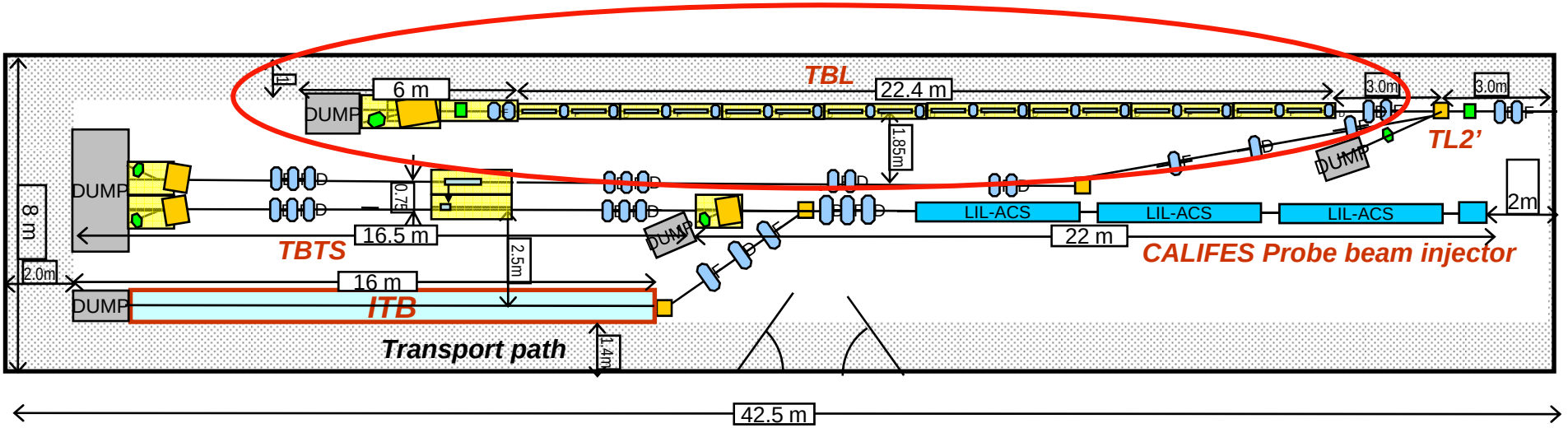
Status of the Test Beam Line



Goals and Requirements

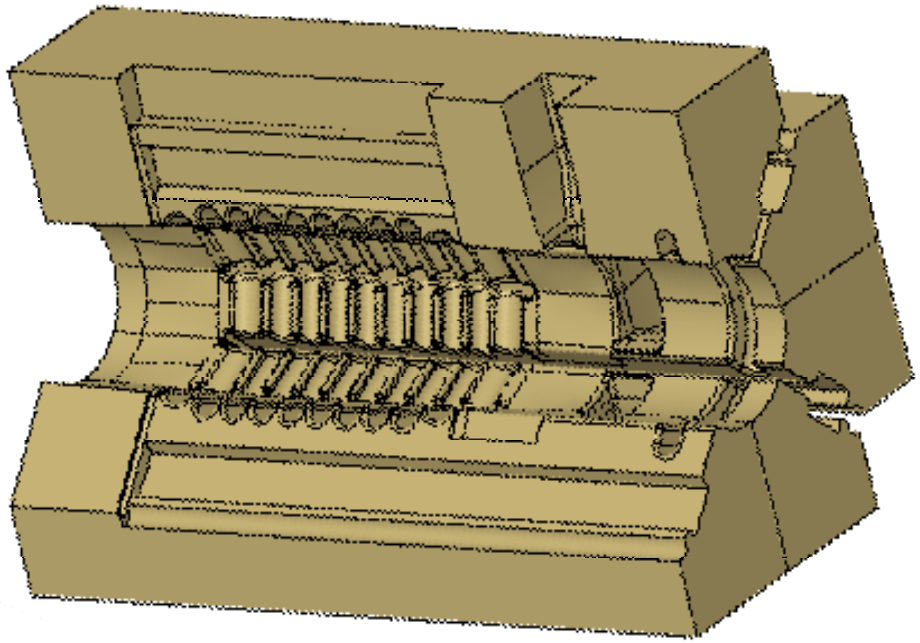
- High energy spread beam transport, low losses
  (Bench mark simulations)
- RF Power Production, Stability
  (End Energy <50%, 2.6 GW of RF power)
- Alignment (Test procedures for BBA)
  100 microns alignment for PETS, test of CLIC alignment equipment)
- Drive Beam Stability, Wake fields
  (no direct measurement of the wake fields)
- 'Realistic' show case of a CLIC decelerator
- Industrialization of complicated RF components

TBL-PETS Design

Aperture: 23 mm

5.1 MV/m deceleration (30 A)

150 MV output Power



Frequency, GHz	11.9954
R/Q, Ω	2030
V group/ *C*	0.477
Q factor	7440

TBL (12 GHz ; 30 A; 23 mm aperture)

Energy loss only

ε = 150 μm

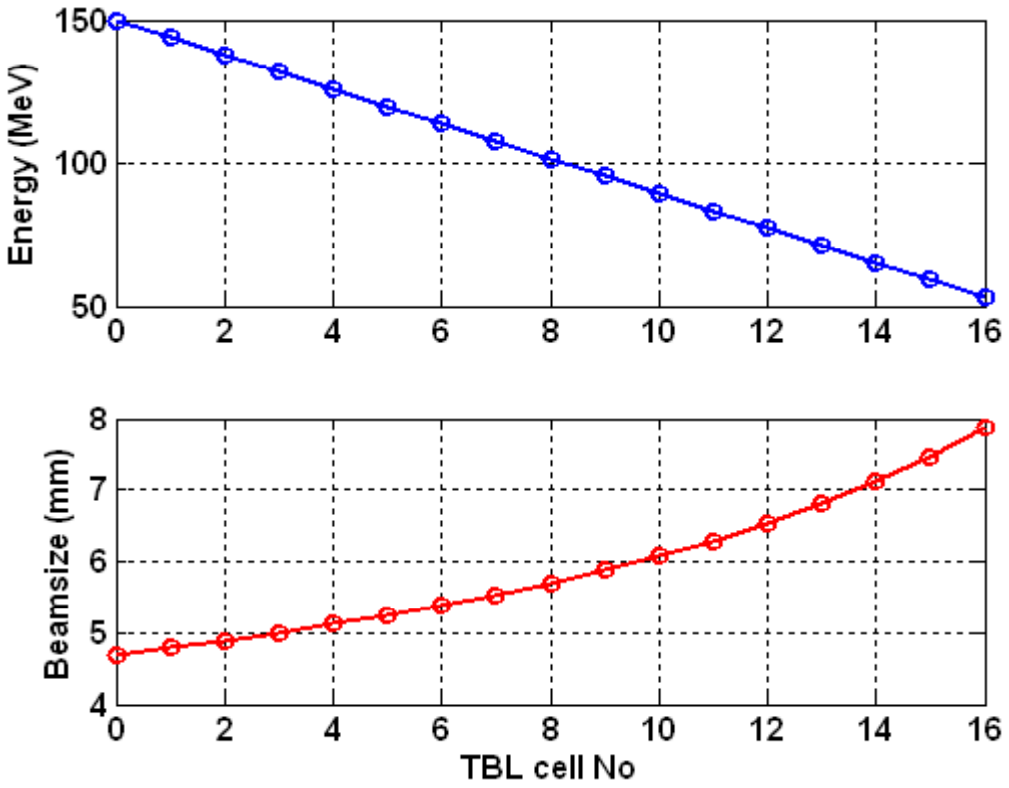
E = 150 MeV

I = 30 A

ΔE = 0.17*I

cell = 1.4 m

β = cell*(2+sqrt(2))



I = 35 A

P = 3.3 GW

W_{ext} = 64 %

I = 30 A

P = 2.4 GW

W_{ext} = 55 %

I = 25 A

P = 1.7 GW

W_{ext} = 45 %

CLIC Decelerator vs TBL

CLIC

E = 2.37 GeV

I ~ 80 A

P/pets ~ 140 MW

W_{ext} = 90 %

TBL

E = 0.15 GeV

I = 30 A

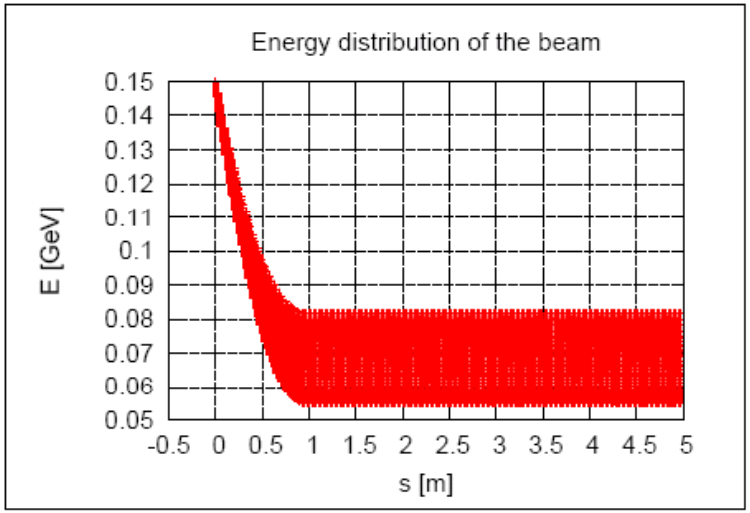
P/pets = 150 MW

W_{ext} = 55 % (16 cells)

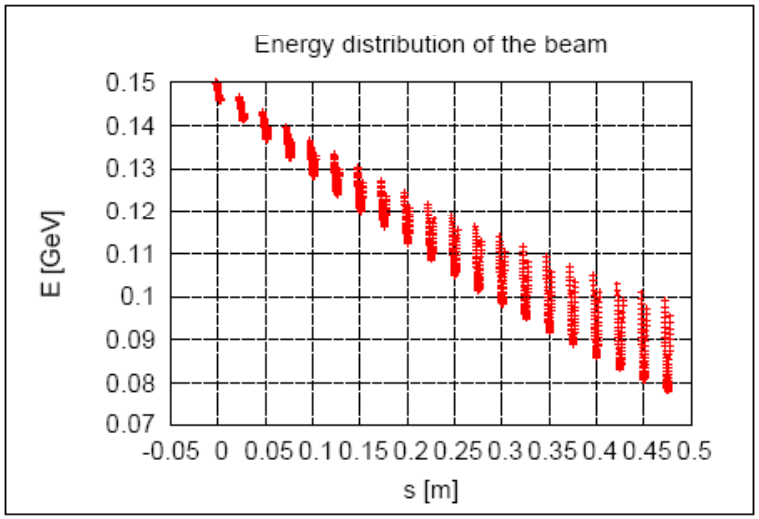
Very similar PETS for both machines (only length is different),
30 A needed to produce nominal Power/PETS

W_{ext} = 80 % (23 cells) might be possible with some beam improvements
and perfect compensation of wakefield effects

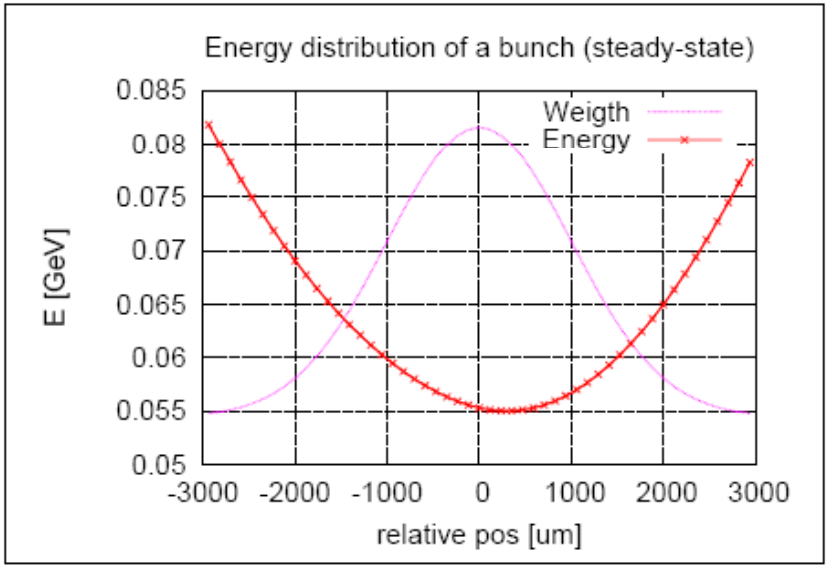
TBL beam dynamics highlights



Beam energy after lattice



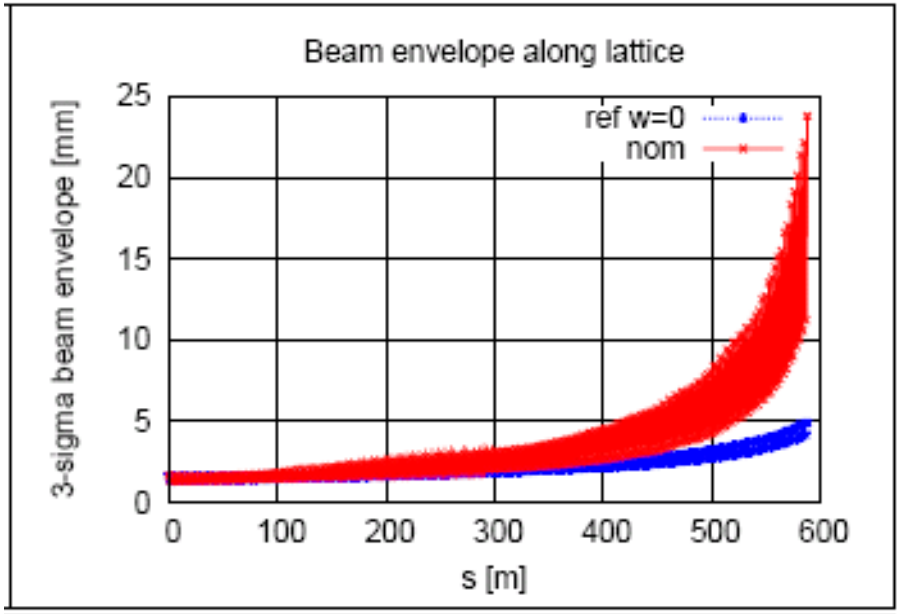
Beam energy after lattice



Steady state bunch energy profile

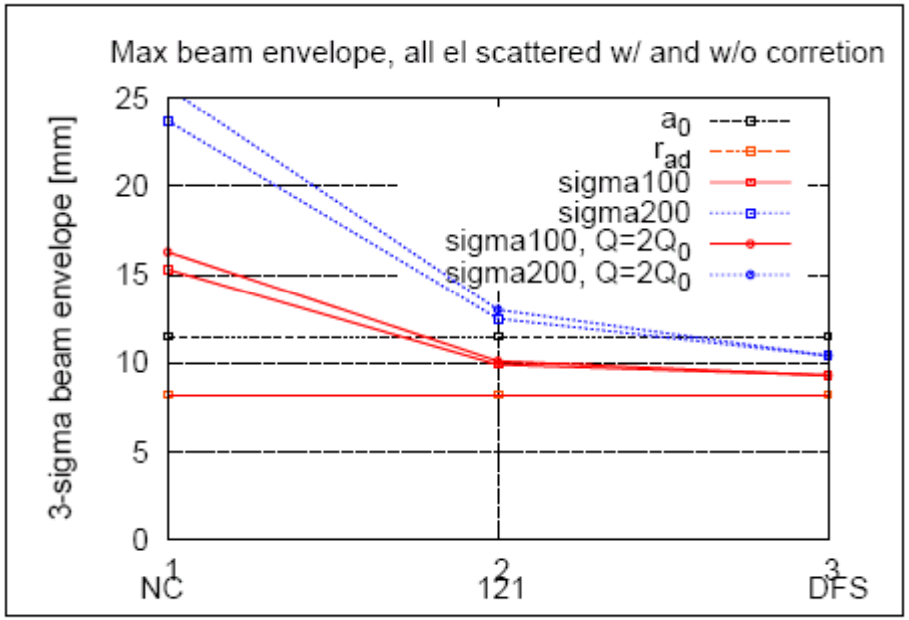
TBL beam dynamics highlights

Wakefield effects



7A, Q=1.5Q$_0$ (1.5m, no detuning): $r = 23.8mm$

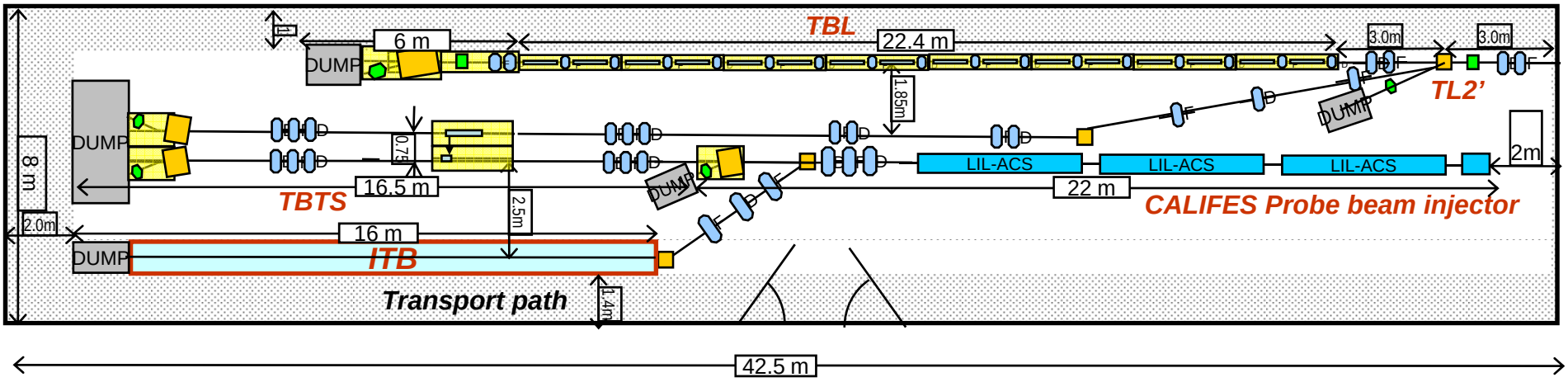
Misalignment and correction



Total 3-sigma enevelope, all elements scattered

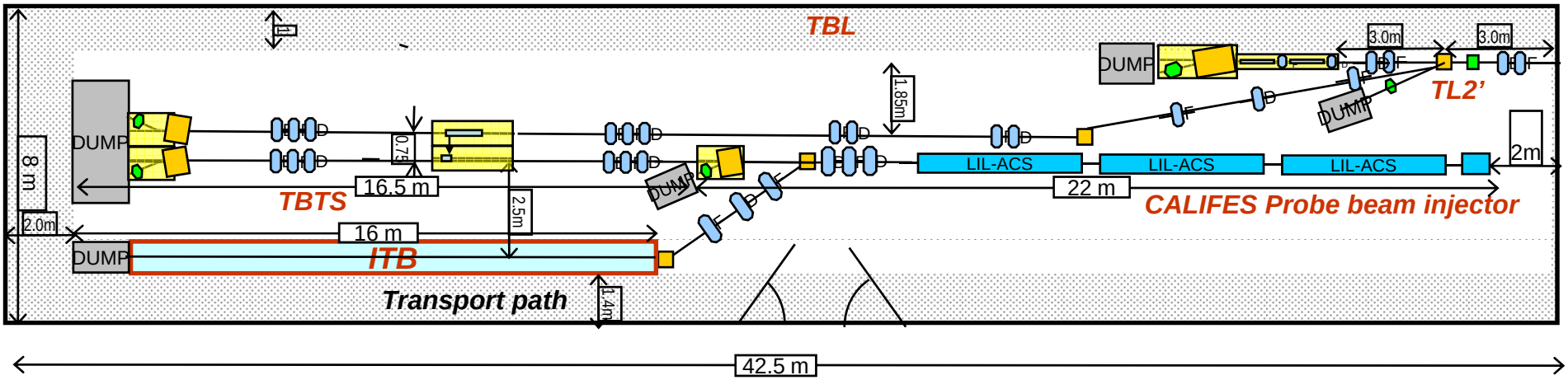
Status 01/2007

- o We have a conceptual design including schedule and cost
  (See CTF3-Note-076)
- o New TBL-PETS frequency will be 12 GHz
  (this decision makes the TBL-experiment more relevant for CLIC)
- o Detailed simulations started (see Erik's talk)
- o Design and Prototyping of key components started
  (BPM, Movers and PETS)



Reduced plans for shutdown 2007/2008

- Because budget constraints revised plan necessary
- Only one module to test the prototype elements



TBL-cell

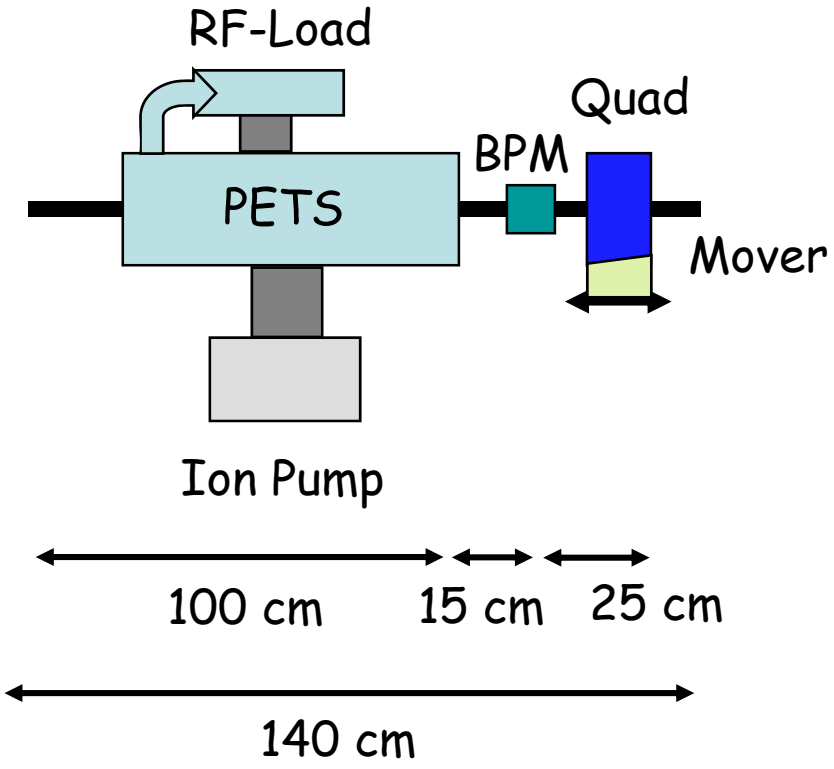
TBL cell length 140 cm

PETS: active length max 80 cm

16 cells planned = 22.4 m

23 mm aperture in PETS

24 mm max in Quads/BPM's



FODO lattice:

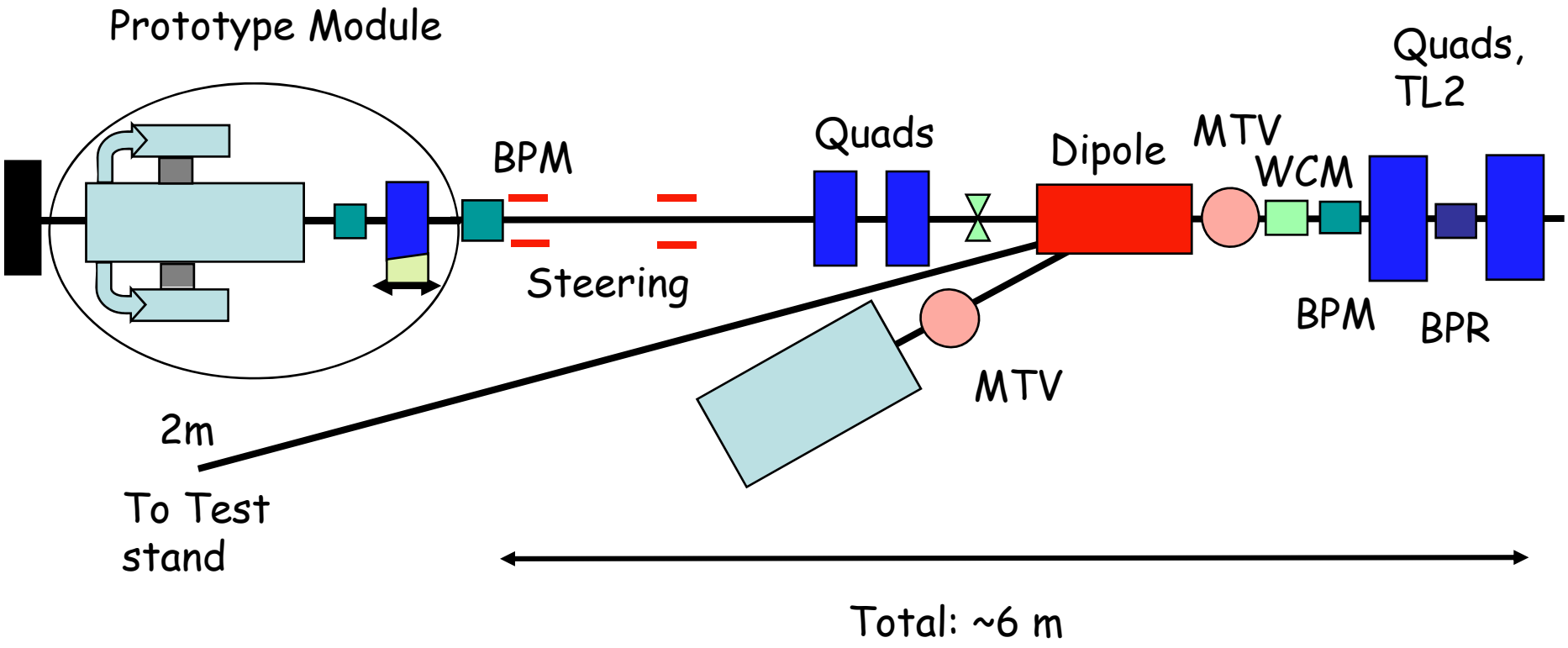
β-max = 4.72 m

β-min= 0.83 m

μ-cell = 90 deg

TBL

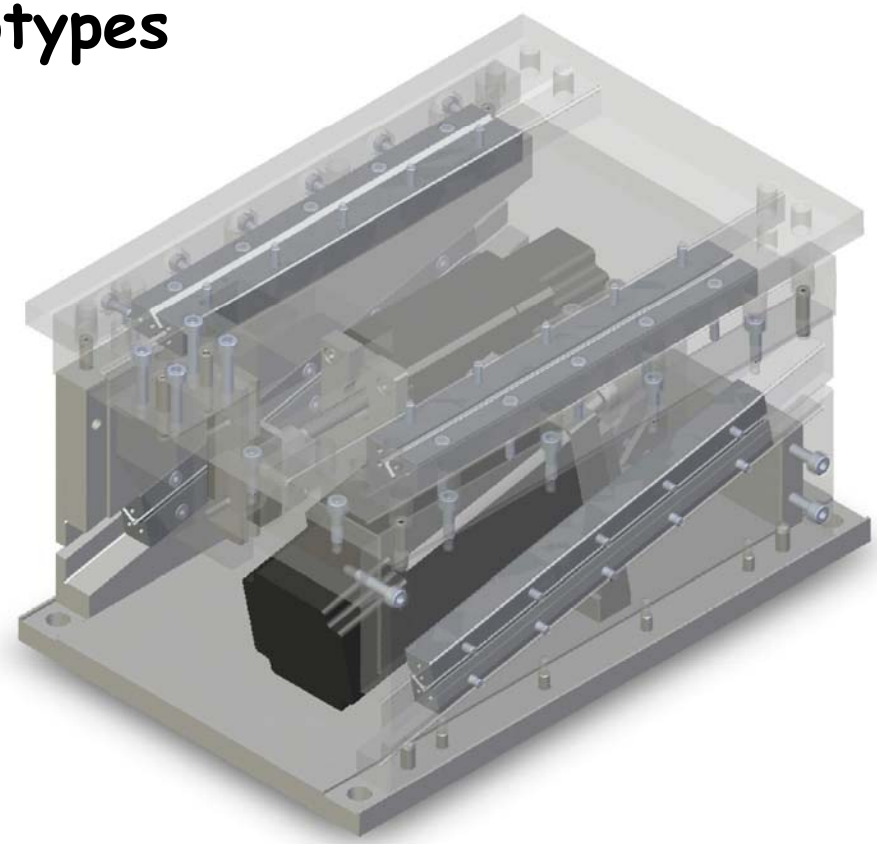
2007/2008



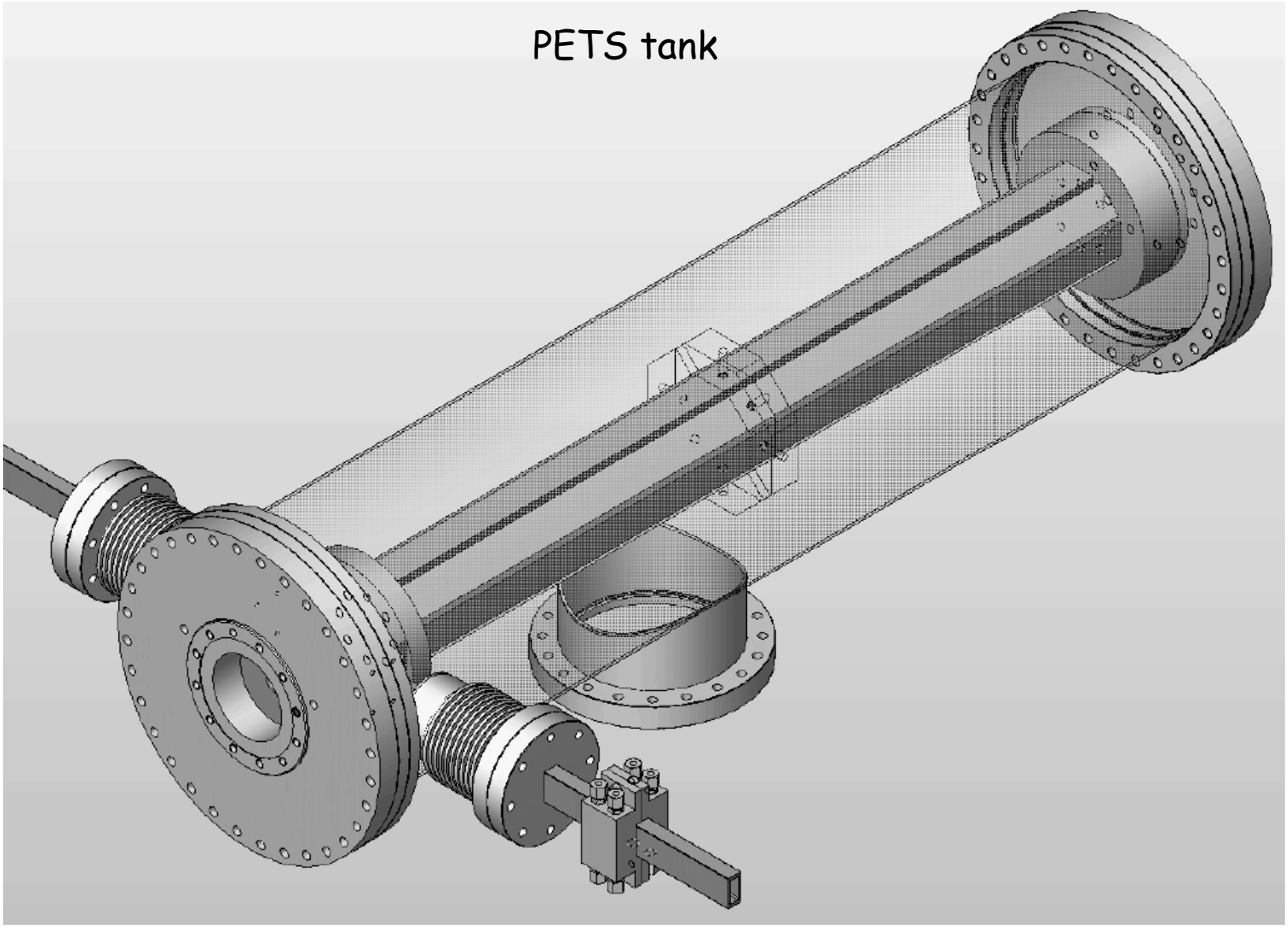
Prototypes

Quad moving table,

Prototype finished

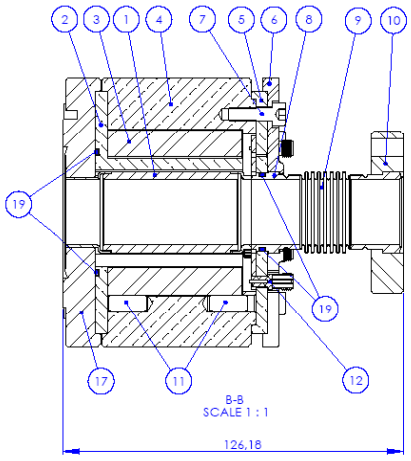


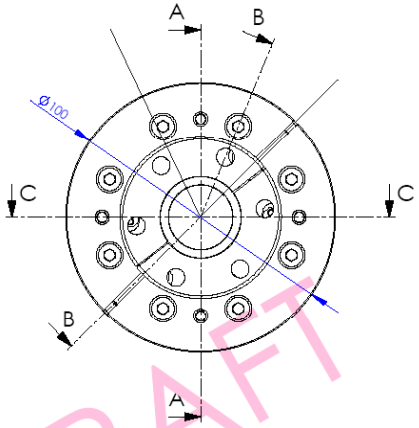
Prototypes

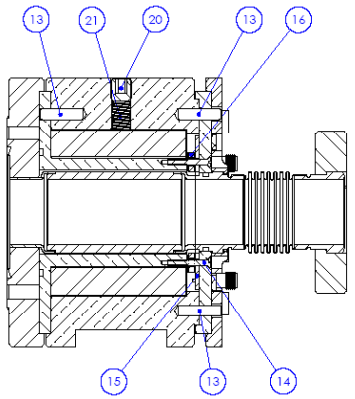


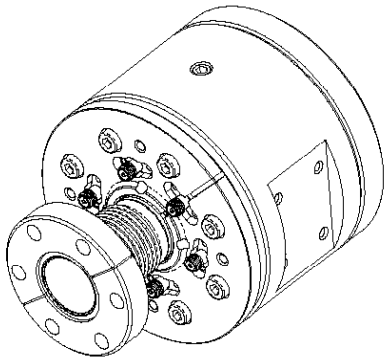
Prototypes

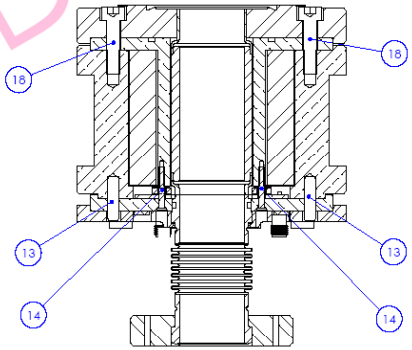
BPM











POS.	DESCRIPTION	MATERIAL	QUANT.	OBSERVATIONS
1	Vacuum chamber assembly	-----	1	-----
2	Electrode	Cu-OFE	1	Ref. UNS C 10
3	Magnetic core	C2050	1	-----
4	Body	Cu-OFE	1	Ref. UNS C 10
5	Copper bridge	Cu-OFE	1	Ref. UNS C 10
6	Flange	AISI 304L	1	-----
7	Screw DIN 912	Stain. Steel	8	M5 x 16
8	Joint Collar	AISI 304L	2	-----
9	Bellow	-----	1	-----
10	Rotatable Flange	AISI 304L	1	-----
11	Cyl. Pin	Steel	4	ISO 8734 - Ø6h6 x 14
12	SMA Connector	-----	6	Huber-Suhner 23_SMA-50-0-13/111_N
13	Cyl. Pin	Steel	5	ISO 8734 - Ø4h6 x 16
14	Screw ISO 2009	Cu Be	4	M2 x 16
15	PCB	Glass Fibre	2	-----
16	Transformer	-----	4	T60009-E4006-W650
17	Flange	AISI 304L	1	-----
18	Screw DIN 912	Stain. Steel	6	M5 x 20
19	RF Contacts	-----	2	BALSEAL BG15H5
20	Screw DIN913	Stain. Steel	1	M8 x 8
21	Comp. Spring	Stain. Steel	1	-----

REV.	NAME	DATE	MODIFICATION

	NAME	DATE
DRAWN	J. V. Civera	30/03/07
CHECKED	J. V. Civera	30/03/07
MATERIAL:		

TOLERANCES UNLESS OTHERWISE SPECIFIED — ANGULAR ±0.5° — RADIAL ±0.2

	>0.5	>6	>30	>120	>400	>1000	>2000
LINEAR DIMS							
MACHINED DIMS	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2
WELDED DIMS	-	±0.5	±1	±2	±3	±4	±6

SIZE A2 — SCALE 1:1 — SURFACE FINISH N8 — GEOMETRIC TOLERANCES — EUROPEAN PROJECTION

TITLE: TBL BPM ASSEMBLY

IFIC. Instituto de Física Corpuscular.
CSIC - Universitat de València.

DRAWING NUMBER: CTFBIPU0012-TBL — REV. -

Tentative TBL-Schedule

Jul-Dec 06	Jan-Mar 07	Apr-Jun 07	Jul-Sep 07	Oct-Dec 07
Define module , Diagnostics, 12 GHz PETS		Fabrication of prototypes		
			Test of Prototypes	

Jan-Mar 08	Apr-Jun 08	Jul-Sep 08	Oct-Dec 08
Install 1 Module		Install a bit more ?	
Series production			

Jan-Mar 09	Apr-Sep 09	Oct-Dec 09	Jan-Mar 10	Apr-Jun 10
Install up to 8 PETS 1.2 GW	Run with 8 PETS 1.2 GW		Install remaining 8 PETS	Run with 16 PETS 2.4 GW

Conclusions

- With the current budget only prototyping can be done this year
- A minimal program of testing one prototype module is feasible and will help a lot for the project.
  Prototypes of BPM, electronics, quad mover and PETS are being built by our collaborators
- If the prototypes are successful and the budget in 2008 sufficient the final project is only slightly delayed