Homework of Cavity-Integration

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Homework by KILC

ML Integration	- Provide a complete ML lattice with 9+4Q4+9 cryomodule unit, - Confirm requirement of energy overhead (1.4%) w/ additional ML length for operational availability (provide rationale) - Fix total numbers of CM including ML, RTML, e-source (# add. CMs to be fixed) - Q + corrector +BPM package design (w/ energy dependent design?) - Plan for full power upgrade at 500 GeV, and scenario up to 1 TeV (→ such as quad. configuration, FDFD up to 500 GeV, and FFDD at 1 TeV?
HLRF	- Required RF power overhead, more detail (in KCS and RDR) - Cost saving of PDS, Klystron, Marx Generator etc - Catalogue local power distribution variants and conceptual designs - Estimate waveguide losses and heat loads
CM and Cryogenics	- Confirm CM slot length to be fixed: 12,652 mm in RDR, and it need to be reflected to the current ILC-CM drawing which has currently 12,644 mm (11794+850) in FNAL-CM4. - Asses the need for accessibility and maintenance of active components (tuner motors) - Cryo-string length, additional length of Cold-box for phase-separation, to adapt new RDR-like RF unit and/or tilting tunnel and effect on add. Total main linac length.
Cavity Integration	- Cavity-slot length to be well established (to be 1326.7 mm) - Feasibility of magnetic shield inside LHe tank at central region and outside at inter-connect.
Cavity Gradient	- Update fabrication process and recipe; re-definition of production yield (documentation)
Coupler processing	- Determine specifications for peak power processing - Evaluate solution for tunnel in-situ processing

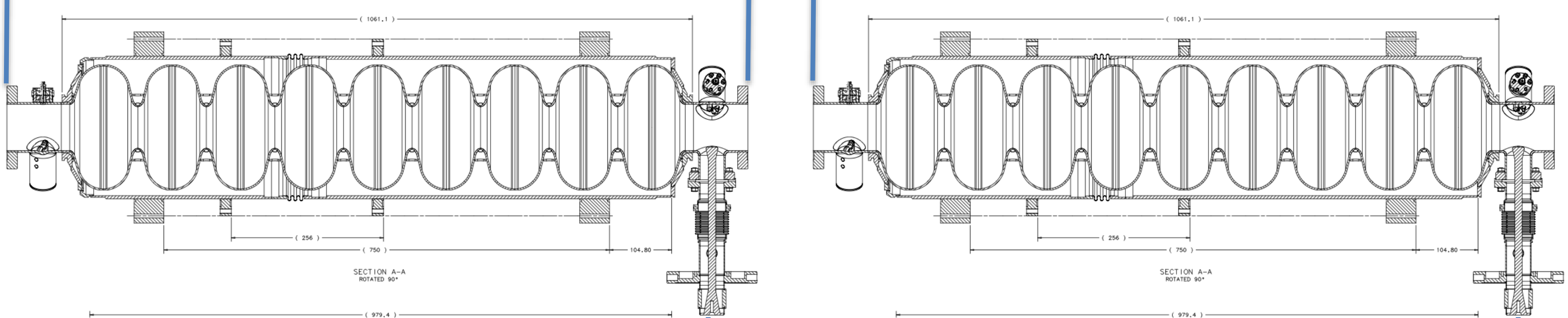
Cavity Slot length: RDR review

Cavity flange-to-flange

FNAL design = 1.2474 m → FNAL for bellows = 0.0786 m

KEK design = 1.2476 m → KEK for bellows = 0.0784 m

Bellows flange-to-flange



Cavity spacing: coupler center-to-center

RDR description: 5 3/4 $\lambda 0$ = 1.326 m

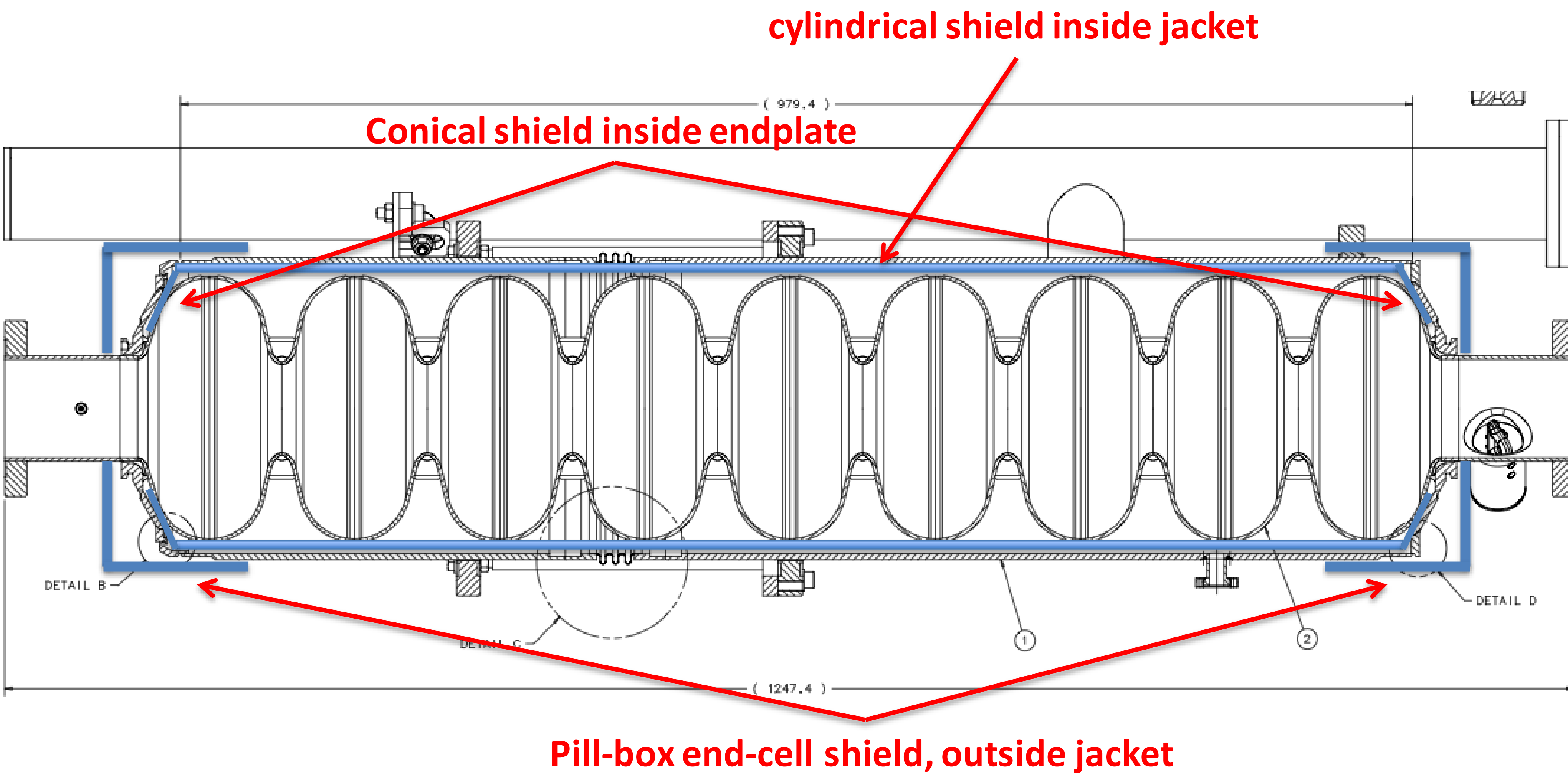
C=2.99792458 x 10^8

f=1300.000000 MHz

1326.7? should be 1326.005

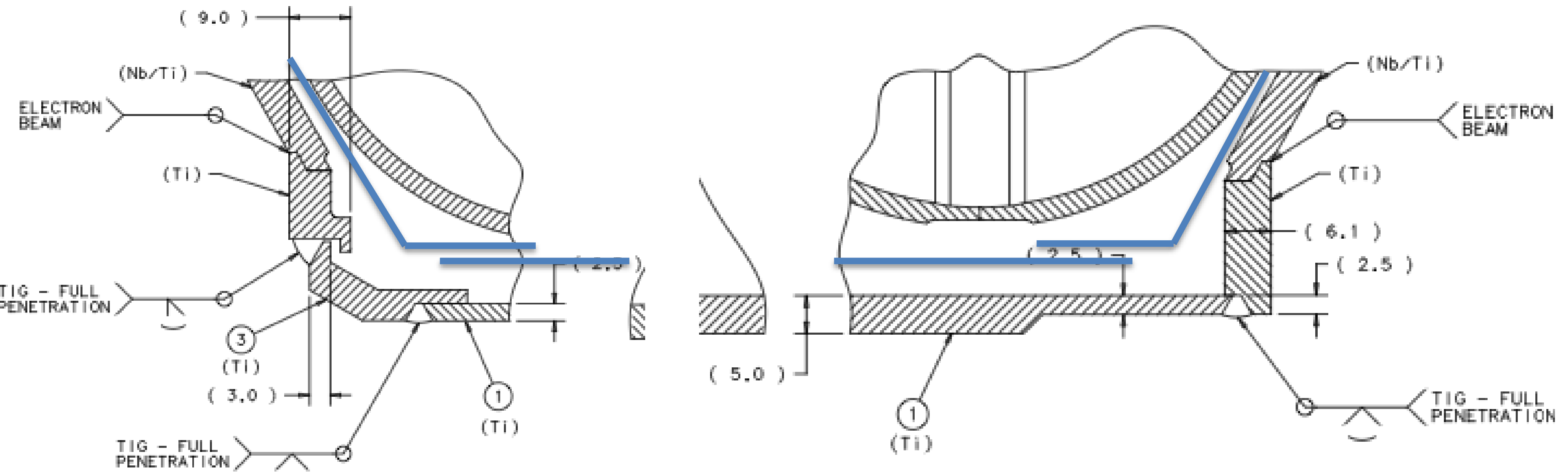
Magnetic Shield Inside at LHe tank
outside in interconnect: feasibility check

Proposal: KEK type inside shield + cylindrical end shield outside



Details of Conical shield at endplate

1 - 2mm thickness conical shield



Conical shield can be formed by press
and put into endplate during end-group welding

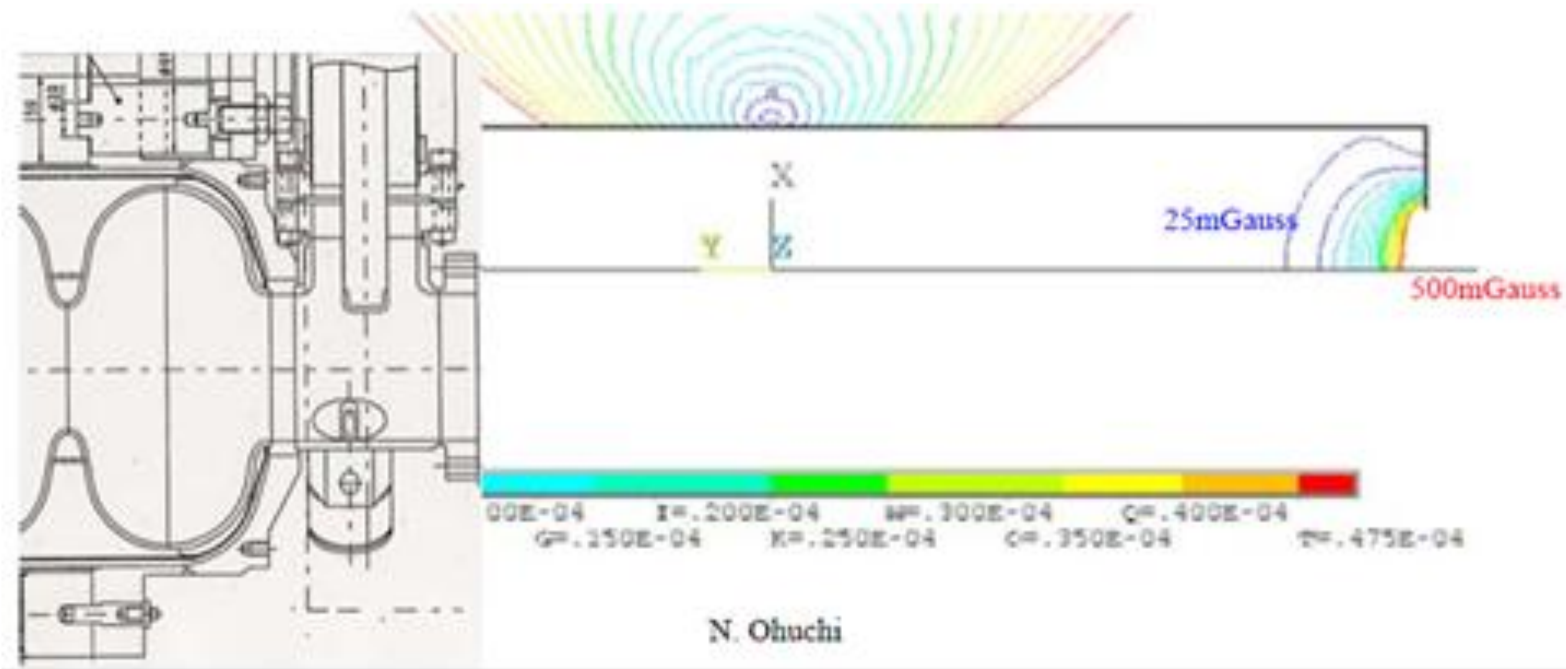
or

Conical shield can be formed from fan-cutout and put into endplate,
by lapped around and bolted,
Connected with short-cylindrical overlap by bolt.

Magnetic Shields of KEK Cavities

4 Components per 1 KEK Cavity

Calculation of Magnetic Fields in KEK Cavity

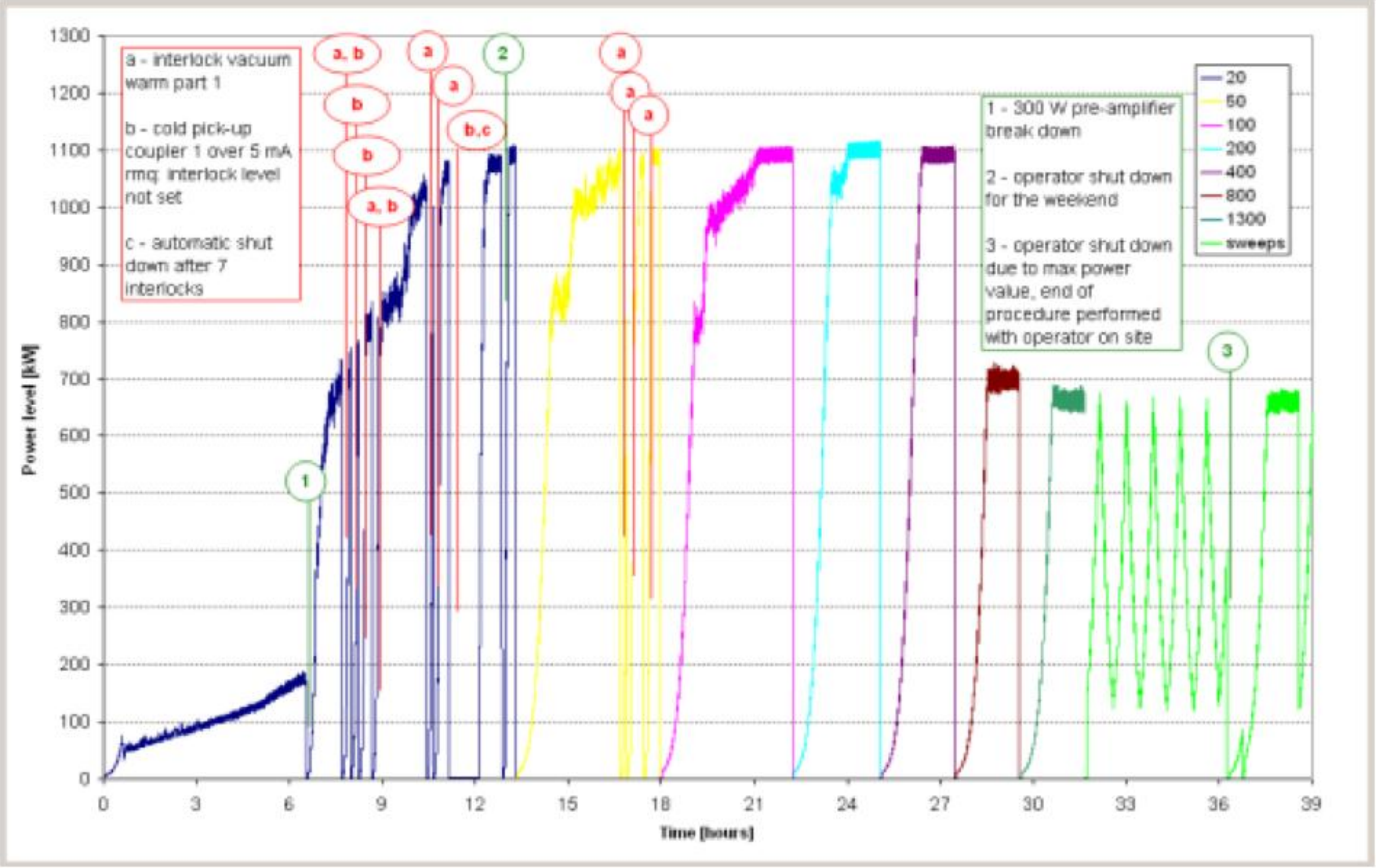


by N. Ohuchi (KEK)

Opening aperture and distance from aperture are important

Coupler processing : procedure

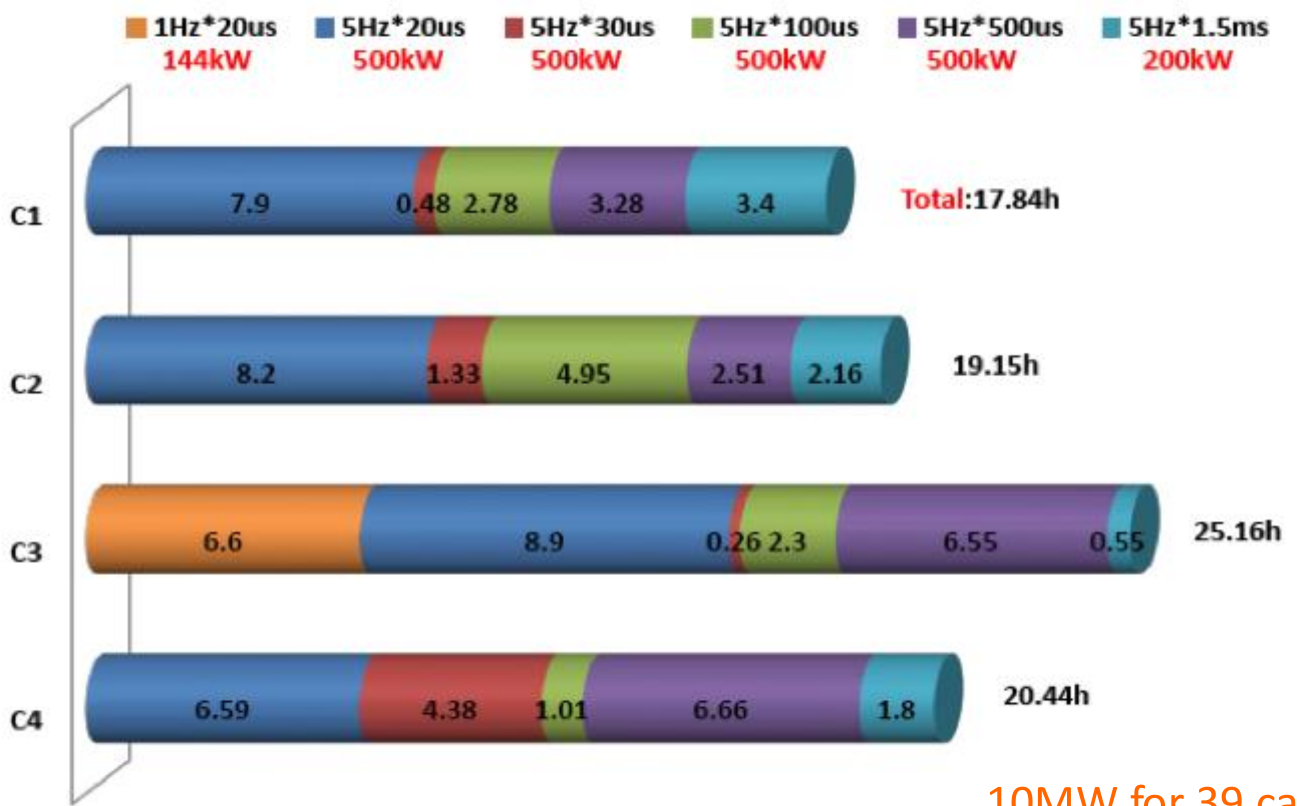
XFEL coupler (used in S1-G) process



Paired coupler process :

20µs	1100kW	400µs	1100kW
50µs	1100kW	800µs	700kW
100µs	1100kW	1300µs	700kW
200µs	1100kW	1300µs	power sweep

XFEL coupler S1-G in-situ process (reflected from cavity at room temp)



10MW for 39 cavities with WG loss

ILC tunnel in-situ : determined by available power ~250kW

20µs	500kW
30µs	500kW
100µs	500kW
500µs	500kW
1500µs	200kW

→

20µs	250kW
50µs	250kW
100µs	250kW
500µs	250kW
1500µs	200kW