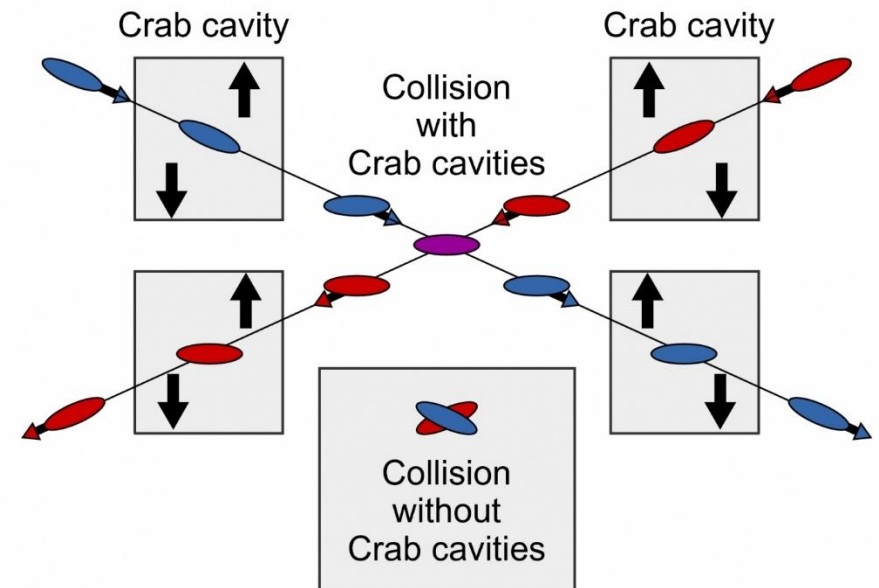


WP3: 4th Crab Cavity Meeting

Peter McIntosh,
UKRI-STFC Daresbury Laboratory

13th July 2021



Agenda for Today

1. Review Specifications Developments
2. Agree Development Plans
3. Fix Project Review Meetings

1. Review Specification Developments (1/3)

Updated CC Specifications (v8):

- <https://agenda.linearcollider.org/event/9290/>

Update includes:

- X, Y beta-function at CC location

Alignment and HOM tolerance discussion meeting held on 25/6, which reviewed:

- Process used for TDR determination of tolerances – G Burt (ULAN)
- Impedance determination process used for the QMiR cavity – A Lunin (FNAL)
- ILC BDS assessment for impedance and alignment tolerances – T Okugi (KEK)
- Agree next steps:

<https://indico.stfc.ac.uk/event/356/>

Access Key: ILCWP3Spec

1. Spec. Developments – Summaries (2/3)

Conclusions

Summary

From physics point of view, it makes sense to put the following parameters into specification for the ILC crab cavity:

- Horizontal kick voltage $U_{\text{eff}} = 2.4 \text{ MV/CHz}$

Short range wakefield issues in the ILC BDS beamline.

T. Okugi, KEK

Crab cavity meeting @2021/06/25

- PLACET+ for ILC crab is transverse growth
- The high impedance
- Single cavity like the m
- FONT may several bu

- The effect of short range wakefield in ILC BDS has been studied in several simulations. Since the ILC BDS is a transport line and the bunch length is short, the effect of capacitive impedance (large structures) is relatively small in general.
- There are 2 type (**static and dynamic**) of the beam size growth by the wakefield in the beam transport line as ILC BDS.
- Simulations have shown that the beam size increase due to **static wakefield** in ILC250 can be compensated by changing the position of wakefield knob (a compensating structure placed on the mover).
- The simulation shows that the beam size increase due to **dynamic wakefield** in ILC250 can be compensated by various feedbacks.
- These compensations for the beam size increase due to wakefield at ILC have been experimentally demonstrated at the ATF2 beamline.
- If the calculated time domain wake potential (0.3mm bunch length) for the crab cavity is available, the effect of wakefield due to the crab cavity can be added to the existing simulations.

al are not critical
y design and may be

1 mm
cavity axis < 1 mm

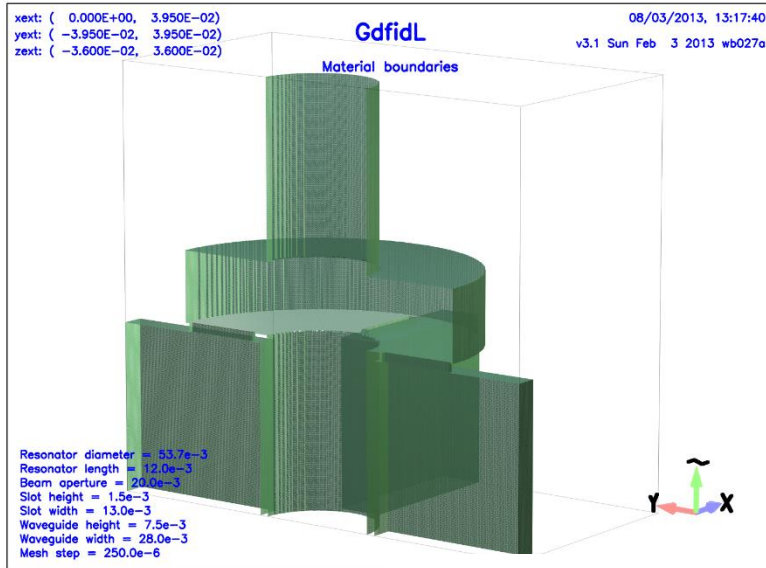


G Burt

A Lunin

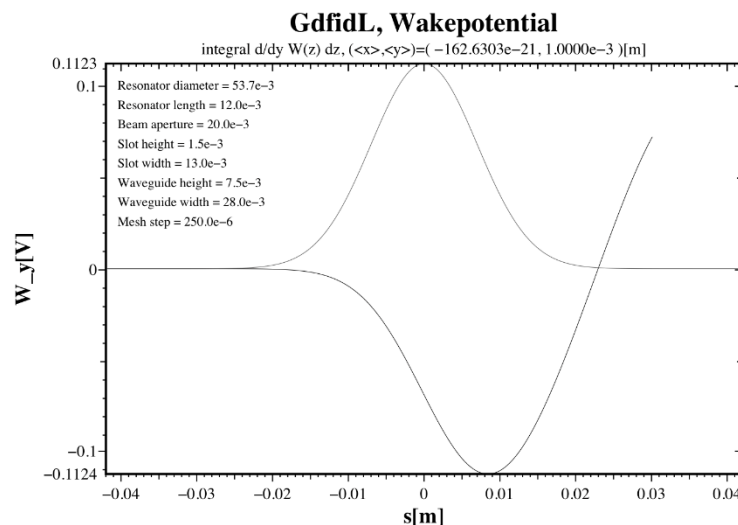
T Okugi

1. Cavity Wake Potential (3/3)



Fri Mar 8 13:15:19 2013

symmetry=full, total charge=1.0000e-12 [As], [xyz]loss=(3.0694e-27, -64.5053e-15, -469.1446e-15) [VAs]



- Agreed to try and provide some example cavity wakepotential input into the ILC BDS simulations:

- 3.9 GHz TDR elliptical - ULAN
- 2.6 GHz QMiR - FNAL
- 1.3 GHz RFD - ODU
- 1.3 GHz QWR/WOW – BNL
- Any others?

Okugi-san comments:

- This is an example of the GdfidL output:
 - GdfidL will provide the output in csv format.
- We don't care about the format.
- As long as we know how the kick field changes over time, we can integrate it.
- **Trying to source GdfidL users who can help ... any suggestions?**

2. Agree Development Plans

Activity	R&D Plan	Tmescale																When?
		2021				2022 (Yr 1)				2023 (Yr 2)				2024 (Yr 3)				
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Set CC specifications	T0 + 3m																	24-Jun-21
Bare cavity EM design parameters																		
Hom damped cavity parameters																		
HOM coupler development																		
Mechanical design																		
1st Workshop review of various design options (cavity, HOMs, couplers)	T0 + 9m																	07-Dec-21
Multipacting assessment																		
Tuning solution and pressure analysis																		
2nd Workshop review of various design options (cavity, HOMs, couplers, multipacting, tuning)	T0 + 15m																	21-Jun-22
Decision 1 - cavity shape, HOMs, couplers, multipacting, tuning, pressure stability, fabrication	T0 + 18m																	27-Sep-22

3. Fix Project Review Meetings

- Priority to complete CC system specifications.
- Pre-Lab now not expected to start in 2022 as originally planned.
- Propose to initiate cavity design process amongst WP3 collaborators.
- Set more optimised **workshop reviews** to assess design progress for each CC solution – **Sept, Dec 2021** and **March, June 2022**, with intermediate **catch-up meetings**.
- Target converged design optimisation for Decision-1 during 2022 (Nb: previously Pre-Lab Phase).

Propose:

1st Workshop Review of CC Design Status – Tues 7th Dec 2021

2nd Workshop Review of CC Design Status – Tues 21st Jun 2022

Decision 1: EM Design Optimisation and Down-Select – Tues 27th Sept 2022