
***XP 625: Investigation of Thermal EBW
Emission & Oblique O-Mode Coupling
Efficiency in
L- & H-Mode Plasmas***

***S.J. Diem¹, G. Taylor¹, J.B. Caughman²,
P.C. Efthimion¹, B.P. LeBlanc¹, R.W. Harvey³,
J. Preinhaelter⁴, J.B. Wilgen²***

- 1) Princeton Plasma Physics Laboratory*
- 2) Oak Ridge National Laboratory*
- 3) CompX*
- 4) Czech Institute of Plasma Physics*

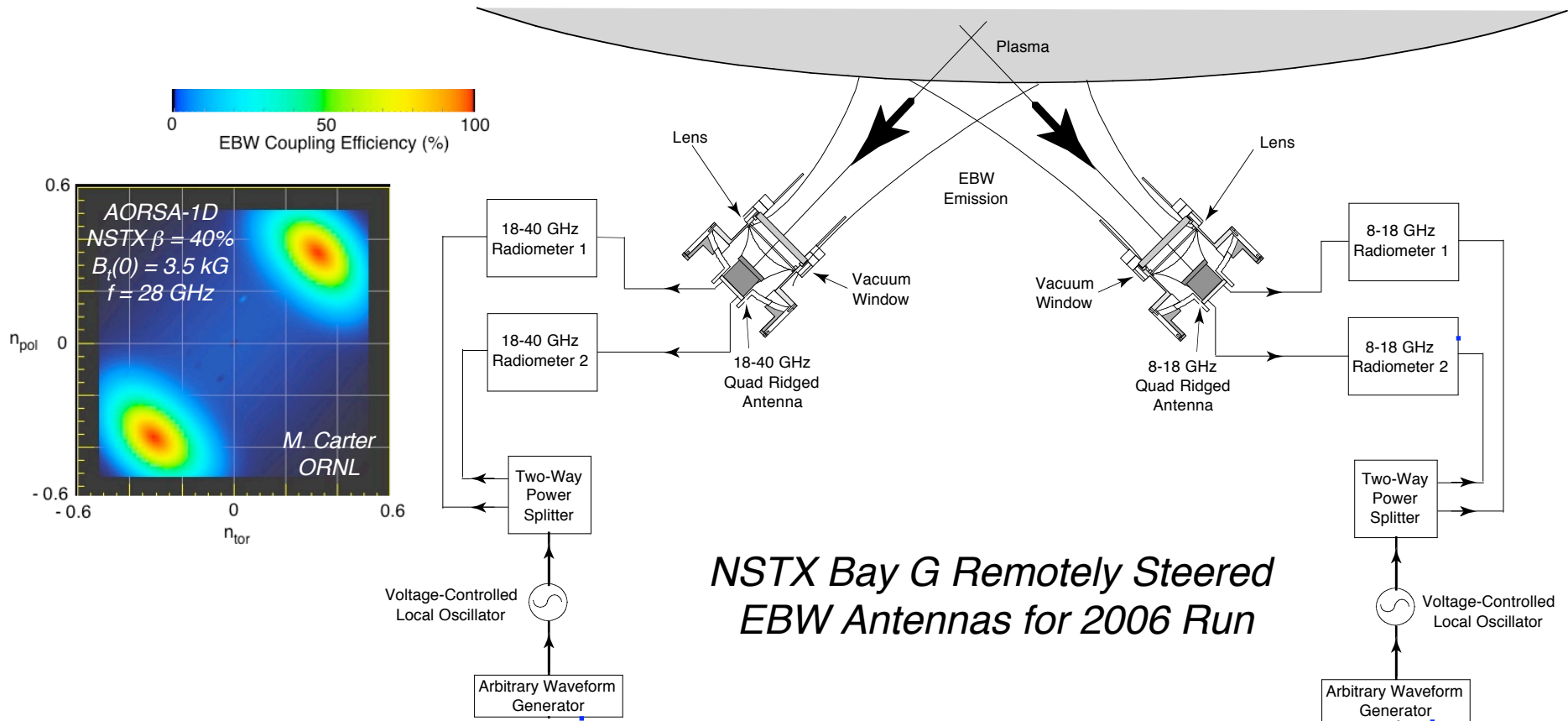
April 6th, 2006

Experiment Supports Long-Term NSTX Goal to Provide EBWCD & Development of EBW $T_e(R,t)$ Diagnostic



- Study 8-40 GHz thermal EBW emission via oblique B-X-O coupling
- Use remotely-steered, quad-ridged antennas and dual-channel radiometry at Bay G
- Study behavior of EBWs emitted from the fundamental, 2nd and 3rd harmonic emission from L-mode and H-mode plasmas
- Experiment has three objectives:
 - Map coupling efficiency as a function of antenna pointing direction & compare to theory
 - Analyze emission polarization & compare to theory
 - Measure $T_e(R,t)$ using thermal EBW emission
- Two dedicated run days, separated by at least two weeks
- Require $B_t(0)$ from 0.3 to 0.6 T, P_{nbj} up to 6 MW:
 - Thomson scattering n_e and T_e profiles are critical

Remotely-steered B-X-O Antennas Covering 8-40 GHz being Installed on Bay G for 2006 Run



*NSTX Bay G Remotely Steered
EBW Antennas for 2006 Run*

- *EBW emission studies assess coupling resilience over wide range of plasma conditions:*
 - *does not test parametric decay or ponderomotive effects*

Preliminary Run Plan

- Shot list is based on 2 half-day runs (minimum)
 - Day 1: study B-X-O emission in H-mode discharges (ref. shot #117405, $I_p=800$ kA, 0.5 s flattop, $I_{tf}=-53$ kA, $P_{nbi}=4$ MW)
 - Day 2: study B-X-O emission in L-mode discharges (ref. shot #113544, $I_p=800$ kA, 0.2 s flattop, $I_{tf}=-53$ kA, $P_{nbi}=2$ MW)
- Preliminary shot list:
 - (1-3)** Shot development
 - (4-13)** Repeat best shot from (1-3) and scan antenna pointing direction to obtain a B-X-O mode conversion efficiency mapping
 - (14-15)** Repeat best shot from (4-13) with a toroidal field sweep (10% increase) during I_p flattop
 - (16-18)** Repeat best shot from (4-13) and introduce gas puffs (50, 100, and 165 torr-l/s) from low field side at ~ 0.3 s