IPM Teheran contribution

Past:	1 PhD student, 3 years – located at CERN and fully funded by IPM
Present:	1 Post-doc, 3 to 4 years – located at CERN and jointly funded
From 2012:	2 PhD students, 3 years – located at CERN and jointly funded

Collaborators: general information and resource estimate							
Institute:	School of Particles and Accelerators, Institute for Research in Fundamental Sciences						
Main contacts:	Mr. Hessamaddin Arfaei						
CERN responsible:	Steffen Doebert, Roberto Corsini						
Activity/work package/task:	CLIC0/CLIC0-001/ Design & Preparation, RF Structures ; CTC-012 RF Systems/CTC-012/ Design of DB accelerator/cavities						
Technical subject:	CLIC0 RF Structure Design and Beam Dynamics Study						
Working arrangement:	One project associate , two Ph.D. Students are staying at CERN						
Funding status:							
Formal agreement:	One contract for one project associate. The general contract is in progress to sign.						
Expected resources		2012	2013	2014	2015	2016	Comment
	Material budget [CHF at current rate]						Not known yet
	Manpower at institute [FTEyears]						Not known yet
	Manpower at CERN [FTEyears]	3	3	3	?	?	1 Project associate,2 Ph.D. students, jointly funded by IPM and CERN

Informal agreement (as for past activities)

MOU under definition

Subjects:

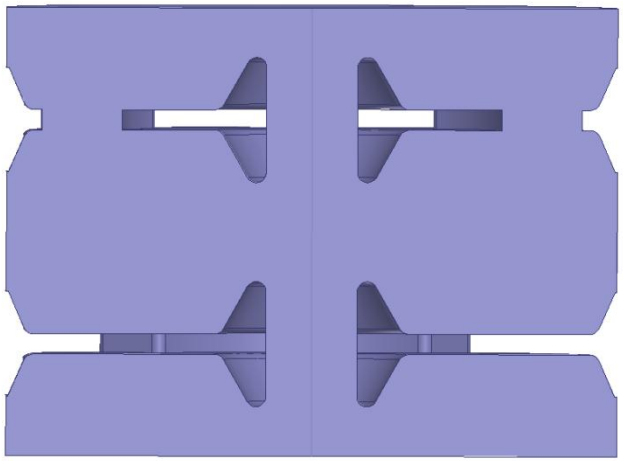
- RF pulse compression software, bunch length measurements in CTF3, CTF3 beam dynamics

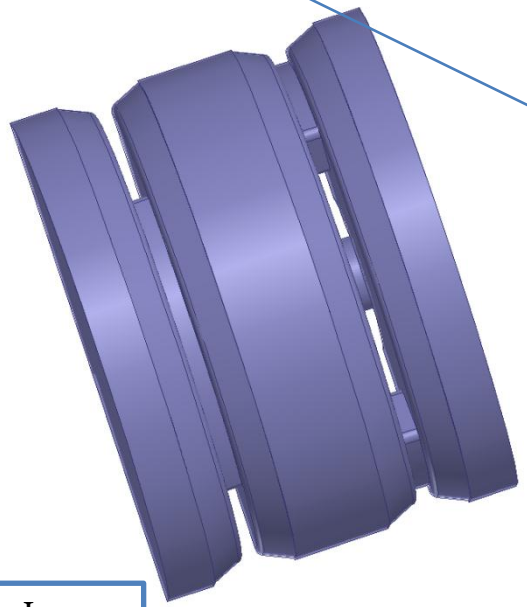
- RF design of SHB, buncher and accelerating cavities for CLIC Zero front-end (CLIC0-001)
- Beam dynamics simulation for CLIC Zero front-end (CLIC0-001, CD-DRV)
- Beam-loading/break-down rate experiment in CTF3 (CTF3-001, task 4)

- RF hardware for CLIC Zero front-end (waveguides, cavities…) ?

Parametric study, optimization and RF design of CLIC Zero front-end SHB cavities

number of cells	phase(deg)	vg/c(%)	R/Q - cell (Ω)	R'/Q (Ω/m)	R/Q (Ω)	Input power (KW)	r_1(mm)	r_2(mm)	r_c(mm)	θ_c(deg)	l_c(mm)	r_n(mm)	t(mm)	g/l	phase velocity/c
3	105	10.86	142.76	1337.61	428.28	100.79	169.8	186.35	164.9	75	49.04	6.13	12.26	0.45	0.61
3	120	12.2	163	1336.35	489	86.81	152.9	167.8	148.49	89	44.16	5.52	11.04	0.44	0.61
4	105	14.34	142.16	1331.96	568.64	75.04	159.55	175.1	154.94	87	46.08	5.76	11.52	0.46	0.61
5	105	16.14	126.89	1314.05	634.45	67.07	162.88	178.75	158.17	95	47.04	5.88	11.76	0.54	0.61





It is possible to reduce the power a little. For example to 75 KW from 80 KW in last slide.

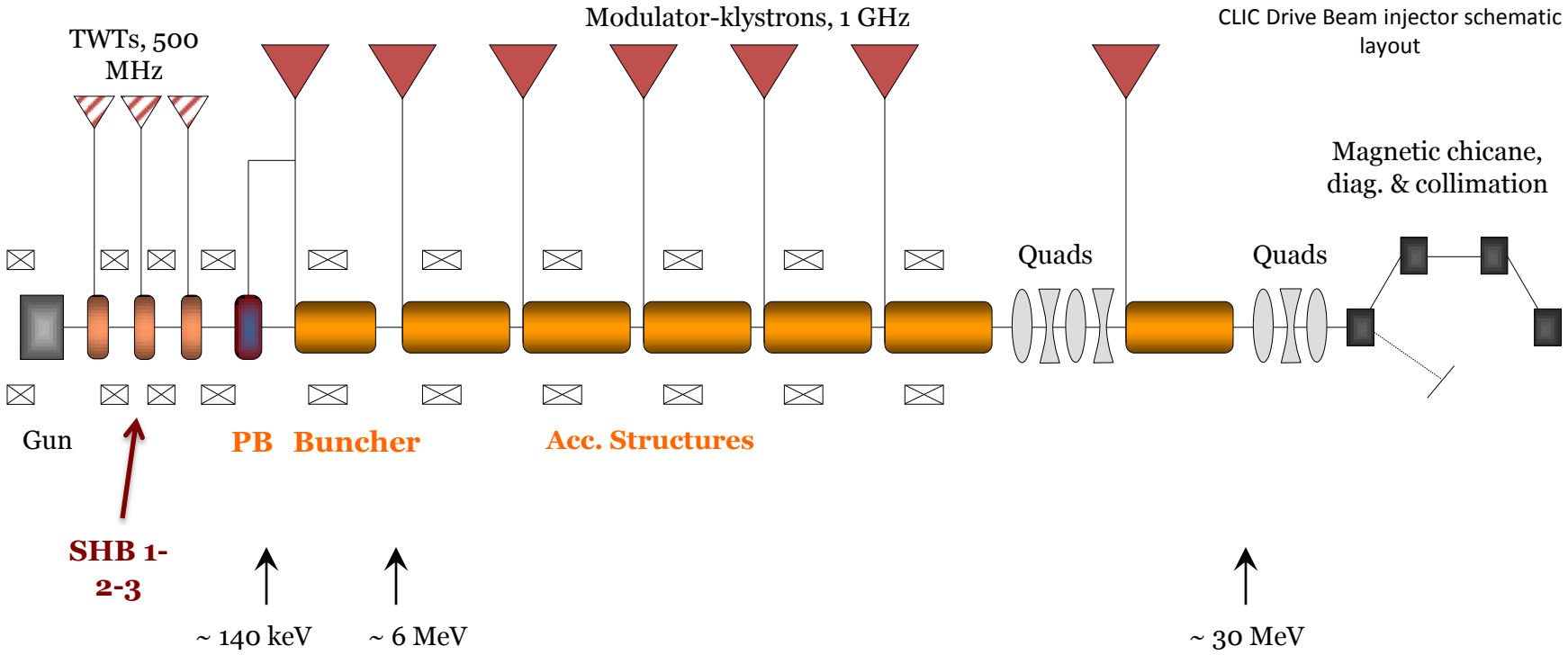
$\tau' \equiv \tau\left(1 \mp \frac{v_g}{v_e}\right)$: For FTW(BTW) structure

It is the definition of drain time as was introduce by L. Thorndahl et al.[2] . This time is used to find the number of bunches passages during phase switching. For FTW case it is about 8% less (τ'≈9ns) and for BTW case it is about 20 % more than filling time(τ'≈12ns).

After choosing the structure we can work to optimize cells depend on all parameters affect the design like beam loading, HOMs, minimum wall thickness for cooling water pipe holes and …

CLIC Drive Beam Front-end

CLIC0-001



BDR with beam loading

- Beam loading reduces field => BDR lower?
- CLEX probe beam current limited => use CTF3 drive beam and klystron-driven X-band structure in the old '30 GHz PETS' line
- 30 GHz waveguide network has to be converted to X-band
- Interface to regular structure test area and switchable connection to klystron
- RF instrumentation from stand-alone power source
- need manpower for the software and analysis