

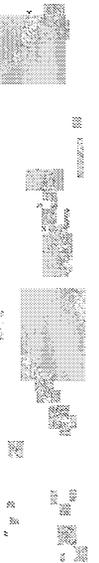
Directions and Future Work on the RDDS

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Reduction in Dipole Wake

- BBU considerations indicate It is required to damp the higher frequency modes to a Q of approx 1000
- This will be achieved in practise by
 1. Providing a means whereby all the cells remain coupled by placing loads downstream or upstream of the HOM (by introducing lossy material into the last 5cm or so of manifold)
 2. Direct loading of the last few cells with either SiC introduced into slots in the walls, highly lossy material (stainless steel for example) on the inner edge of the irises or, couple 4 lossy dielectric filled cavities (as in done in TWTs)

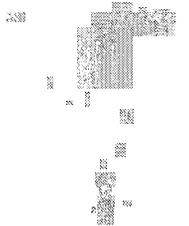


- This will require using the MAFIA code to model the \rightarrow of
 1. Five cells or so, loaded with dielectric slots
 2. A cavity which is strongly coupled to the last few cells
- The circuit model will be required to include losses (work in progress).
- For a given cell loss $\text{☎} \rightarrow \text{①}$ what is the corresponding modal $\rightarrow \text{✍}$



Contribution of Higher Bands to Transverse Wakes

- An initial investigation, using an uncoupled model, on the 3rd and 6th bands for RDDS1 indicates that the 3rd band has significant kick factors, such the level of the wake field is brought up to $.1 \text{ V/pC/mm/m}$.
- This implies further a coupled mode analysis is required for the 3rd band
- A full coupled circuit model will be instituted to model the 3rd band coupling.



Future Fabrication Issues Affecting the RDDS Wake Field

- Fabricate RDDS1 such that, the last few cells, if time permits, can be replaced with cells incorporating direct loading. Adding SiC via slots in the walls appears to be the most efficient means of doing this. Merits. further investigation
- ASSET RDDS1 run: straight structure, with accurately machined cell dimensions

- Objective of ASSET RDDS 1: demonstrate we can accelerate beam whilst minimising the transverse wake which we are able to predict with circuit modeling.
- Provided the last few cells are replaced with loaded cells we will also be able to demonstrate a structure which is NLC-ready (the wake being of sufficiently small magnitude that BBU is not expected to be a problem)
- RDSS2 will almost certainly incorporate a redesign of the last few cells

Summary of Future Work

- Load last few cells: MAFIA modeling, loss-enhanced coupled circuit, cold tests? Or, Upstream/downstream HOM loads.
- Modeling of higher band modes
- ASSET RDDS 1: Straight structure with accurately fabricated cells. Aim at being able to replace last few cells with damped cells in order to achieve NLC-ready RDDS
- RDDS2 damped last few cells.

- Model the wake field for 3-fold interleaving. This may reduce the wake and in particular the mode that drives BBU, to sufficiently low levels that BBU will not occur (T. Higo). Perform tracking simulations
- This interleaving will not require tight tolerance as the modes at the end of the structure are well separated ($\sim 50\text{MHz}$).
- If this works, it will be a straightforward soln. To BBU

- Important to set tolerance bounds on f_0 and f_1 . f_0 : 1MHz and f_1 : 3MHz.. Run wake calc. with wavelength variation to confirm (T. Higo)

