TENTATIVE LAYOUT FOR A KLYSTRON-BASED CLIC MODULE AND SOME CONSIDERATIONS FOR ITS DEVELOPMENT

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380 GeV Module Sequence

Sectors of the MB FODO lattice for one Linac

Sector	T0	T1	T2	Totals	
1		120		120	sequence: 120 x T1
2	150	150		300	sequence: 150 x T0T1
3	172	86		258	sequence: 86 x T0T0T1
4	124		62	186	sequence: 62 x T0T0T2
5	450		150	600	sequence: 150 x T0T0T0T2
6	16		4	20	sequence: 4 x T0T0T0T0T2
Totals	912	356	216	1484	

"traditional" Modules are considered with

T0 = 8 x AS, T1 = 6 x AS and T2 = 4 x AS

length may vary depending on the AS choice

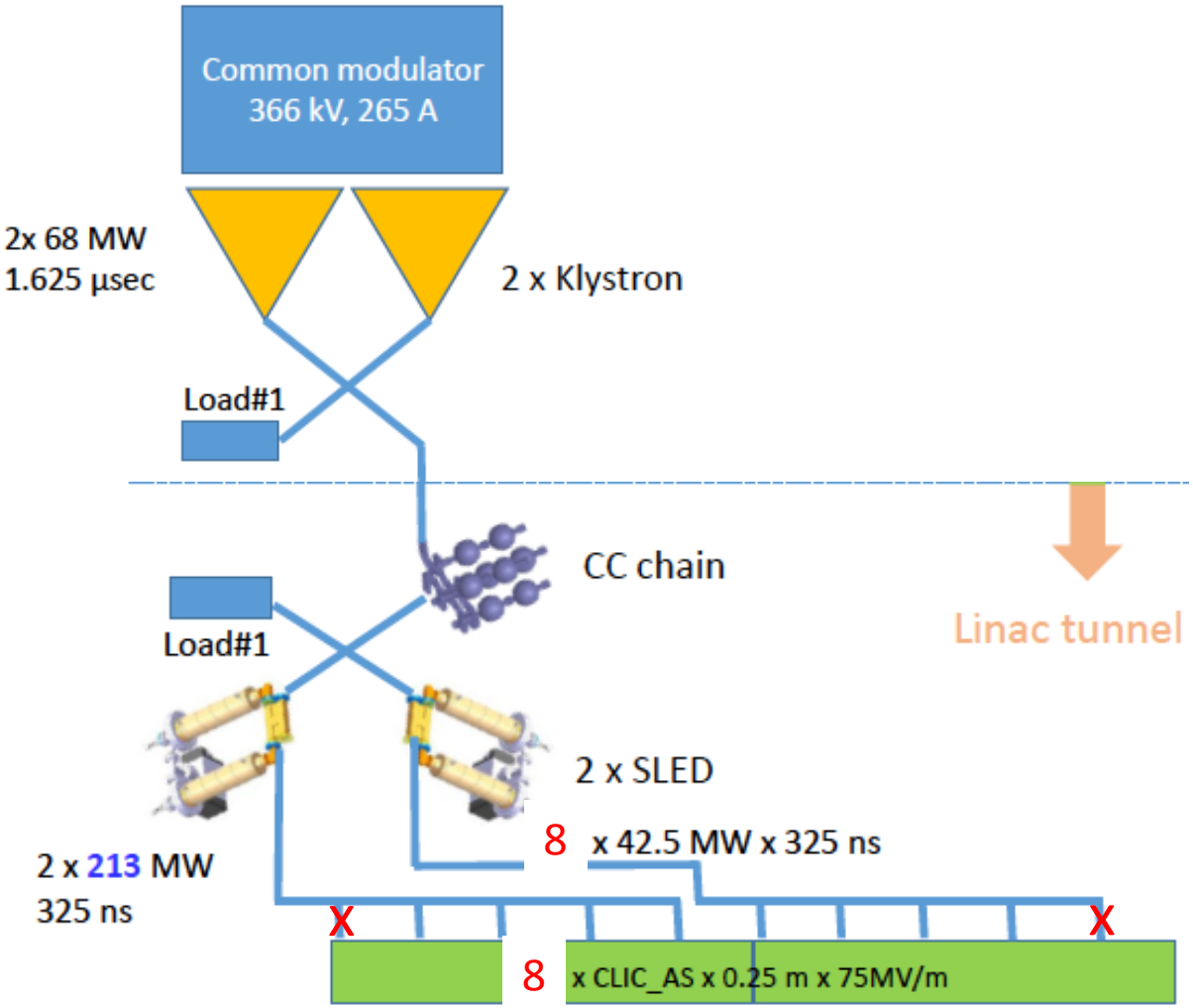
380 GeV RF choice

Optimization of RF structure design – D. Schulte 21/01

Parameter	Symbol	Unit	DB	K	DB244	K244
Frequency	f	GHz	12	12	12	12
Acceleration gradient	G	MV/m	72.5	75	72	79
RF phase advance per cell	$\Delta\phi$	°	120	120	120	120
Number of cells	N_c		36	28	33	26
First iris radius / RF wavelength	a_1/λ		0.1525	0.145	0.1625	0.15
Last iris radius / RF wavelength	a_2/λ		0.0875	0.09	0.104	0.1044
First iris thickness / cell length	d_1/L_c		0.297	0.25	0.303	0.28
Last iris thickness / cell length	d_2/L_c		0.11	0.134	0.172	0.17
Number of particles per bunch	N	10^9	3.98	3.87	5.2	4.88
Number of bunches per train	n_b		454	485	352	366
Pulse length	τ_{RF}	ns	321	325	244	244
Peak input power into the structure	P_{in}	MW	50.9	42.5	59.5	54.3
Cost difference (w. drive beam)	$\Delta C_{w.\,DB}$	MCHF	-50	(20)	0	(20)
Cost difference (w. klystrons)	$\Delta C_{w.\,K}$	MCHF	(120)	50	(330)	240

380 GeV K-based RF distribution

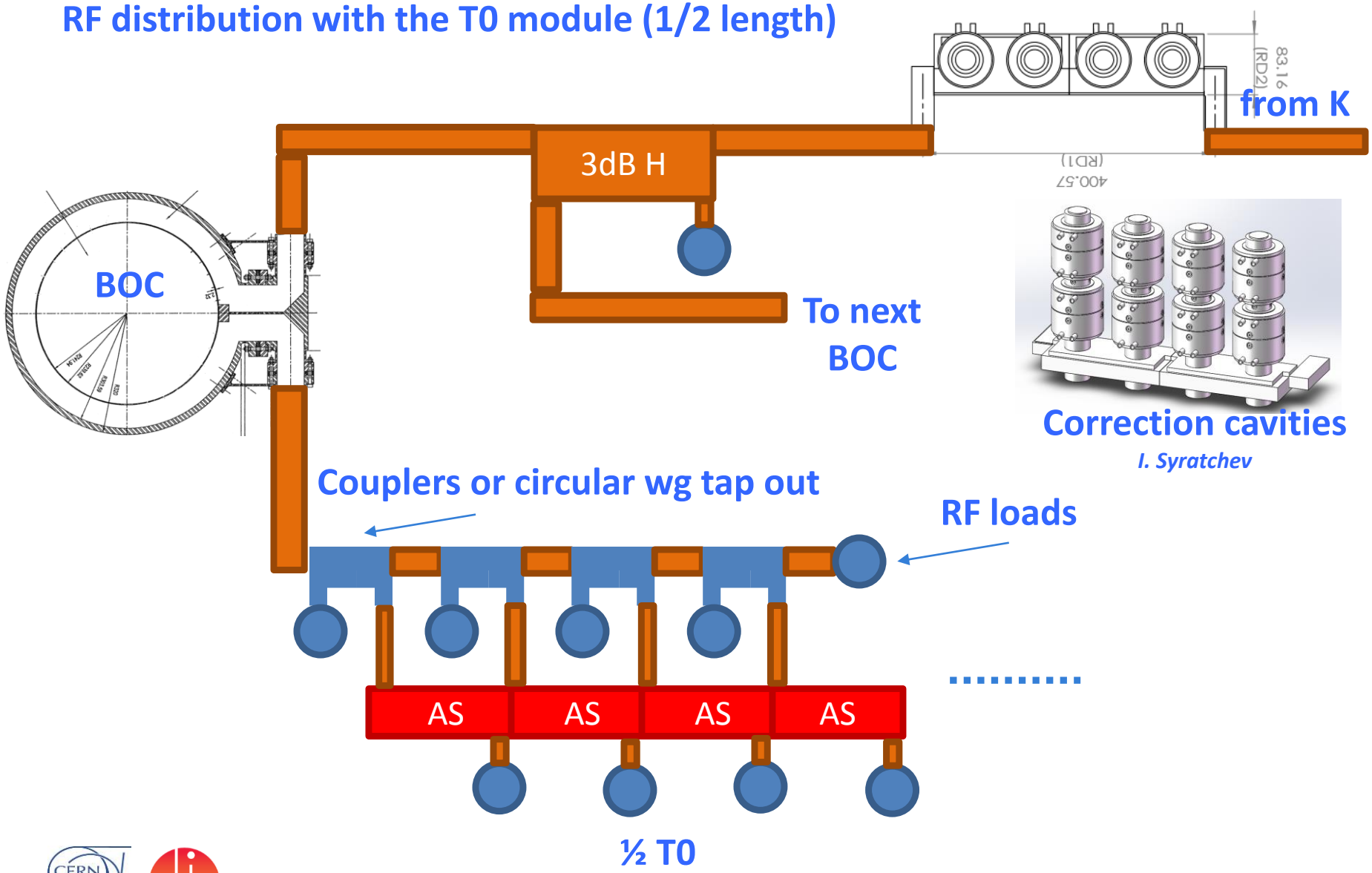
Example of RF Distribution as presented by I. Syratchev on 21/01



I. Syratchev 21/01/17

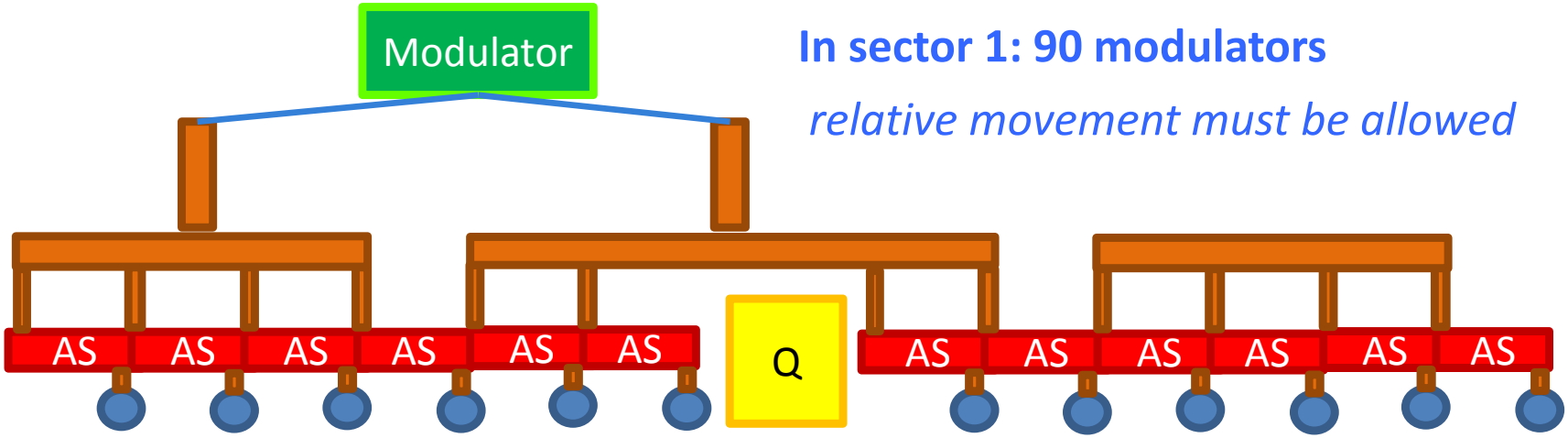
380 GeV Layout – RF and Module Sequence

RF distribution with the T0 module (1/2 length)



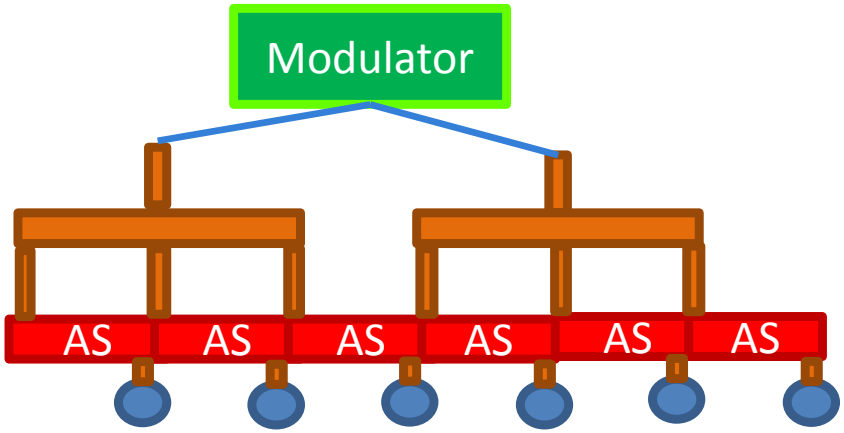
380 GeV Layout – RF and Module Sequence

RF distribution with the T1 module



In sector 1: 90 modulators

relative movement must be allowed



In sector 1: 120 modulators

380 GeV Module Sequence

RF distribution choice (for one Linac)

Sector	T0	T1	T2	Totals	
1		120		120	sequence: 120 x T1
2	150	150		300	sequence: 150 x T0T1
3	172	86		258	sequence: 86 x T0T0T1
4	124		62	186	sequence: 62 x T0T0T2
5	450		150	600	sequence: 150 x T0T0T0T2
6	16		4	20	sequence: 4 x T0T0T0T0T2
Totals	912	356	216	1484	
2-pack	912	356	0	1268	Modulators no bridging
1-pack	0	0	216	216	
2-pack				1287	Modulators with bridging

Should this parameter be considered in the cost optimization ?

380 GeV K-based Layout – RF questions

do we see any inconvenience in bridging adjacent modules with the RF distribution (phase control, alignment requirements) ?

RF pulse compression and distribution in the tunnel: what are the temperature stability requirements and what the thermal impact on the environment ?

Who is looking into the modulator + klystron space requirements and layout to provide input to the CE WG (including safety requirements) ?

380 GeV K-based Layout – Conclusions

We will soon have a 3D concept for the RF distribution, first based on T0 modules;

In case we want to keep the DB option, clarifications from Beam Dynamics about the single girder option would provide an indication about the direction for development;

A shared strategy for deciding about the Module layout should be in place soon. Proposal :

Confirm figures on RF efficiency → Optimize RF structures on cost → Decide if DB + K or K only → Choose Module layout

A revised PBS structure is in preparation for the 380 GeV case (K and DB-based), including names of responsible people (to be decided) for the different cost centres;