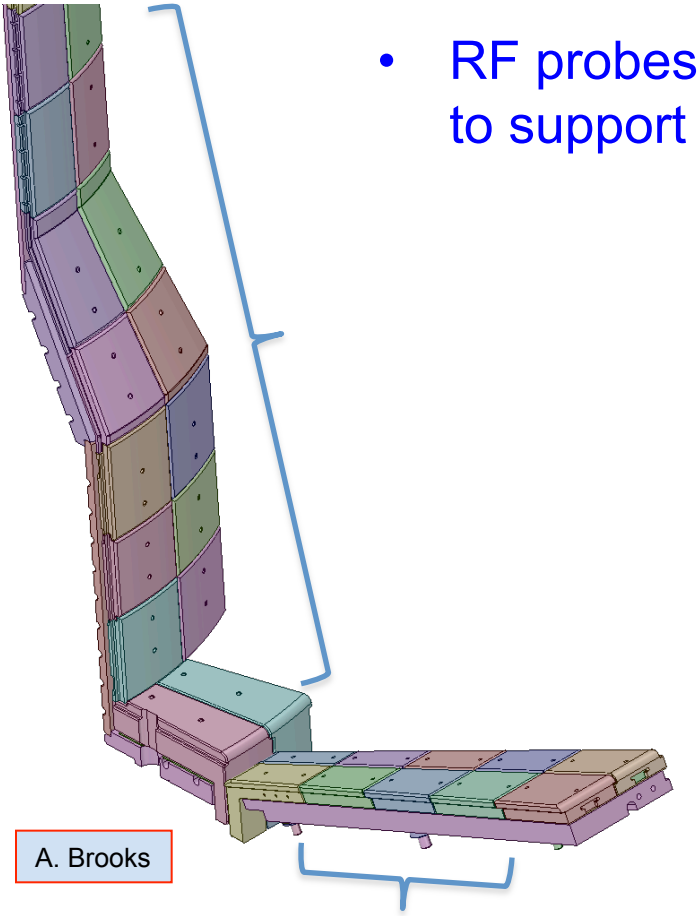
Wave Heating and Current Drive TSG

R. Perkins and J. Hosea

1. Polar region change impact:
   - Research objectives will be compromised if changes are made to rows 2 – 4 of the outer divertor tiles that require removal of the divertor RF probes
     - These probes are necessary for quantifying heat deposition due to far field RF rectification

2. Plasma Parameters needed for HHFW experiments
   - HHFW experiments are compatible with all plasma parameters except for the outboard antenna/separatrix gap
     - An outboard limiter is needed to shield the antenna from energetic ions in the SOL
     - An outboard limiter located away from the antenna should also result in less gas entering the antenna and thus in more robust coupling into high power NB heating conditions.

Impact of possible PFC changes for rows 2 – 4 of the outer divertor tiles



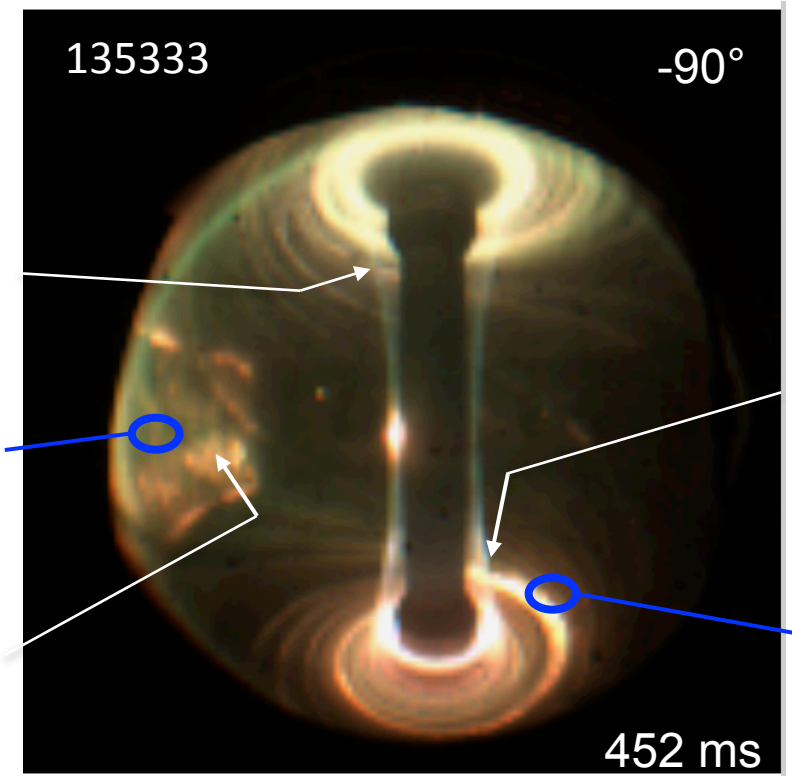
Outboard divertor tiles
Rows 2 - 4

- RF probes in outboard divertor tiles need to be maintained to support RF deposition physics in the SOL

Recovery project is still working to determine requirements for the tiles shown

- Initial studies indicate that their may be sufficient thermal margin in an average sense.
- Risk of strong leading edge heating on vertical target
- Recently revised both physics and analysis assumptions regarding halo currents on the CS.
- Halo current loads are large and likely problematic
  - Refining both the requirements and the analysis to better assess this issue.

IR camera and probes are critical for documenting RF edge heating



Bay G
IR view

Antenna
probes,
reflectometer

Antenna
IR view
& visible view

Bay I
Wide angle
IR view

Bay J probes (Langmuir and RF)

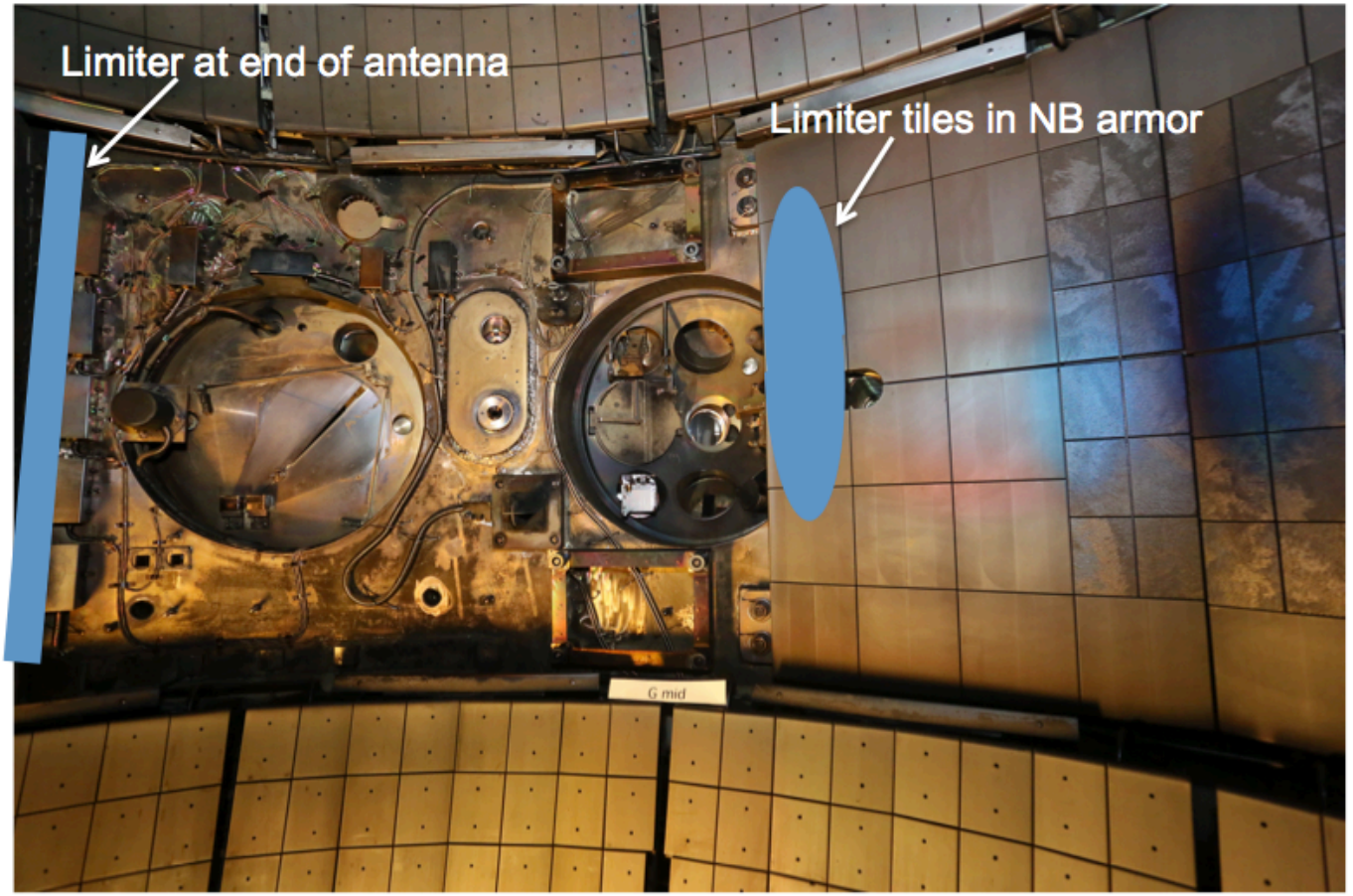
- 6 poloidal Langmuir probe array for radial coverage top and bottom

B_T = 4.5 kG, I_P = 0.8 MA

- Probes for measuring IV characteristics and RF fields: Coaxial Langmuir at Bay J top and bottom tiles in Rows 2 - 4

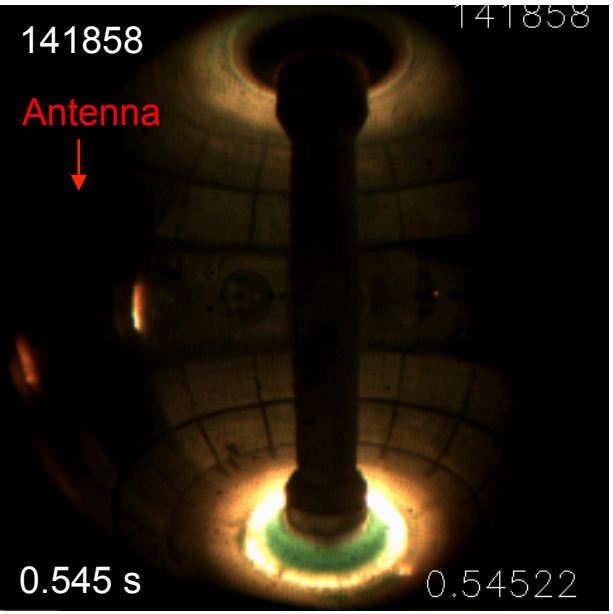
Plasma parameter needed for HHFW experiments is a controlled outer gap to the antenna

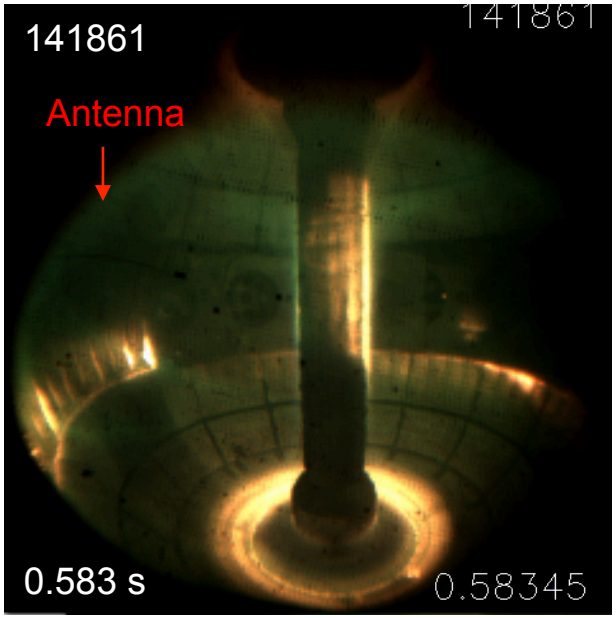
- NB energetic ions bombard the HHFW antenna when the gap is too small
- Limiter on NB armor should prevent this and excessive gas flow into the antenna

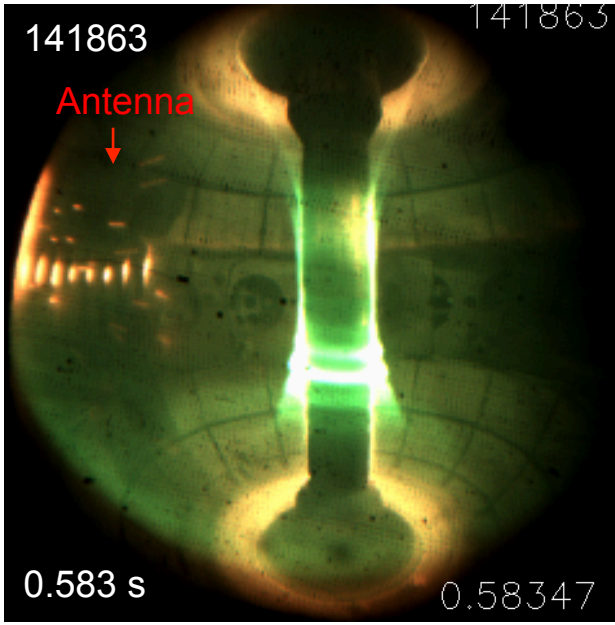


NB bombardment of antenna follows the center of the plasma (smallest gap)

Scan of Z position of plasma with P_{NB} = 2 MW, P_{RF} ~ 1 MW, I_P ~ 0.65 MA







Midplane gap ~ 6 cm		~ 6 cm	~ 5 cm
Gap at interaction zone	~ 6 cm	~ 4 cm	~ 4 cm
Z_C position	~ -3.5 cm	~ - 20 cm	~ + 16 cm

- A central mid-plane limiter on the NB armor should be sufficient to protect the antenna