

Asymmetric Biasing for SOL Control in NSTX

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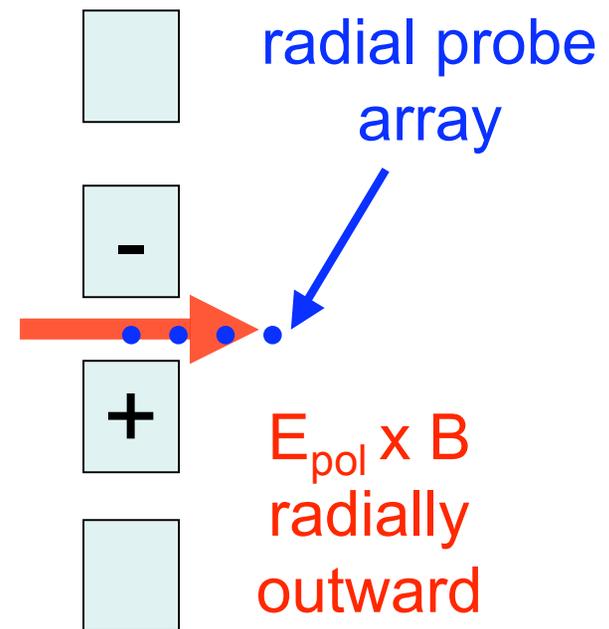
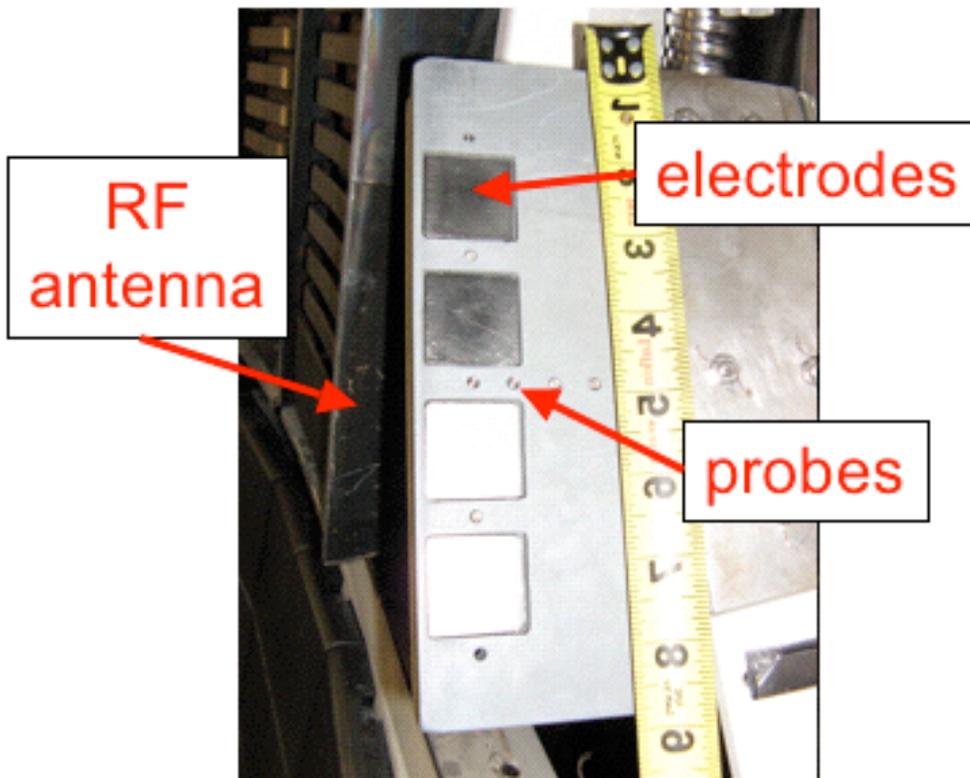
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Motivations:

- Control local SOL width using ExB drift created by biased electrodes (based on idea of Cohen, Ryutov et al)
- Optimize biasing technique to minimize power input

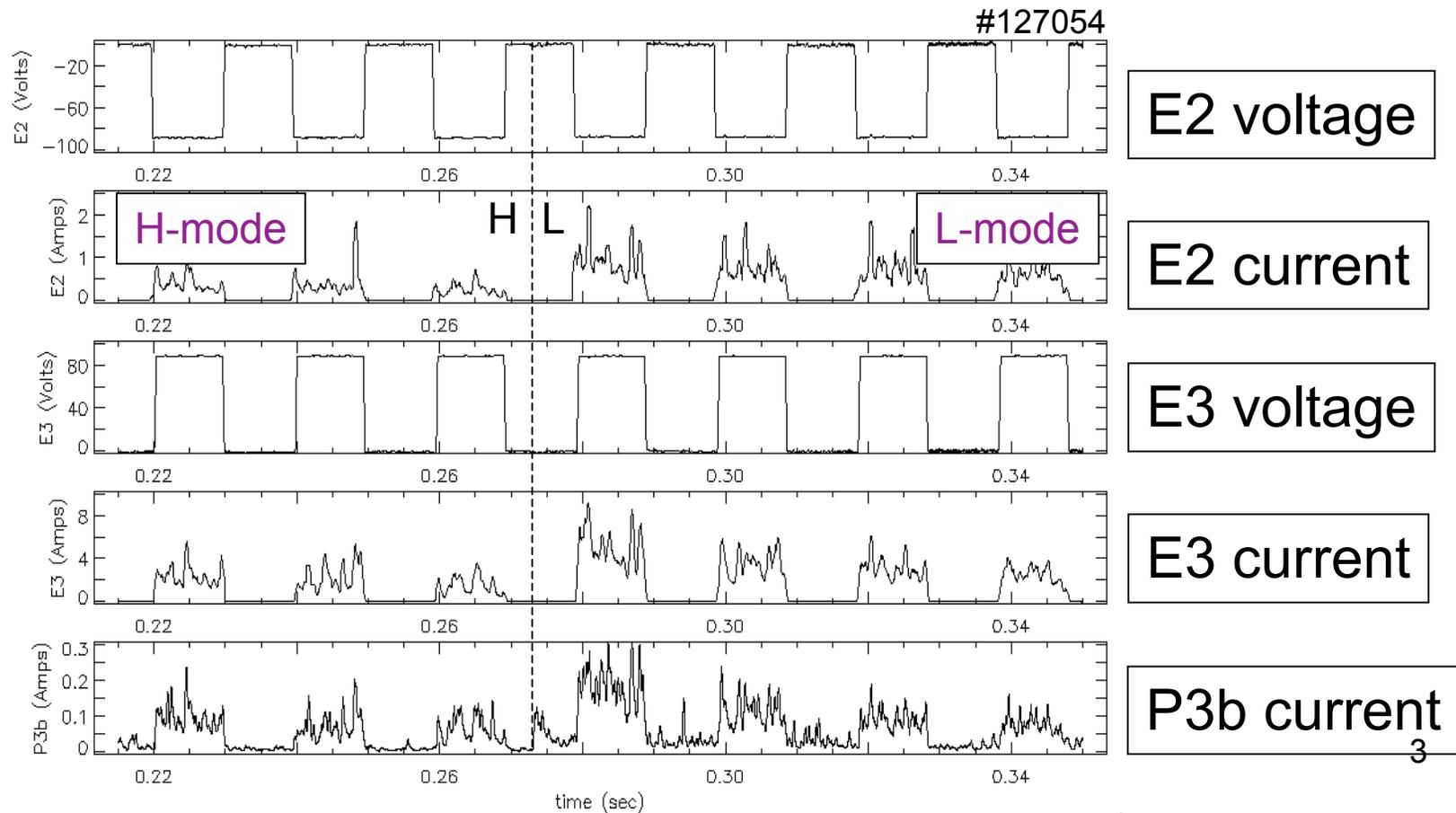
Biased Electrodes and Probes

- Electrodes ≤ 100 V @ 30 A (or -100V @ 10 A), @ 50 Hz
- Nearby Langmuir probes biased DC or swept ± 50 volts



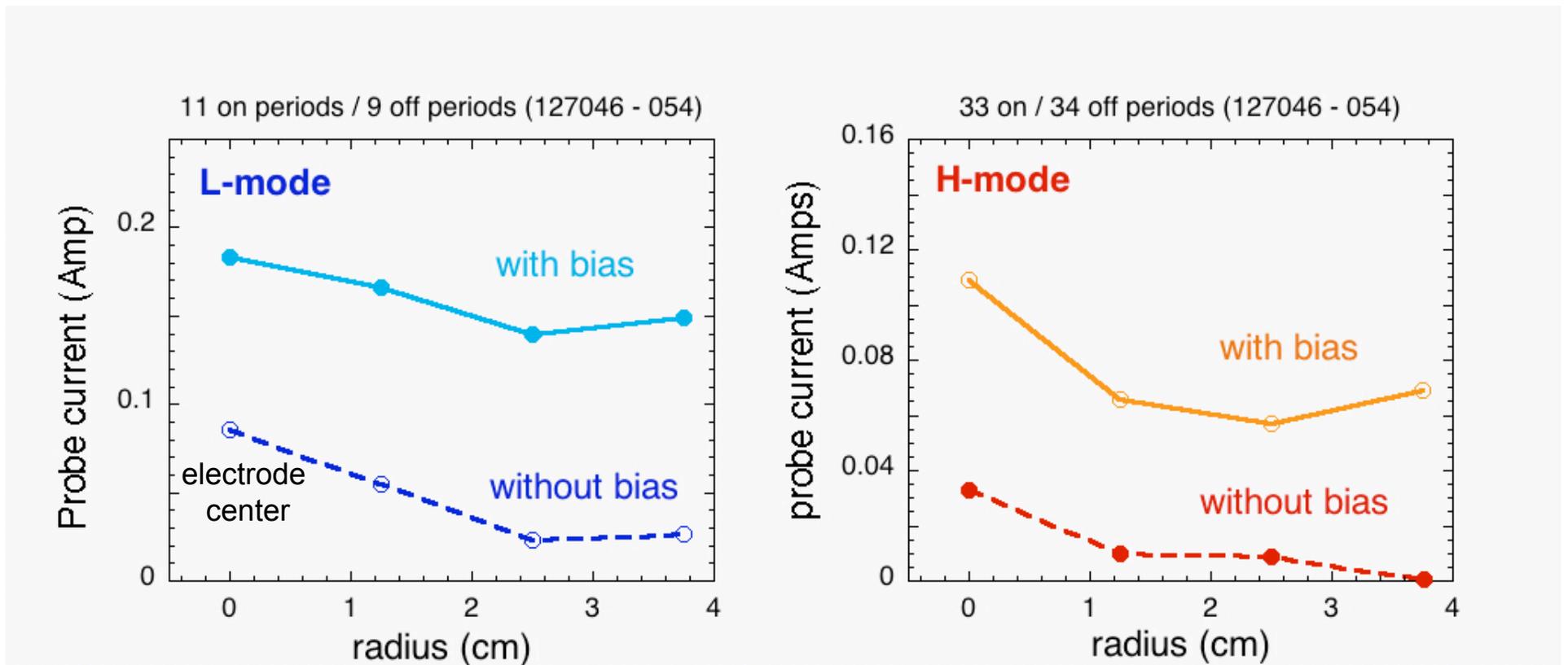
Electrode and Probe Signals vs. Time

- Here E2 @ - 90 volts, E3 at + 90 volts, P3b @ +45 volts
- See clear increase in probe current with each biasing



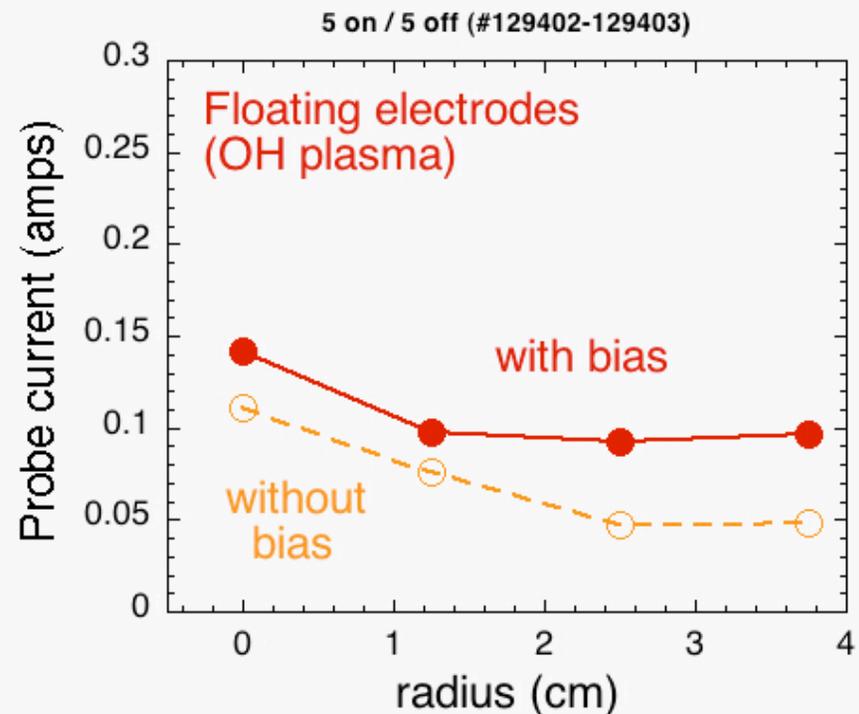
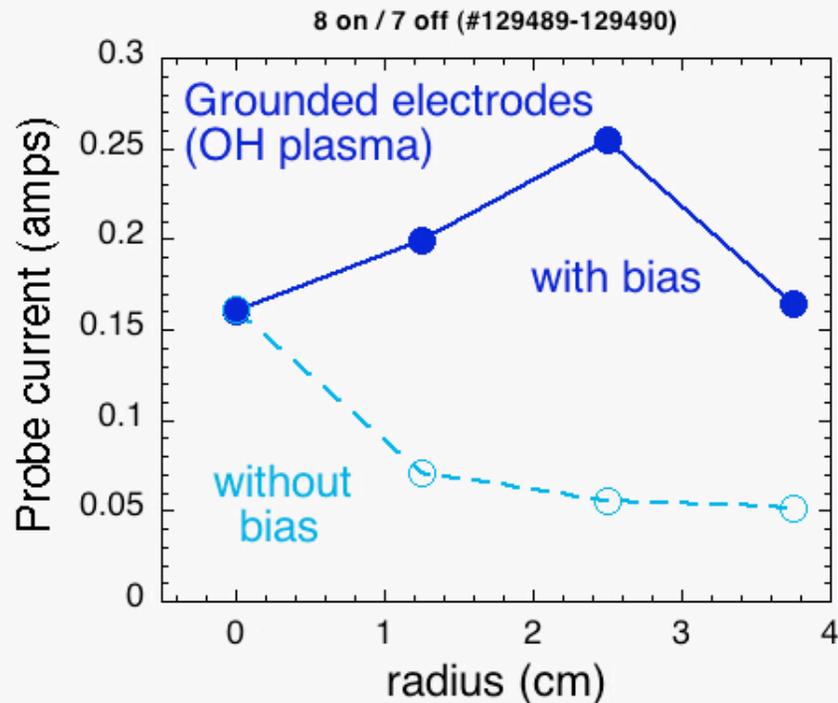
Local SOL Density Profile Effects

- SOL broadened for E_{pol} directed outward at probe array
- Similar profile change seen in NBI, OH and RF plasmas



Floating vs. Normal Electrodes

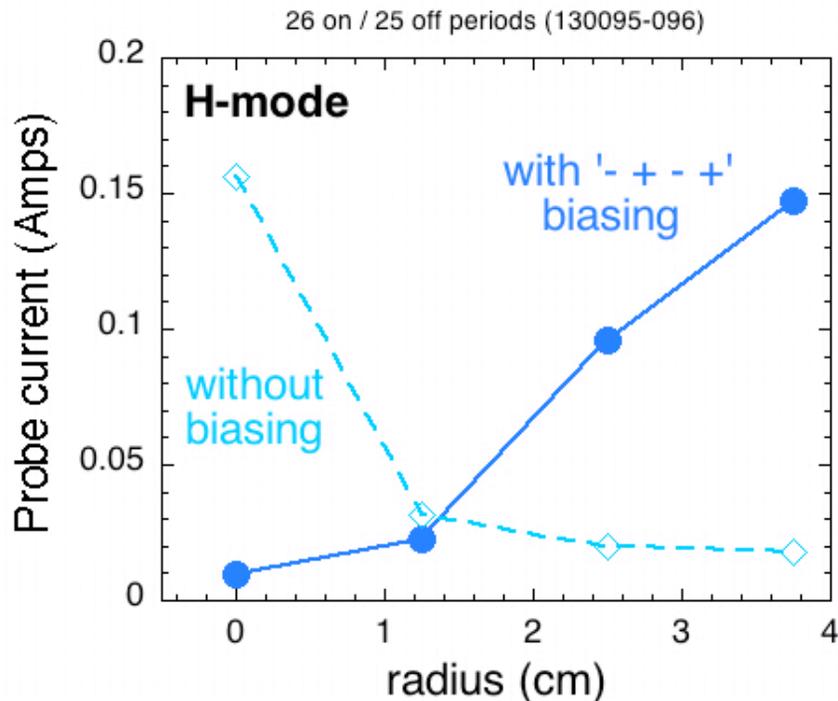
- Normal case ~ 8 Amps + 90 volts, ~ 1 Amp at - 90 Volts
- 'Floating double probe electrode' ~ 1 Amp @ ± 45 volts



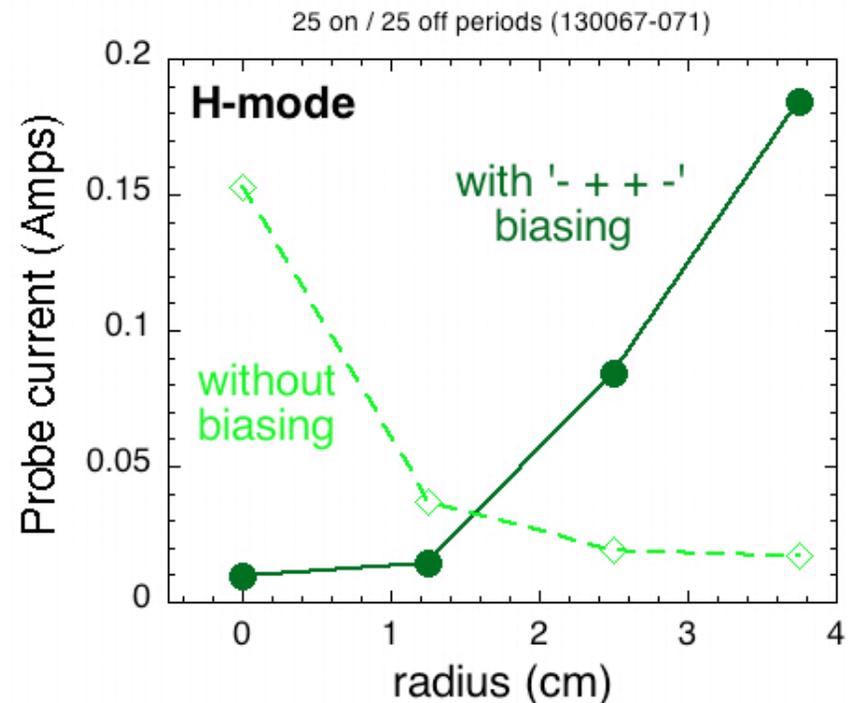
Different Polarity Electrodes

- SOL profile changed in opposite with different polarity
- Increase at large radius likely due to convective cells

reversed polarity



double-plus electrode



Summary

- Asymmetric biasing did control local SOL near midplane
- Ready to try biased electrodes in LLD diagnostic tiles, can view SOL movement using camera from top

