



LINEAR COLLIDER COLLABORATION

Designing the world's next great particle accelerator

Change Request CR-0021
New estimate of Z pole running power - Update
Benno List, DESY

TCMB Meeting
15.9.2020



New issue considered since June:

- In "3.7+3.7Hz" operation, gradient in cavities alters between 31.5MV/m and 8.8MV/m from pulse to pulse
- Gradient is changed only via klystron output. Coupler settings (Q_{ext}) are the same
 - -> Q_{ext} is not matched to loaded Q_L for log gradient beam
 - RF efficiency is further reduced
- New calculation provided by Kaoru Yokoya:
 - Fill times recalculated for electron beam at 46GeV and 125GeV, and positron beam at 46GeV, for 1312 and 2625 bunches
 - RF power recalculated, considering effect of mis-match for 46GeV beam in electron machine matched for 125GeV beam
- New Klystron efficiencies estimated



	Electron ML		Pos ML	Electron ML		Pos ML
Scenario	Baseline			Lumi upgrade		
Ebeam	125	45.6	45.6	125	45.6	45.6
Bunches	1312			2625		
Gradient / MV/m	31.5	8.8	8.8	31.5	8.8	8.8
$Q_{\text{ext}} / 1E6$	5.5	5.5	1.5	3.6	3.6	1.0
Tfill / us	930	329	259	614	217	171
MBK eff	67%	53%	48%	67%	53%	48%
$P_{\text{AC}} / \text{MW}$	9.0	3.1	2.1	12.9	5.1	3.6
Change to CR-0021	-	+1.2	+0.2	-0.1	+2.0	+0.5

Note: Wall plug power PAC still under discussion,
need to understand treatment of efficiencies involved



- Finalize discussion of efficiencies
- Apply new fill times etc to Nick Walker's spread sheet to obtain effect on cryogenic power