Accumulator Core 4-8 GHz Transverse Stochastic Cooling Upgrade

- This is a Run 2A project
- This project is critical in increasing luminosity in the Collider
- This project specifically targets large transverse pbar emittances at extraction.
- The goal is to have this project installed by May 1, 2002

Large Transverse Pbar Emittances during Extraction

- Due to:
  - Poor mixing
    - Accumulator Lattice Upgrade
    - 2-4 GHz core transverse systems ineffective
  - Poor performance of the present planar loop transverse 4-8 GHz arrays
    - Poor pickup signal to noise
    - Small bandwidth – virtually no bandwidth above 5.5 GHz
  - Heating Terms
    - Accumulator vacuum?
    - Transverse dampers

Present System

- The present system consists of four tanks 52” long
  - 2 planes
  - 1 pickup tank and 1 kicker tank per plane
- In each tank there is
  - A 2-4 GHz array with sixteen 100 Ohm loops
  - A 4-8 GHz array with thirty two 100 Ohm loops
  - Each kicker tank is powered by two TWT’s
    - One for 2-4 GHz
    - One for 4-8 GHz
- Most of the cooling is done with the 4-8 GHz array

New System

- Replace the two bands (2-4 GHz and 4-8 GHz) with 3 bands spaced in the 4-8 GHz range.
- The arrays for the 3 bands will occupy a single 52” tank.
  - Each array will be 10.6” long
  - Each array will be isolated from the other arrays with 5” sections of TT2-111R absorber
  - There will be four 5” absorber sections per tank
    - One at each end and two in the middle.

New System

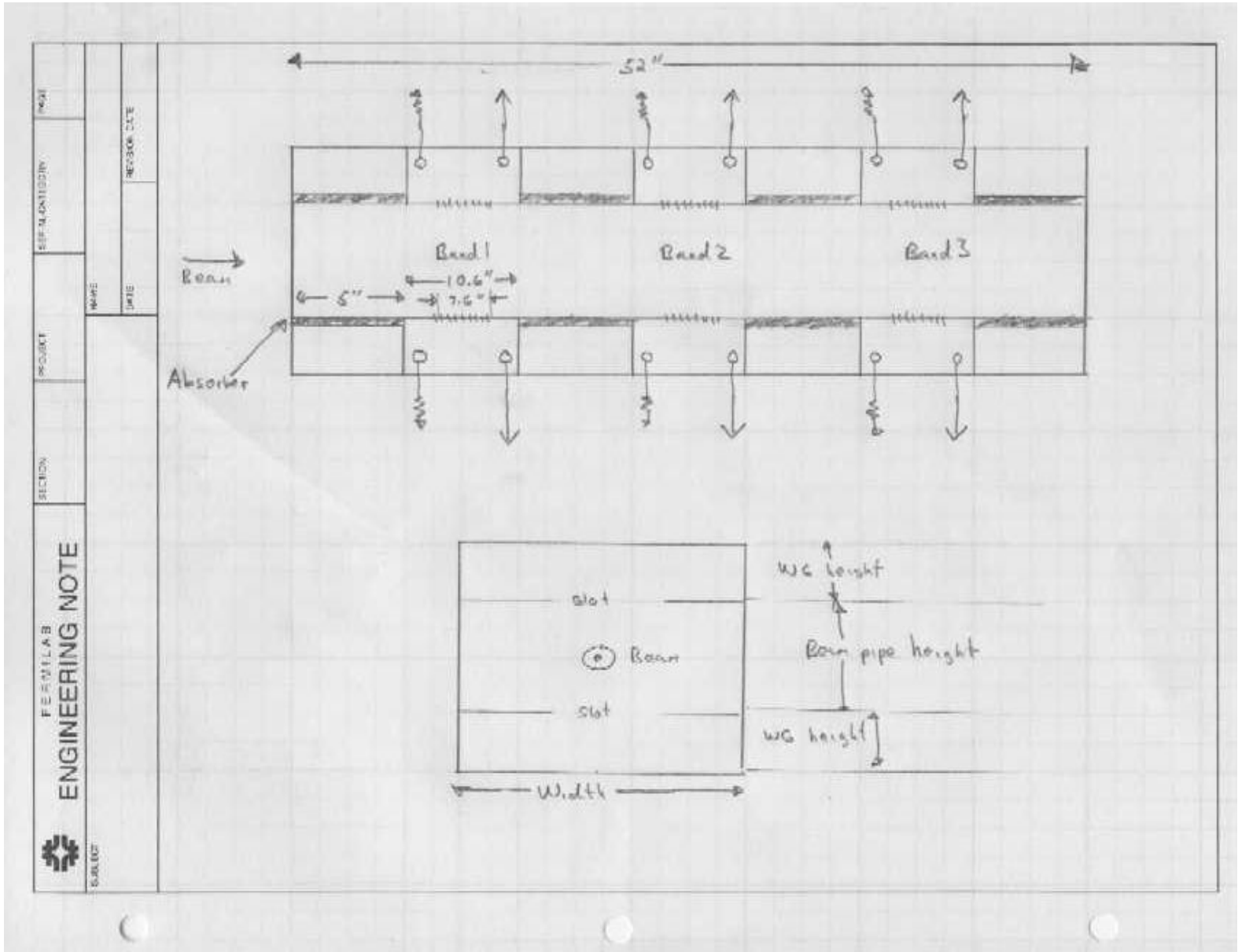
- Each pickup array will have it’s own pre-amp, trombone, and filter.
- Each band should have independent remote gain control
  - During stacking, the low frequency bands would have higher gain
  - During shot setup, the higher frequency bands will have higher gain
- All three bands will sum together into one trunk line.
- There should be only TWT per plane
  - There will need to be separating filters at each kicker array to keep reflected power low.
  - These filters will have to take relatively high power
  - Alternative: three TWTs per plane – one for each band.

Some Parameters

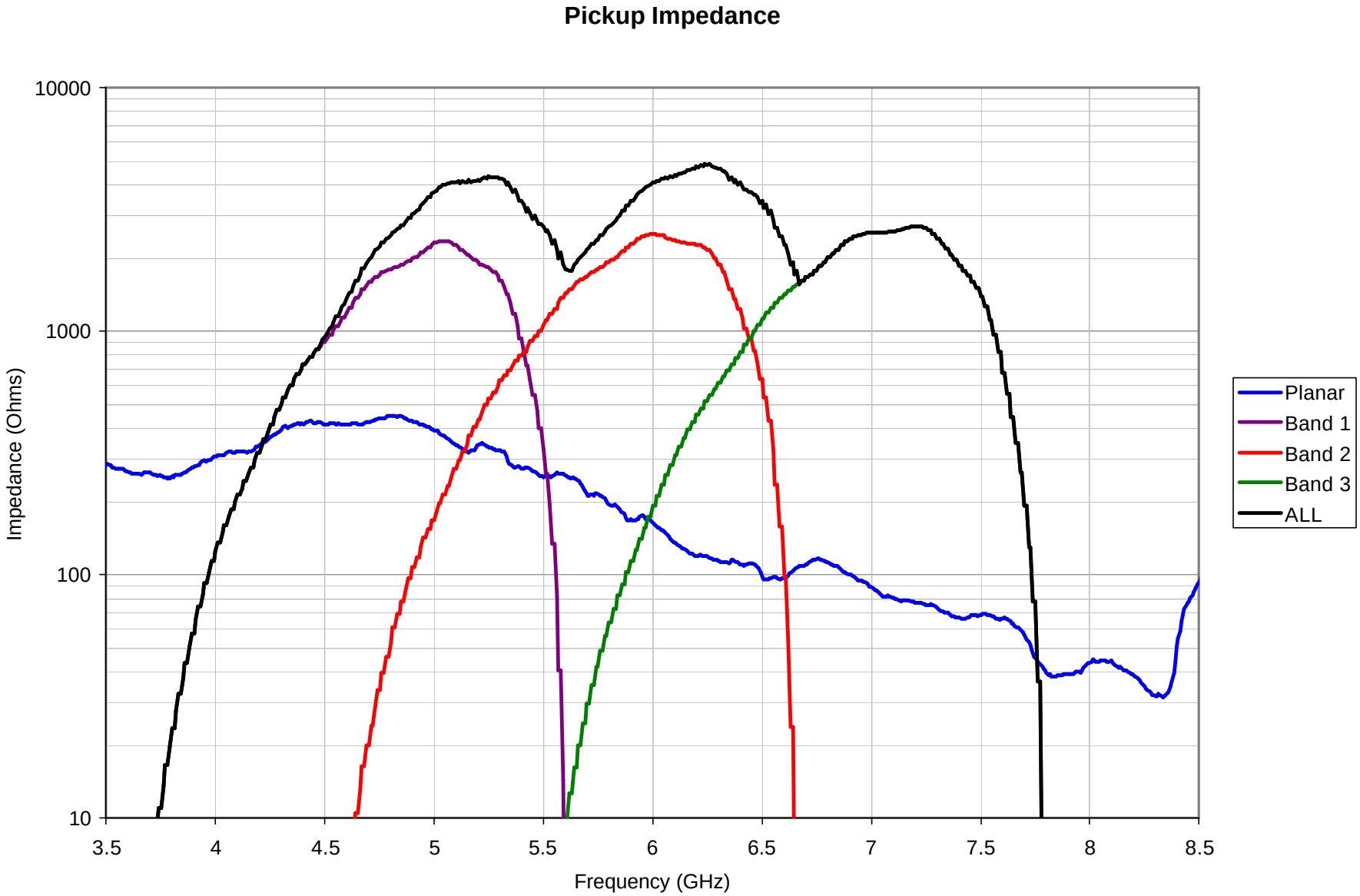
Band	Wave guide	Center Freq (GHz)	Freq Span (GHz)	Waveguide Width (inches)	Waveguide Height (inches)	Beam Pipe Width (inches)	Beam Pipe Height (inches)
1	WR-187	5	1.3	1.872	0.872	1.872	1.244
2	WR-159	6	1.3	1.59	0.795	1.59	1.244
3	WR-137	7	1.3	1.372	0.622	1.372	1.244

Band	Array Length (inches)	No. of Slots	Launcher Room (inches)	Slot Width (inches)	Slot Spacer (inches)	Slot Length (inches)	Peak Impedance (Ohms)	Effective Bandwidth (GHz)
1	10.6	48	1.5	0.08	0.08	0.814	2352	1.082
2	10.6	48	1.5	0.08	0.08	0.679	2510	1.166
3	10.6	48	1.5	0.08	0.08	0.575	2704	1.263

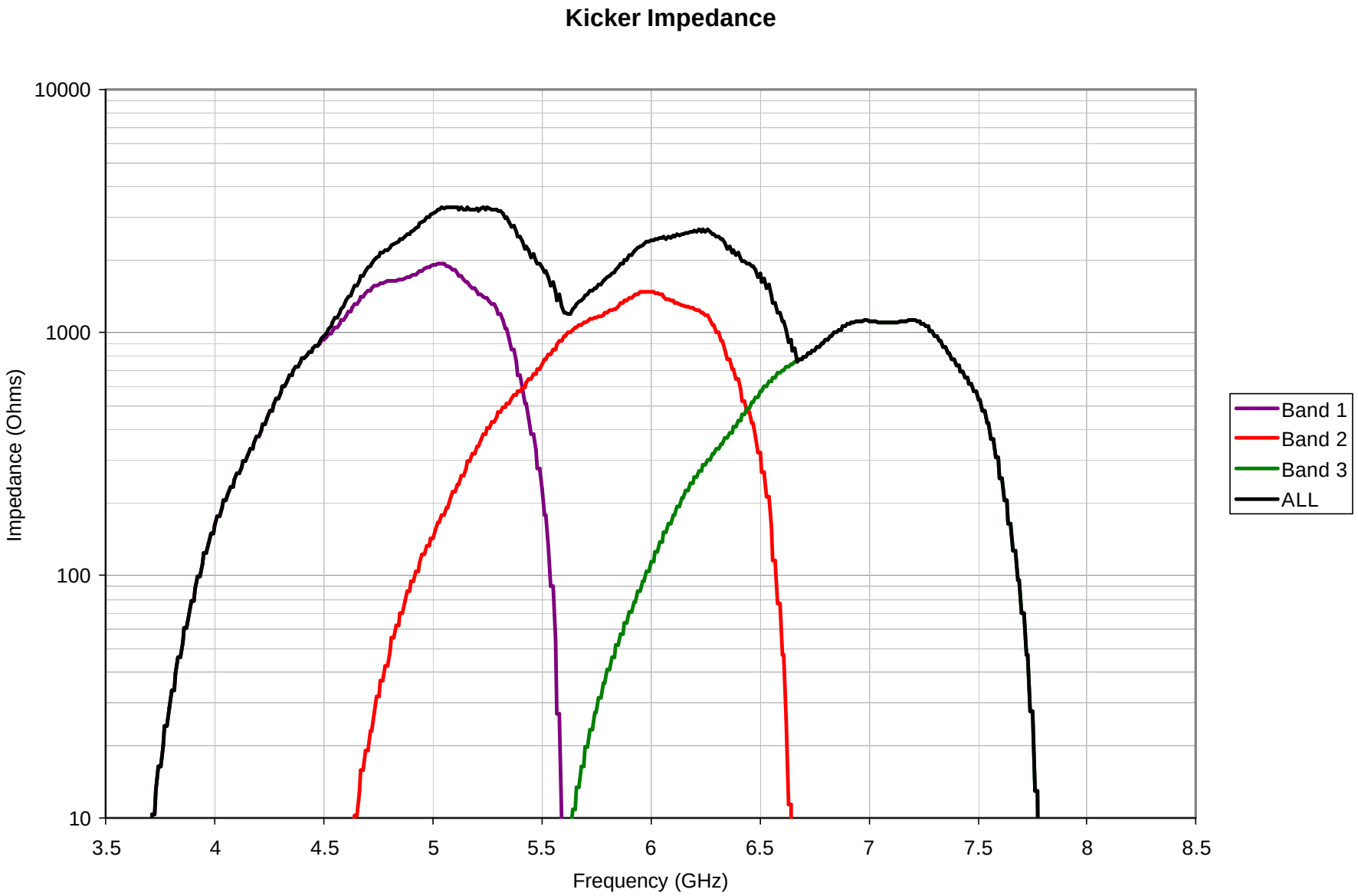
Array Cartoon



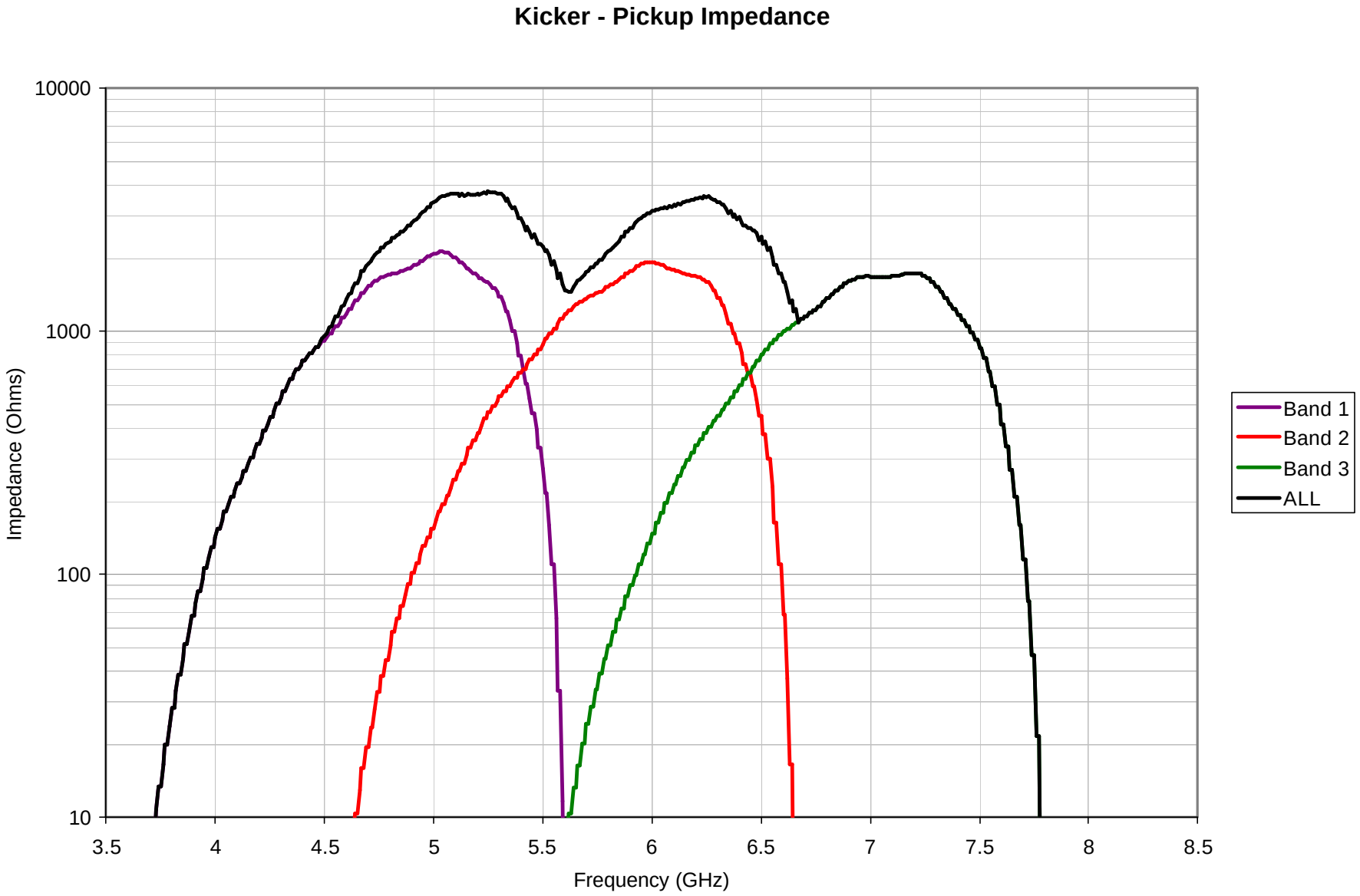
Pickup Impedance



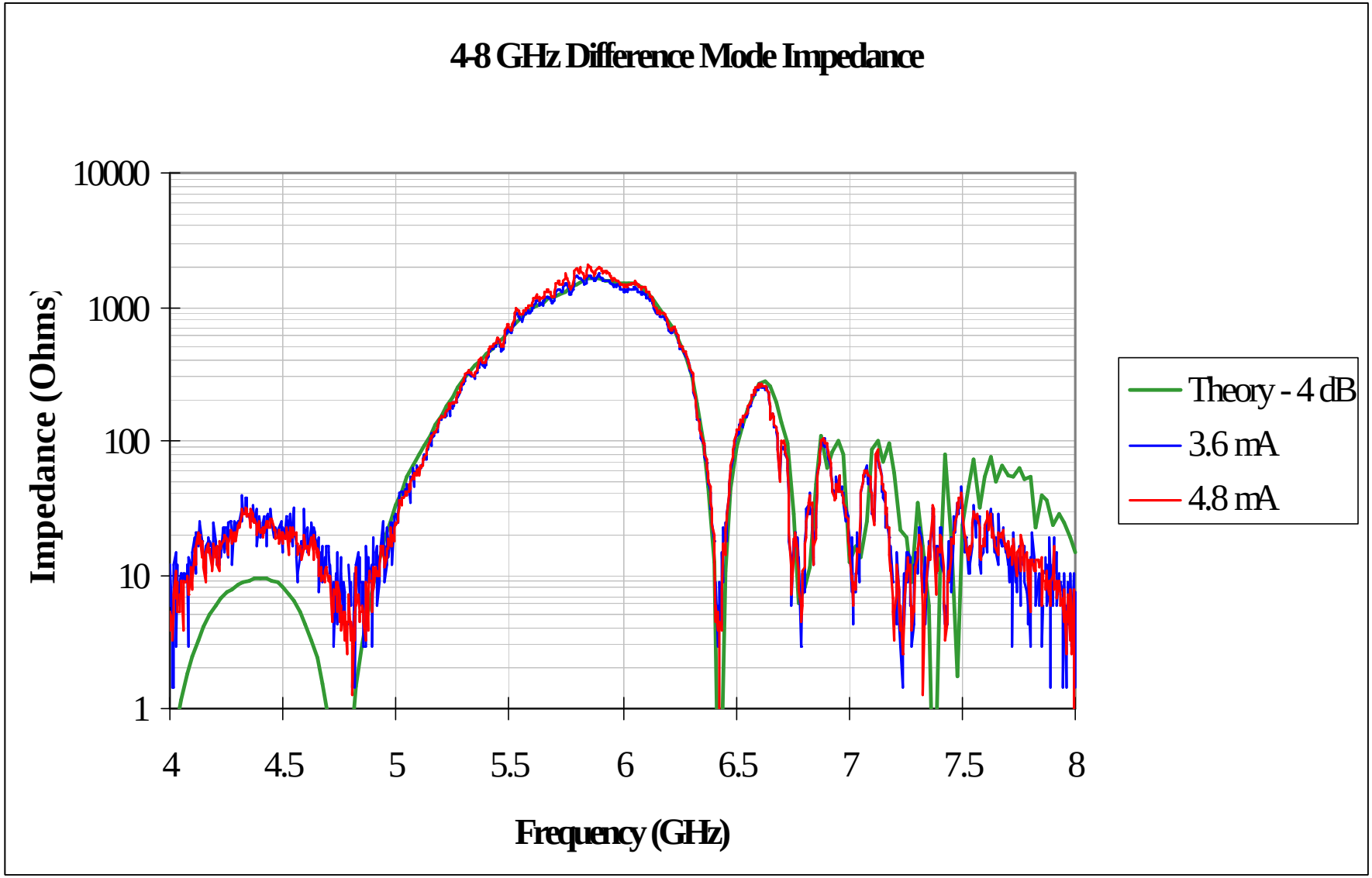
Kicker Impedance



Pickup Kicker Impedance



Debuncher Beam Tests



Questions

- Waveguides and magic – T's in the tank
- Kicker Terminations outside the tank
- Re-use 52" stacktail tanks
- Absorber vacuum properties

Schedule

- Slot Design finished Dec 1. 2001 (Sun-McGinnis)
- Absorber design done Dec 1, 2001 (Sun)
  - Absorber ordered Dec 15, 2001 (Sun)
- Decision on waveguides & magic T's - Dec 1, 2001 (Sun – Mech. Support)
- First set of tank drawings – Dec 15, 2001 (Mech. Support)
- Final tank drawings – Jan 30, 2002
- Tanks fabricated – May 1, 2002
- Rough electronic design – Dec 15, 2001 (Pasquinelli, Cullerton, Van der Meulen, Seifrid)
  - Includes filters
- Final electronic design – Jan 30 (Pasquinelli, Cullerton, Van der Meulen, Seifrid)
  - Includes filters
- Electronic plates built – May 1, 2002
- Tunnel installation – 1 week