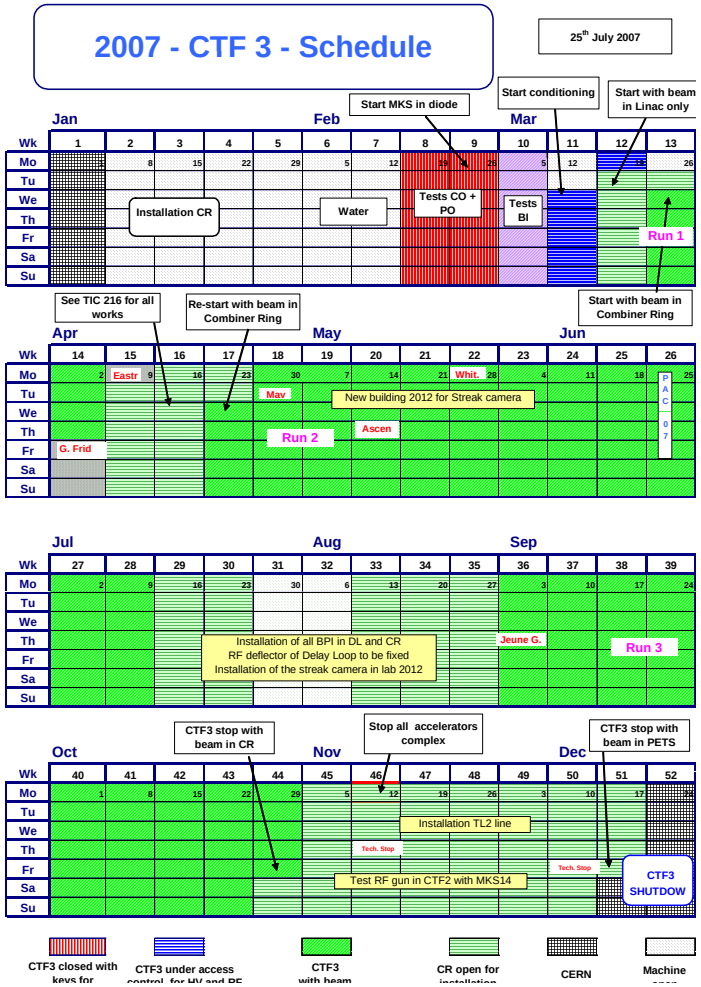
biner Ring




RF deflectors
TL1
injection septa
wiggler
wiggler
bends
COMBINER
RING
quads
TL2
extraction septa



Operation 2007

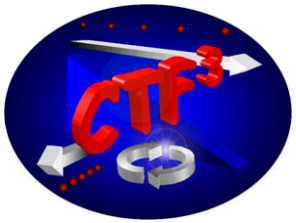


commissioning of CR:
a bumpy start with many problems,
optics studies,
finally good result.

challenging new instability discovered,
possible explanation: see D. Alesini
Delay Loop not used

Operation for 30 GHz:
at nights and weekends, finally share with commissioning in bigger blocks

Operation 2007



- teething problems with modifications to the controls system (improved during the year)

- vacuum leak in dog-leg, ➔ **chamber to be replaced in shut-down**

- two vacuum leaks after injector in vacuum bellows
  cause: dark current from gun?

- two cathodes had to be exchanged
  problems with gun electronics, unstable operation ➔ **consolidate gun**

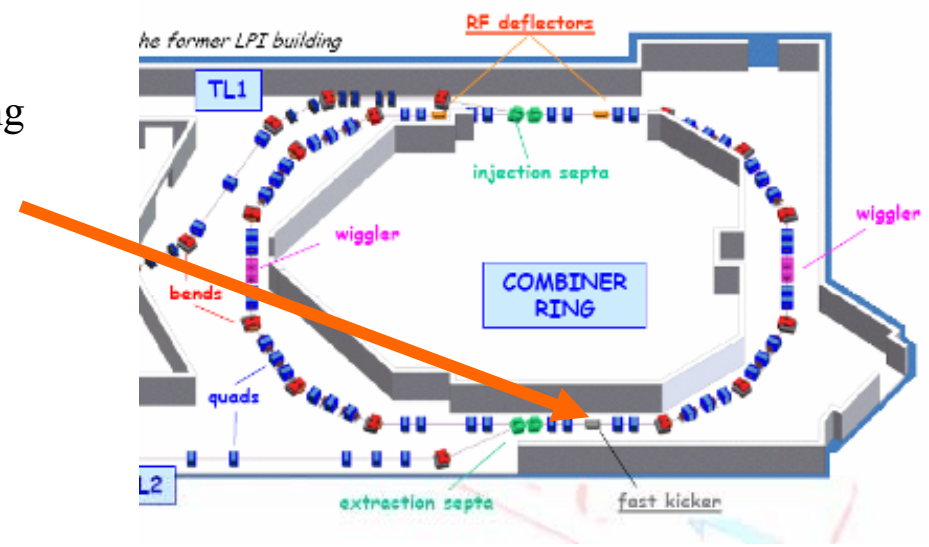
- RF power sources:
  three klystrons needed replacement
  several charging power supplies failed ➔ **new supplies**
  lower beam energy

Ongoing work: Combiner Ring

new extraction kicker for Combiner Ring
(lower impedance):

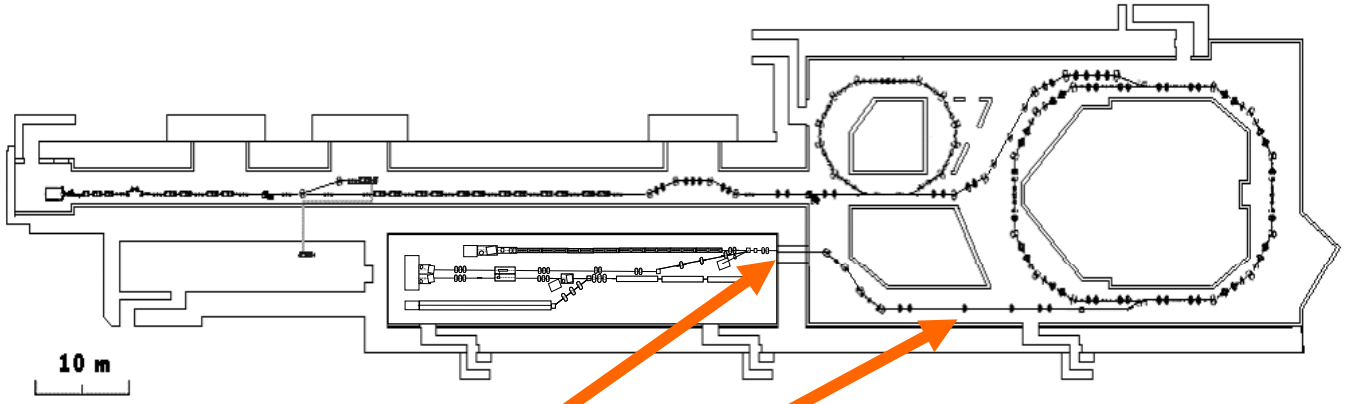
Stripline kicker made by Ciemat,
pulser from CERN

will be installed during this shut-down



Large campaign to align Beam Position Monitors
during this shut-down

Work for the next phase



Optics for TL2 (RRCAT)
Optics for TL2' (CERN)

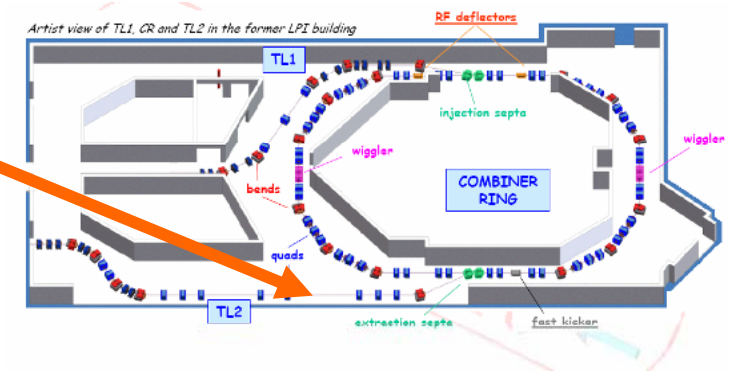
detailed layout TL2 and TL2' finished,

all components ordered
- magnets : RRCAT, TSL, CERN
- vacuum components: AL chambers: RRCAT
  Special components: LNF, CERN
  Stainless steel chambers: CERN
- Beam diagnostics: CERN, LNF, LAPP

Work for next phase

Tail Clipper

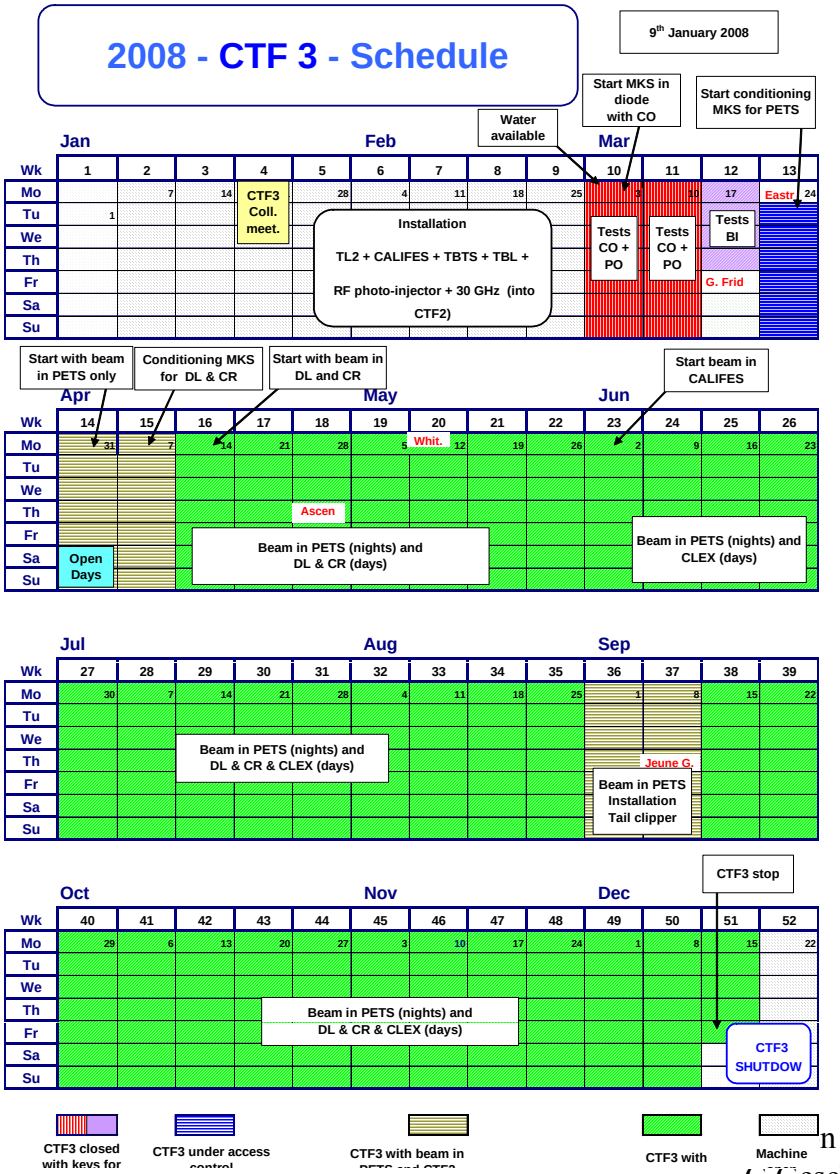
change length of bunch train going into CLEX
with fast transverse kickers – collimator/dump



Strip-line kickers from CIEMAT,
pulser: collaboration CIEMAT-CERN

Collimator / dump (CERN):
serves also as safety element to inhibit beam into CLEX

Operation in 2008

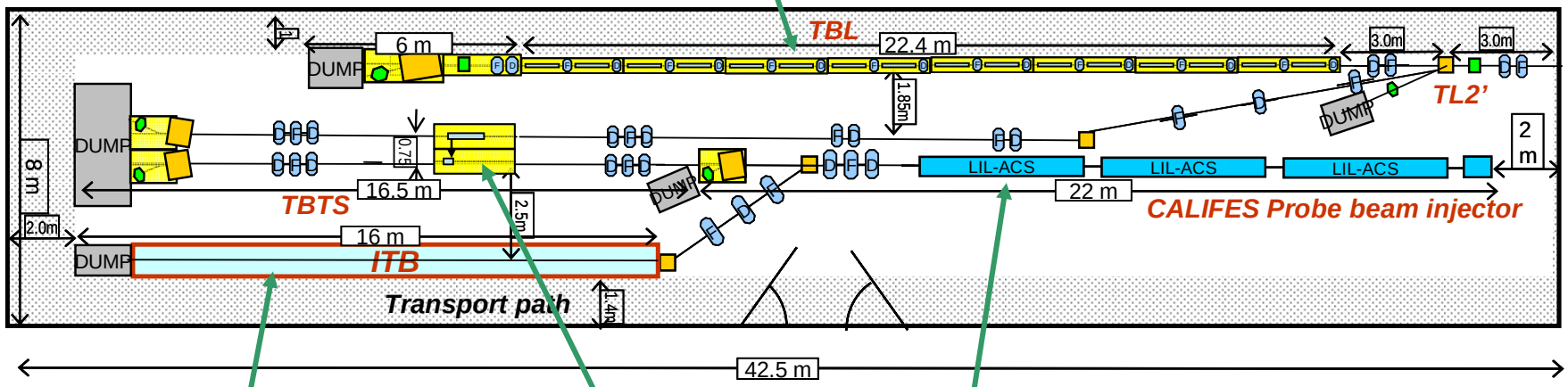


Operation all year,
one stop foreseen: Installation of tail clipper and collimator / dump
in September

30 GHz production will continue in 2008

Ongoing work in CLEX (2007 and later)

CIEMAT magnet movers, PETS prototype,(+ series ????), PETS tank (series ???)
UPC & IFIC : BPM development + electronics (series ???)
CERN overall responsibility, optics, RF equipment, diagnostics, infrastructure, quadrupoles ???



Instrumentation Test Beam Line
not presently funded
(FP7 GADGET proposal)

Uppsala University Two Beam Test Stand
CERN PETS and Accelerating structure

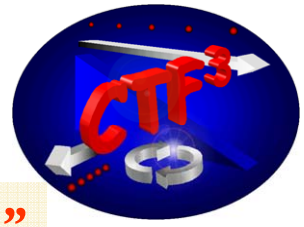
CEA Dapnia Saclay overall responsibility
CERN
CEA laser beam line, laser beam conditioning
LAL RF gun for photo injector

Pakistan: stainless steel vacuum components + ???
Iran: RF + Beam dynamics simulations

X bu

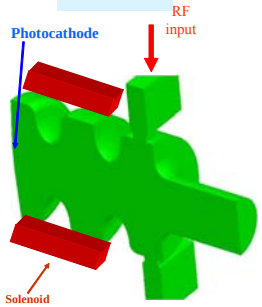
Construction on schedule
Equipment installation from May 2007,
Beam foreseen from April/May 2008

Photo Injector



smaller emittance, faster phase coding, no "satellite bunches"

LAL

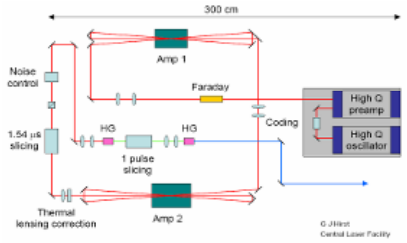


CERN

Cs_2Te photo cathode
3% QE
40 hours life time
pulse train: 1.5 µs,
charge per bunch: 2.33 nC
bunch spacing 0.67 ns
number of bunches: 2332

RAL

diode pumped
Nd:YLF laser
10 µJ IR / bunch
0.37 µJ UV on
cathode /bunch



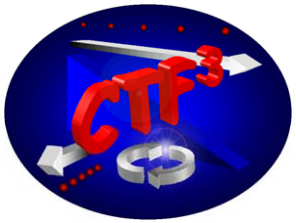
Present status: RF gun under construction,
Laser at CERN, needs to be finished
strong involvement from CERN, INFN Frascati and Milan

Phase 1:
off-line testing from 2008
test stand being built in CTF2

Phase 2:
Gun in CTF3: ?????
base-line optics has been prepared

Laser is needed also for CALIFES injector !

Conclusion



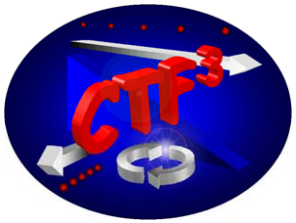
Programme basically on schedule:

- **Commissioning of Combiner Ring has started**
- **TL2 and TL2' will be completed in spring 2008**
- **CLEX : Califes and Two-Beam Test Stand will become operational in spring 2008**

The first cell of TBL will be available in first half of 2008

The other 15 cells of TBL are still missing

Conclusions



Exciting year ahead for operation:

- **Commission Combiner Ring,**
- **Full bunch combination with phase-coding, Delay Loop and Combiner Ring**
- **Commission TL2, TL2'**
- **Commission Two-Beam Test Stand incl. PETS tests**
- **Commission Califes**
- **Qualify TBL PETS**

****** Consolidate some critical equipment ******

Very good perspectives to meet our goals in 2010

Highly motivated team,
excellent collaboration between all partners