

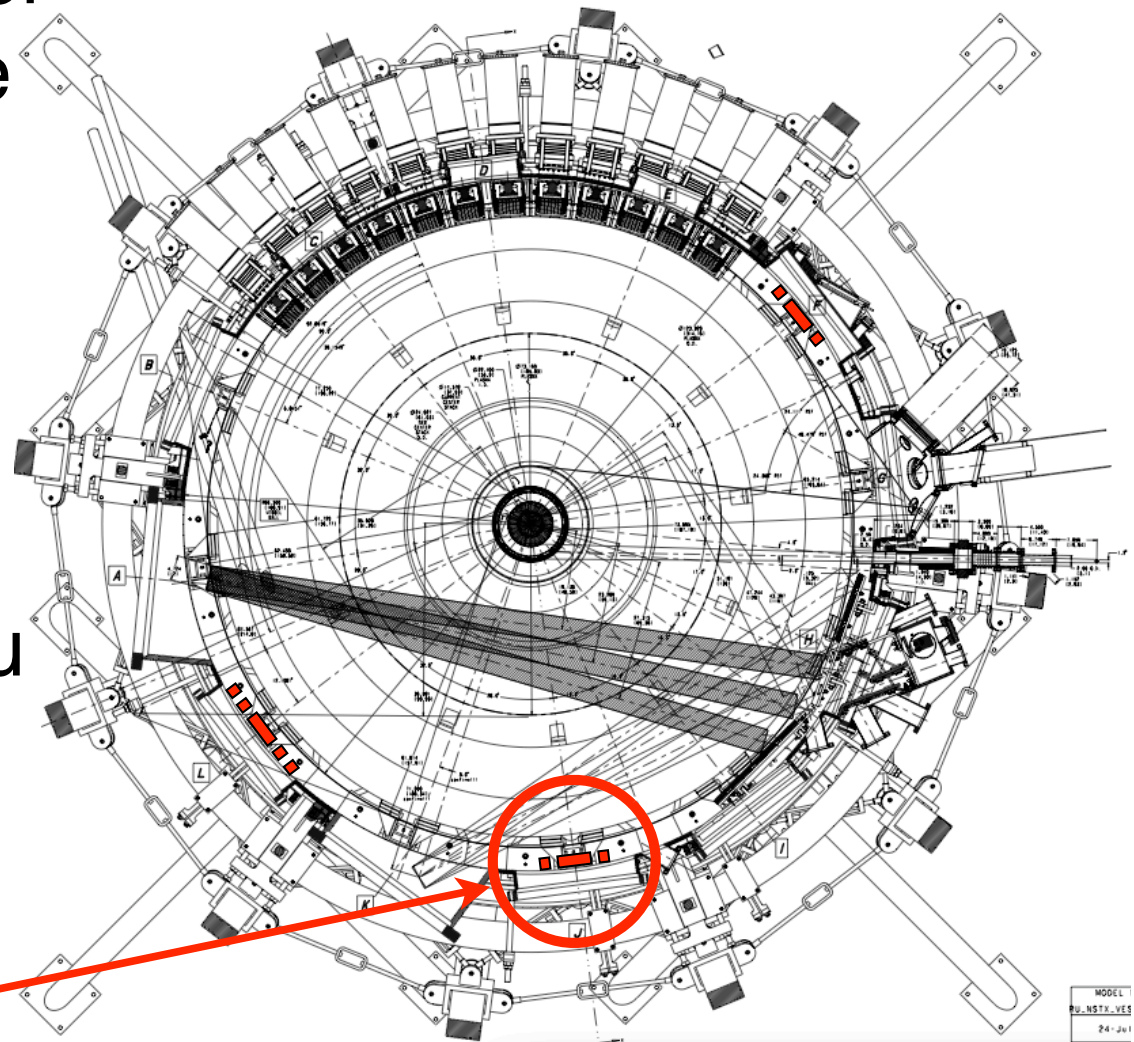
Proposals for HF Mirnov Array upgrades and comments on *AE antenna

E Fredrickson
WPI-TSG
April, 2010

Existing HF array has good even-odd discrimination



- Addition of third cluster would greatly improve mode i.d. capability.
- Third polarization measurement would improve statistics.
- Uses existing feedthru & field cables from 'Hiro' coil installation.

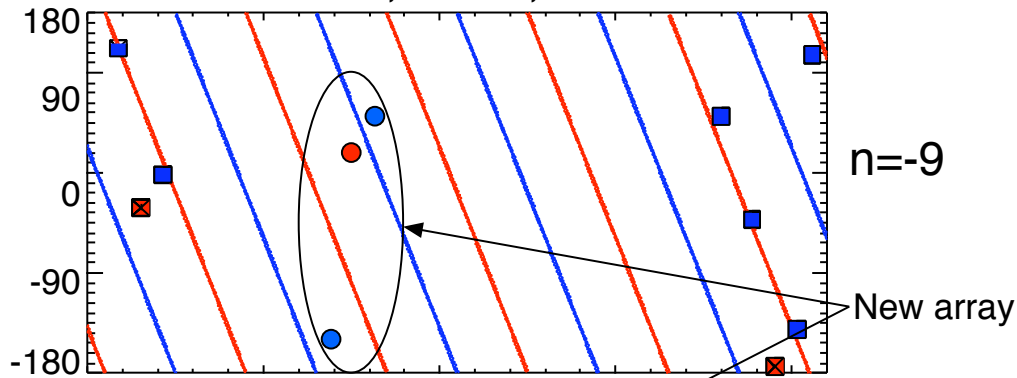


New Array

New array improves n-resolution

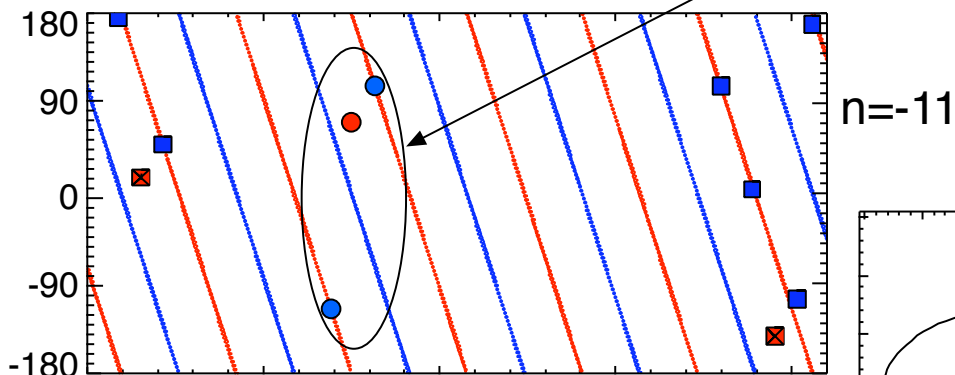


shot 135647, 0.35s, 1.86 MHz

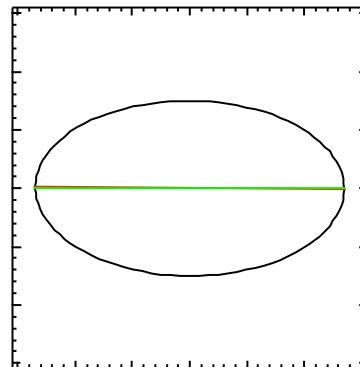
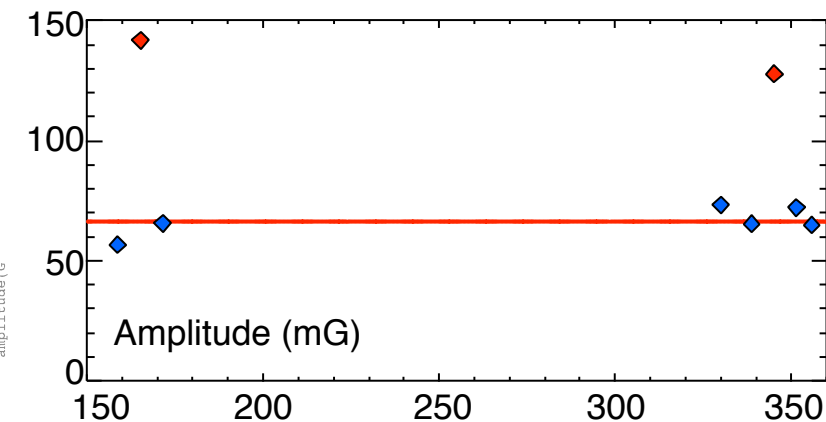


$n=-9$

New array



$n=-11$



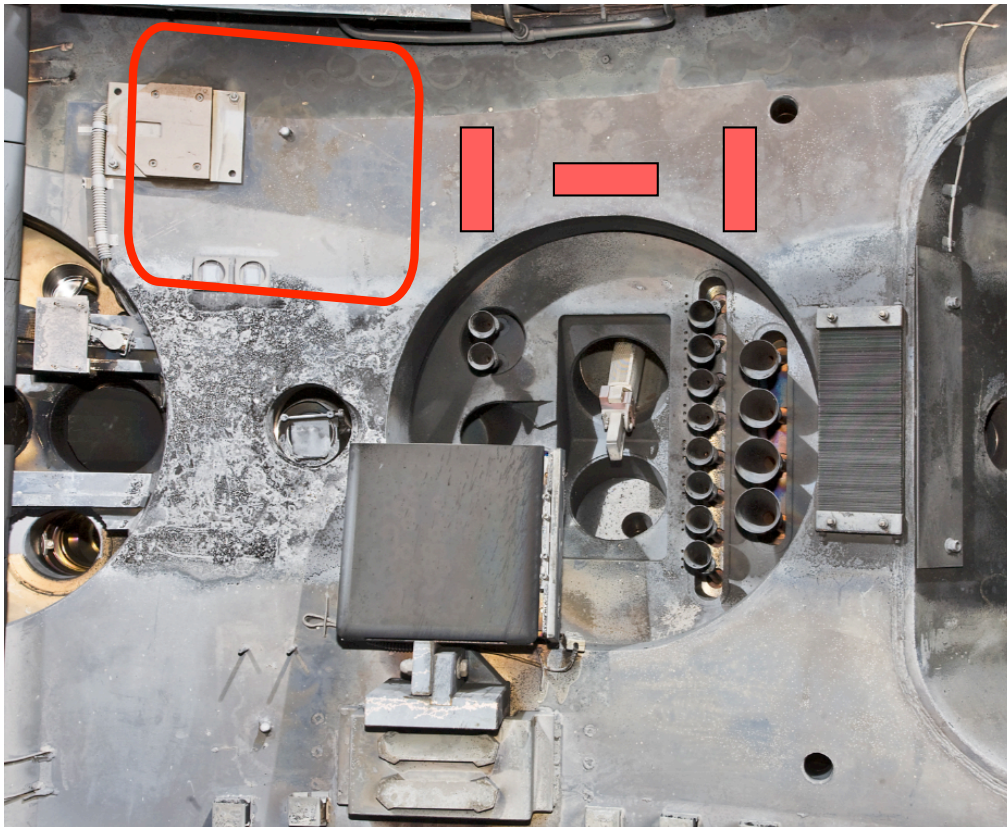
- Present array has good even-odd discrimination.
- Not so good for ± 2

New array in Bay J



Bay F

Bay K



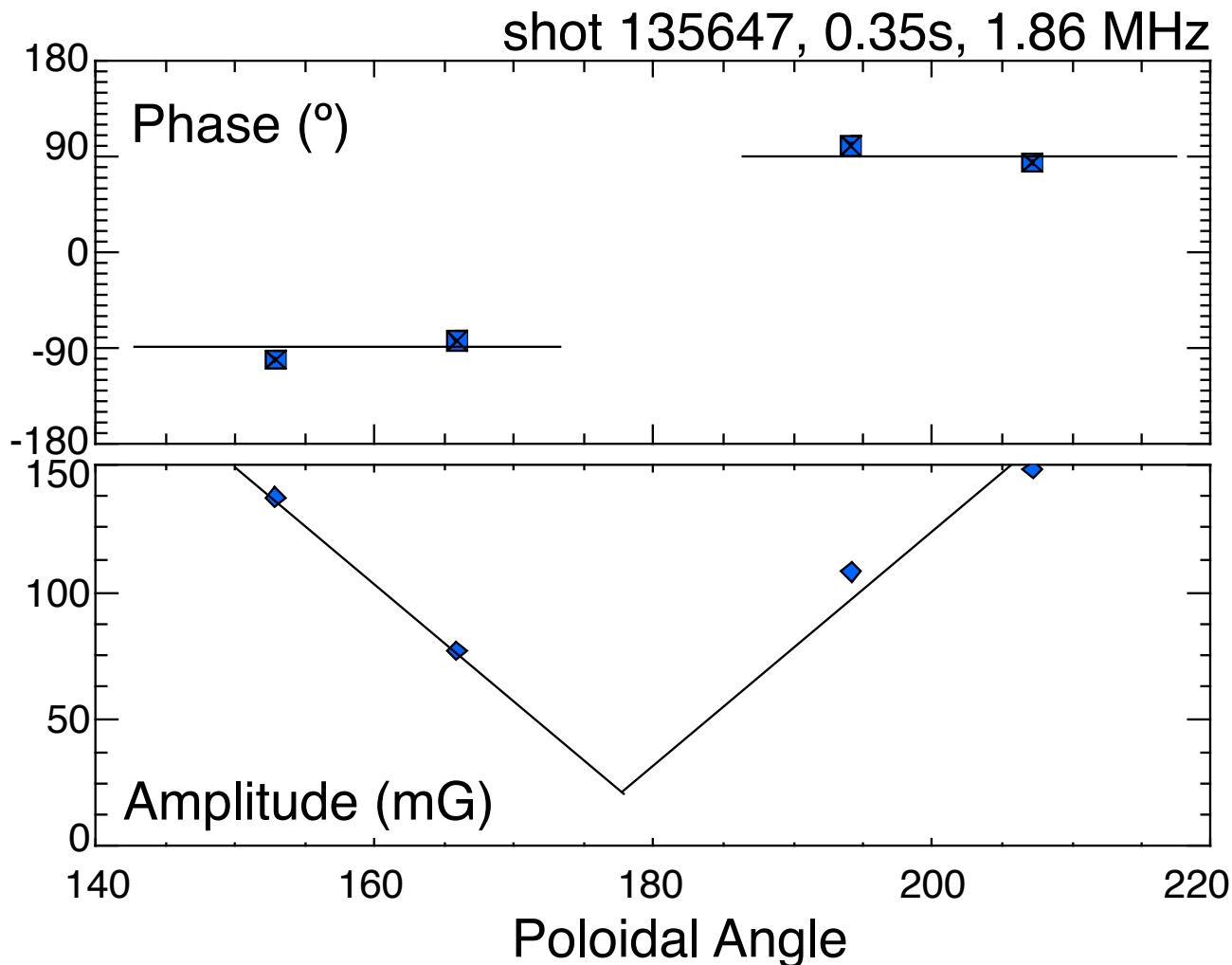
Bay J



Poloidal array needs new coil, too



- Is this a standing wave?

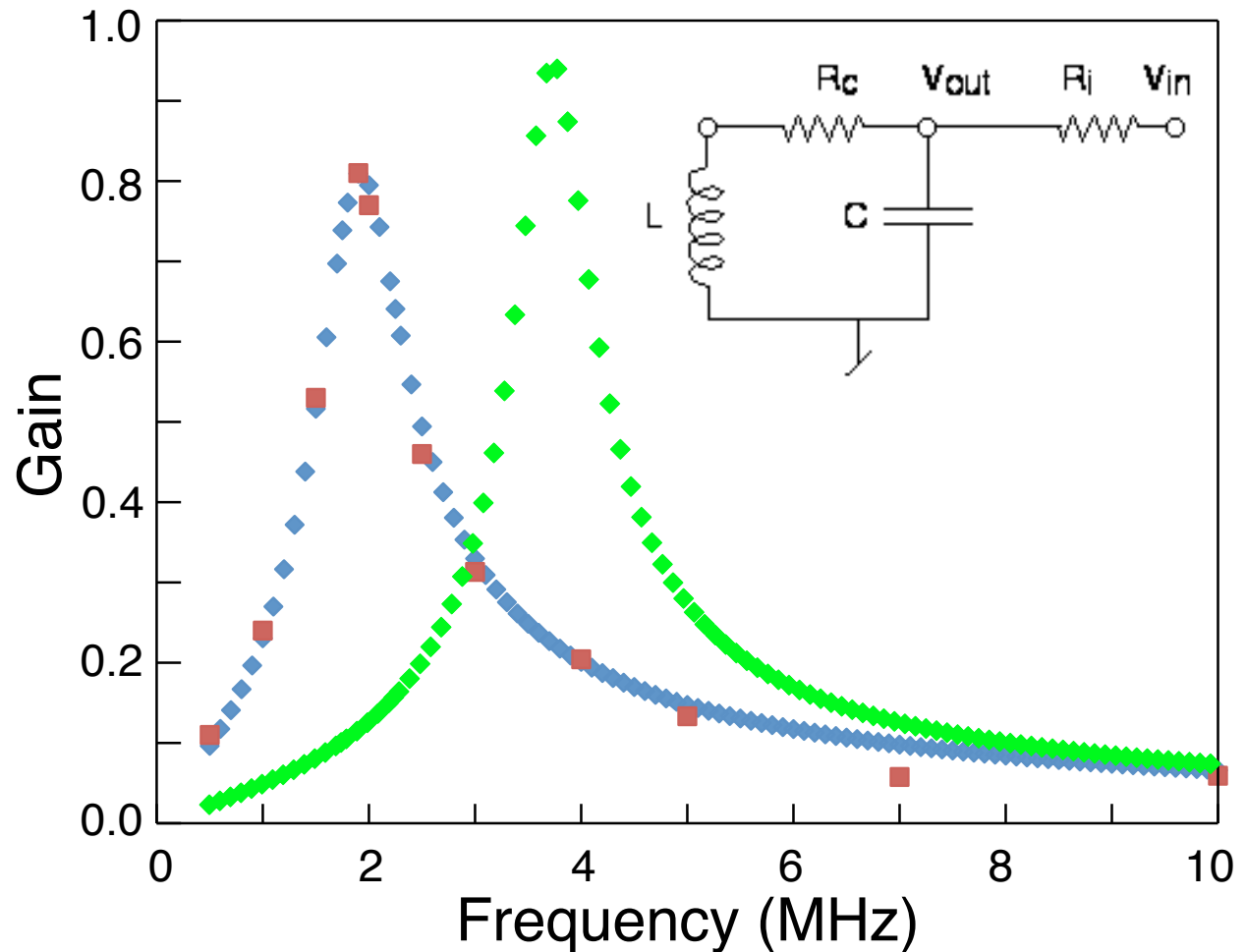


- By symmetry, should be node or anti-node at 180° .

Upgrade to 1T will approximately double *AE frequencies



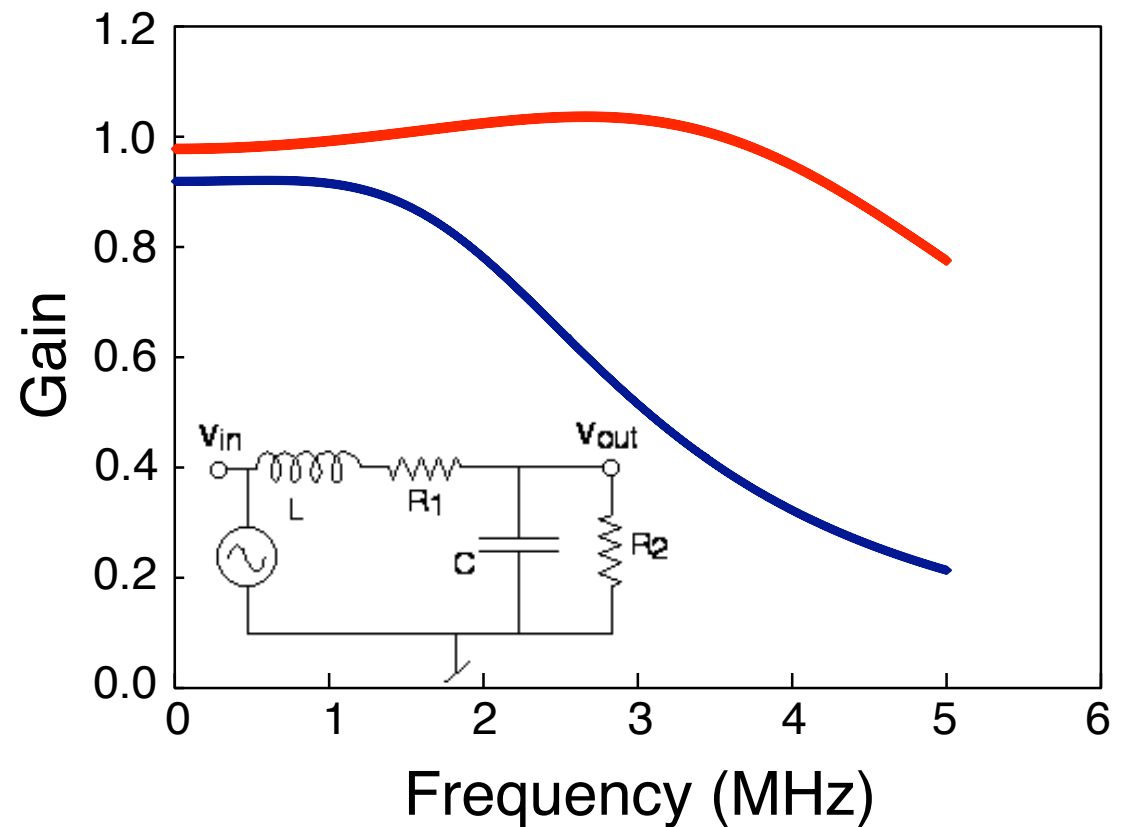
- CAE frequency typically ≈ 2 MHz.
- Bandwidth set loosely by LC resonance of coil and leads.
- Reducing turns by two, doubles bandwidth, halves sensitivity.
- Red points calibration data, blue curve simulation.



Simple modification increases response to 4 MHz



- Blue is original coil design, red is coil with half as many turns.
- May also need to minimize leakage inductance of coil (smaller gap between turns).



Add Coil for CAE/TAE excitation?



- Add simple 1-8 turn coil as shown; ≈ 35 cm x 35 cm, # turns tbd
- Very similar to C-Mod coil (15cm x 25cm, 5 turns, 400 W amplifier)
- Maybe conflicts with new HF coils, but maybe in a different bay?
Bay J
- 8 turns, 100kHz: $\omega L \approx 50 \Omega$.
- 2 turns, 2 MHz: $\omega L \approx 63 \Omega$.
- Old DNB RF source was 2 MHz, 150 - 200 kW.
- Not clear what sources would be available in TAE frequency range.

