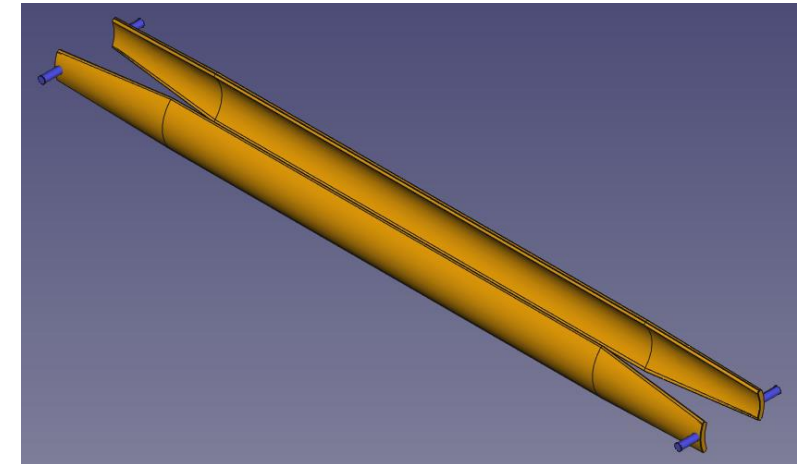


# Multi bunch feedback kickers for Diamond II

Alun Morgan

# Multi bunch feedback kickers - striplines

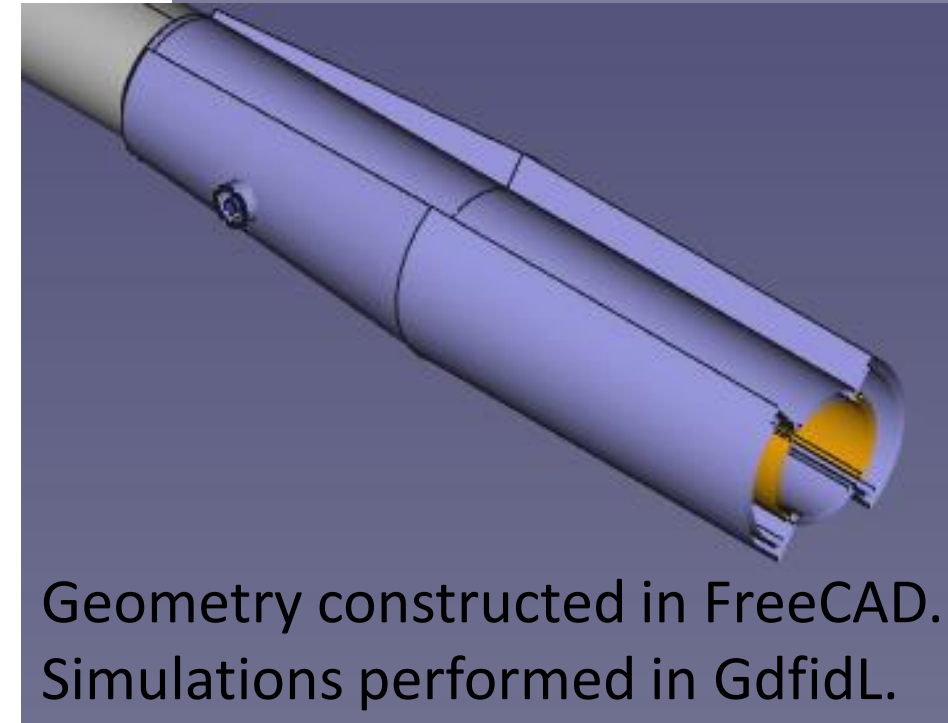


## Design targets (compared to Diamond I design)

- Match new beam pipe geometry
- Lower wake impedance
- Reduced internal reflections of signals
- More efficient coupling of power into the structure
- Reduced cross coupling of blades.

## New design

- Combines features from Sirius and Max IV.
- Common design for x and y due to round pipe.
- Common design for booster and storage ring.

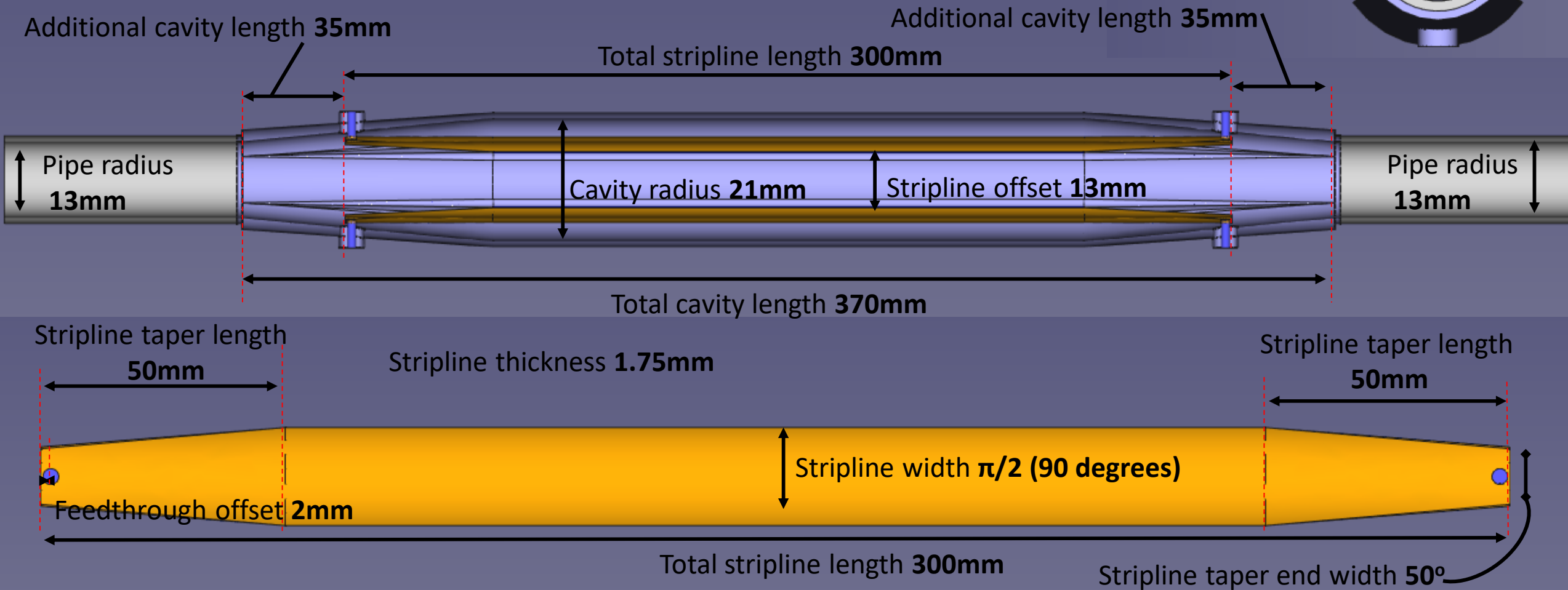


# Stripline geometry

## Status:

Basic form is 'fixed', however there is detailed work to do on the feedthroughs and stripline to coaxial transitions.

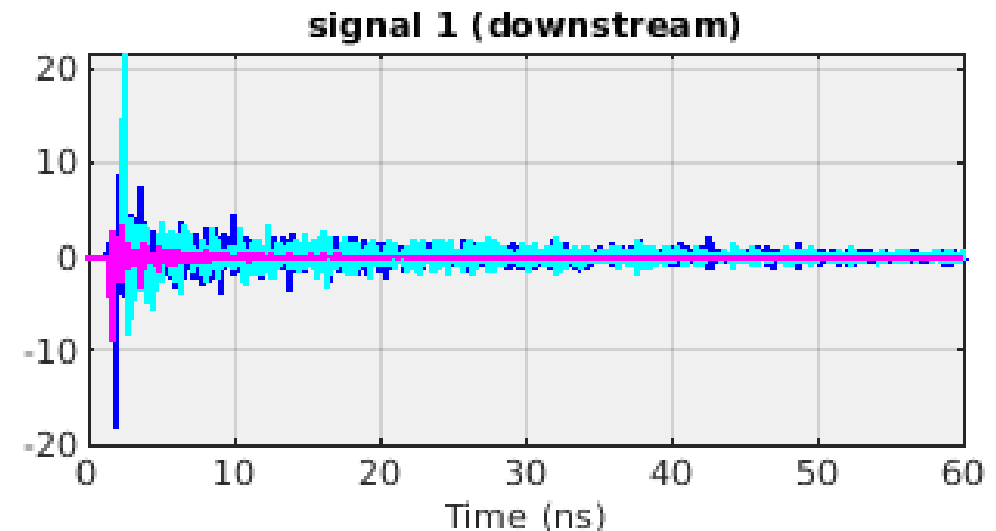
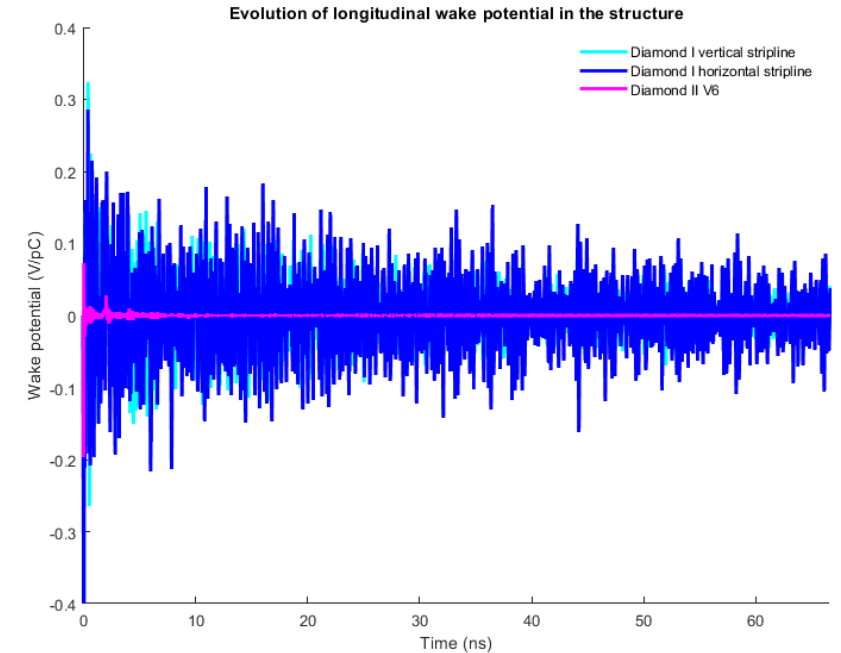
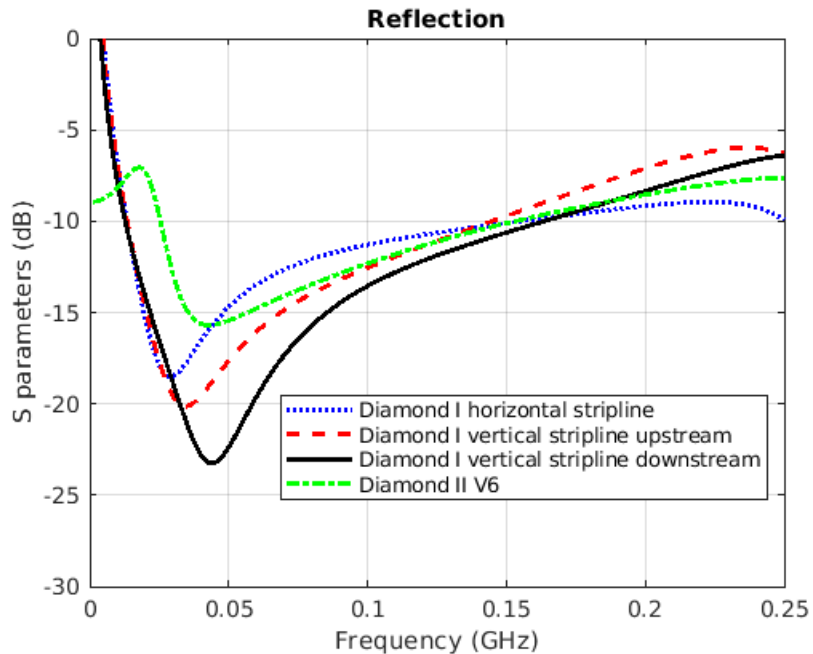
Cavity insert angle  
**38 degrees**



# Multi bunch feedback kickers - striplines

## Comparisons with Diamond-I design:

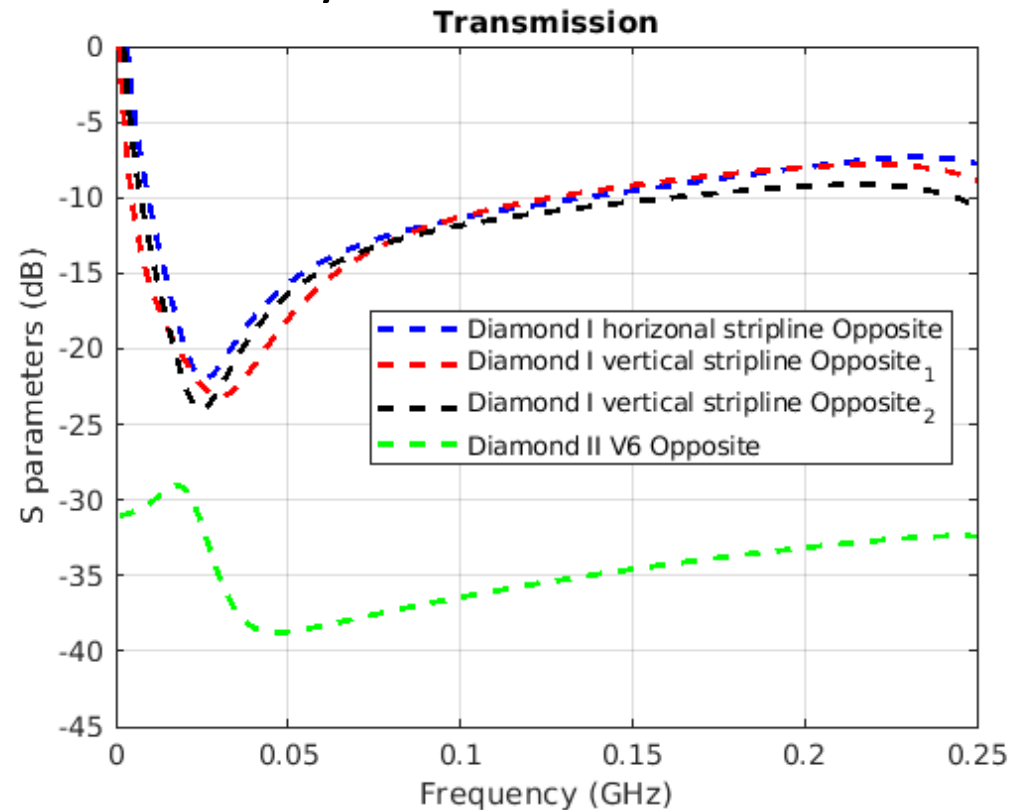
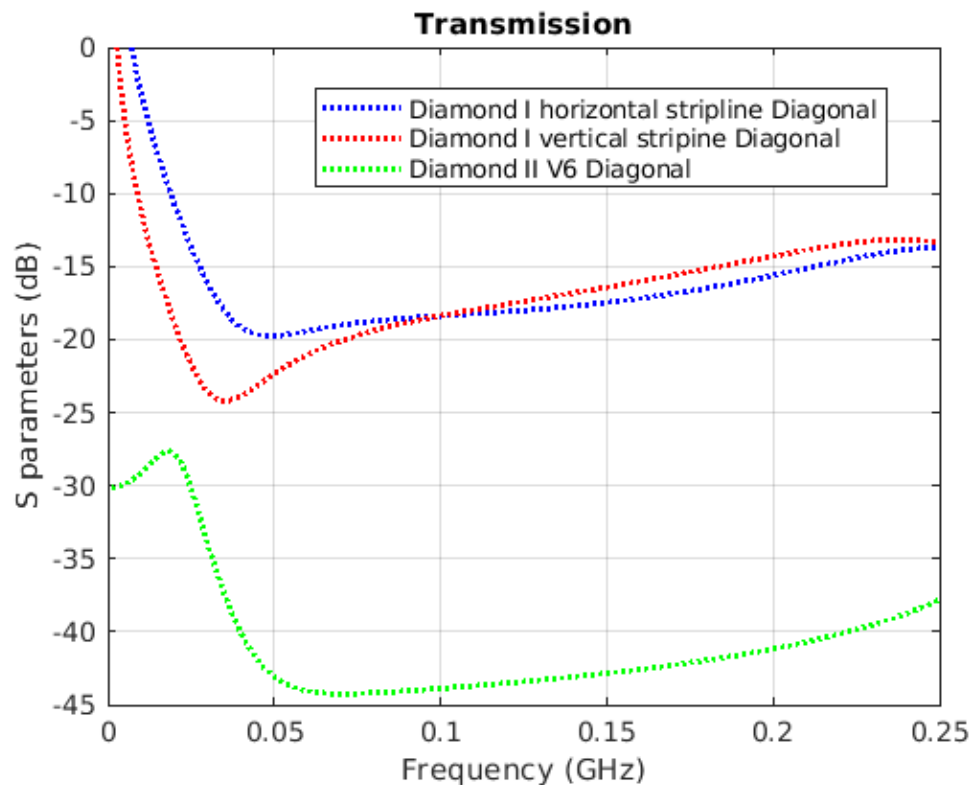
- Coupling into the structure is comparable to the diamond I design.
- Wake loss factor is reduced by a factor of  $\sim 10$  in the operational range.
- Ring down of beam induced signals is  $\sim 2X$  faster.



# Multi bunch feedback kickers - striplines

## More comparisons with Diamond-I design.

- Unwanted coupling between blades is reduced by  $\sim 20\text{dB}$ .



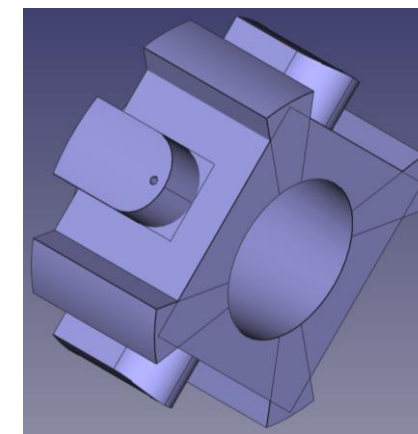
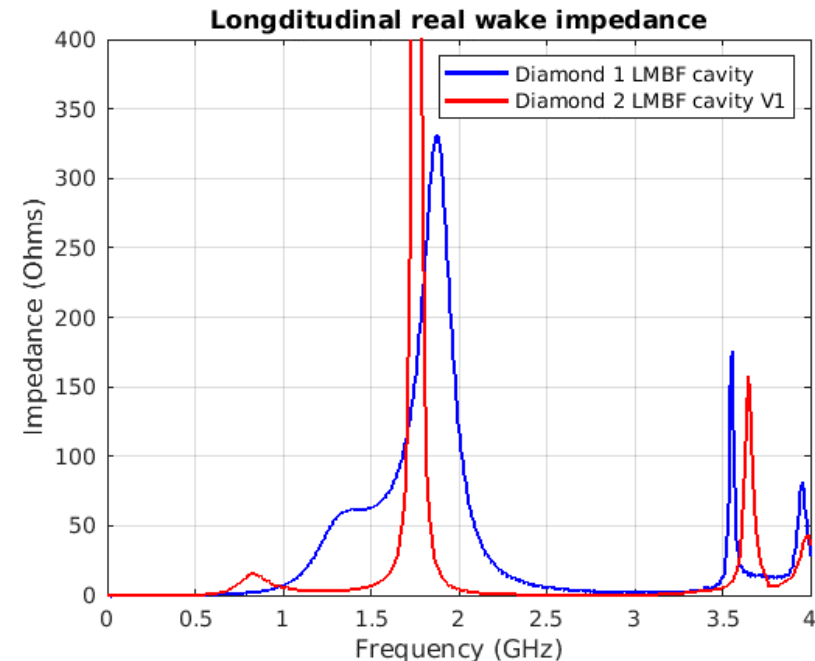
## Desired improvements:

- Better coupling of signals into and out of the structure.

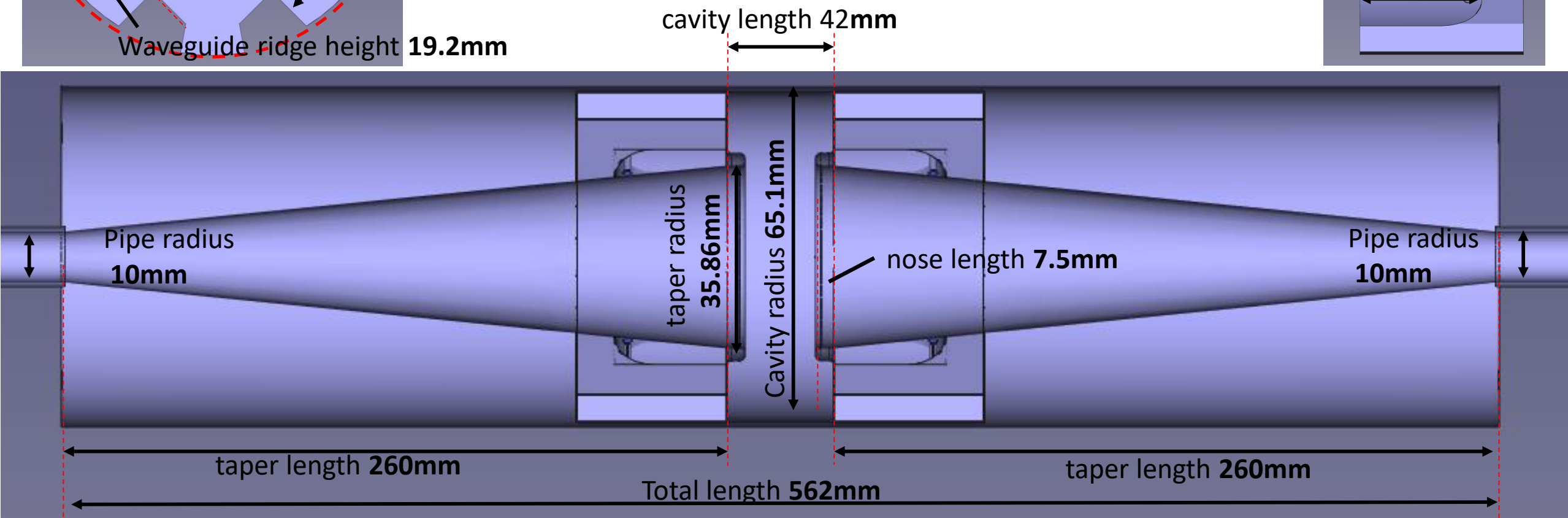
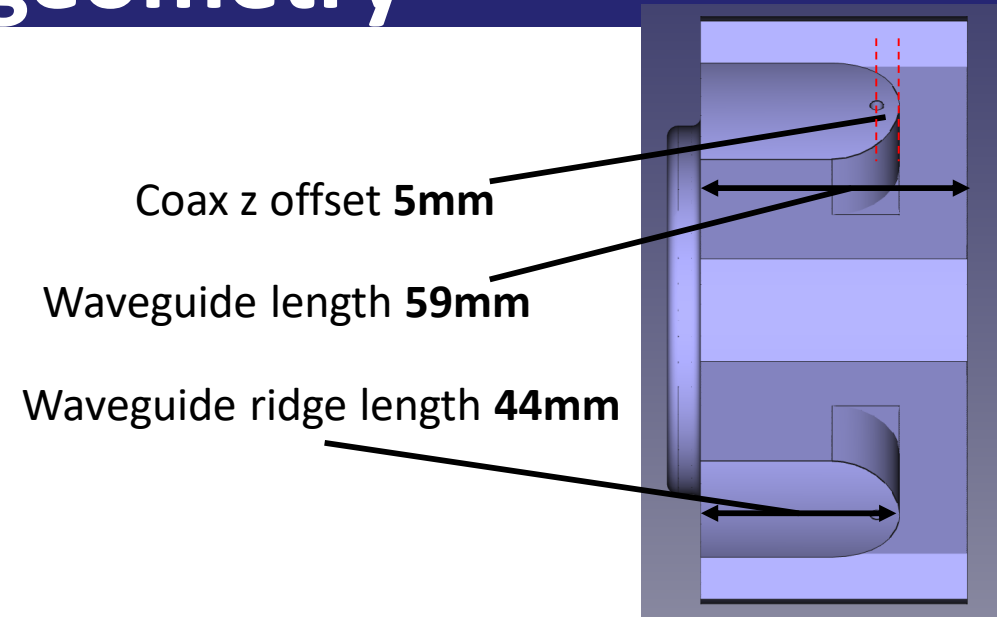
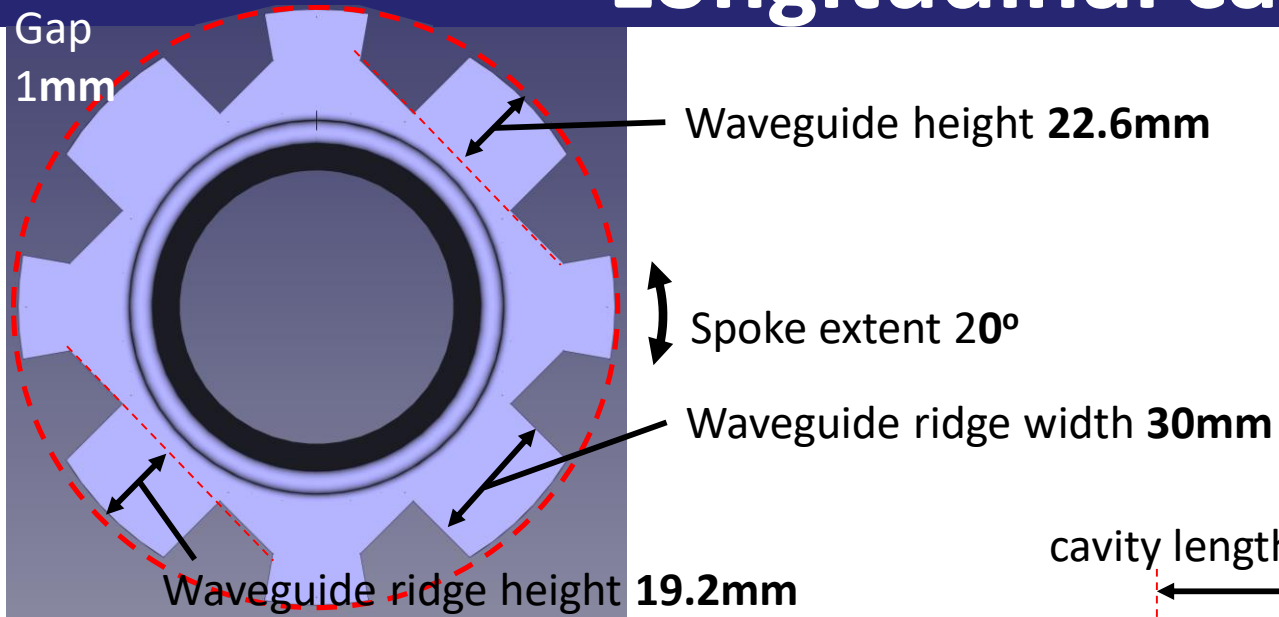
# Multi bunch feedback kickers – longitudinal cavity

## Modified Diamond-II design

- Initial modifications complete
  - However it needs tuning to recover the desired performance.
  - Currently running some parameter scans in order to identify appropriate modifications for the next version of the model.
- Due to the steeper taper down to the smaller pipe the wake loss factor is higher than the Diamond-I design (700 vs 430 mV/pC).
  - May be able to reduce it with further design changes.



# Longitudinal cavity geometry



# Wider considerations

- All models do not yet have a representative feedthrough included.
- The Longitudinal cavity and the stripline kickers need to be fairly close to one another (at most in adjacent cells), as they connect to the same frontend.
- Upstream components may have an impact due to shadowing requirements.
- Ideally we will build prototypes to validate the simulation work.
- We plan to compare the more refined designs with CST for cross comparison.