A TEST OF ELECTRON BERNSTEIN WAVE HEATING AND CURRENT DRIVE ON MST

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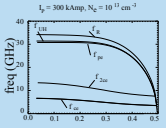
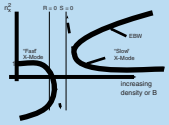
ABSTRACT

⇨EBW show promise for □
* localized heating
* localized current drive overdense plasmas
⇨Edge localized noninductive current drive
*would reduce the magnitude of the magnetic fluctuations,improving the confinement of the RFP
⇨medium power experiment (70 kW)
⇨TWT amplifier in the 3.1-3.8 GHz band
⇨55% reflection

THEORY

Characteristic frequencies in the ECRF on MST

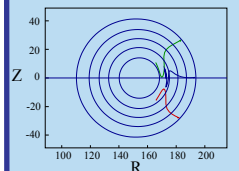




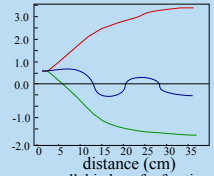
MODE CONVERSION SCHEME

* f(ce) < f(pe) ..... MST is overdense for EM waves
* f(ce) = f(uh) at the very edge of MST.

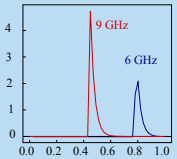
RAY TRACING AND FOKKER-PLANCK SHOWS THE CURRENT DRIVE POSSIBILITIES & LOCALIZED HEATING



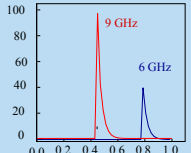
EBW Rays in MST



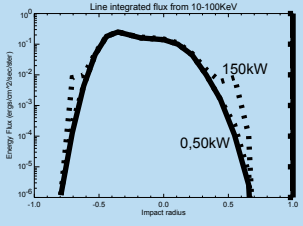
parallel index of refraction



power density (power/volume)



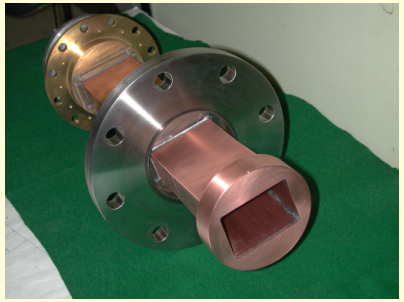
poloidal current density



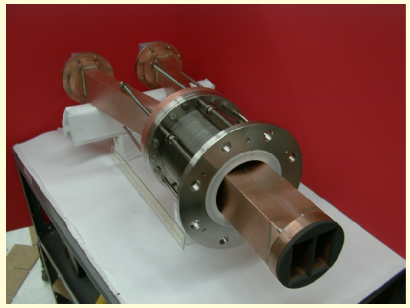
Expected X ray emission as a function of radius

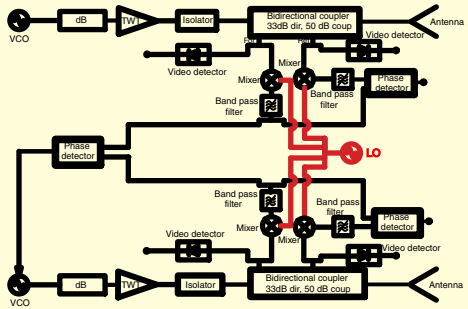
EXPERIMENTAL SET-UP FOR EBW

SINGLE WAVEGUIDE ANTENNA

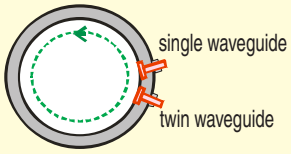


TWIN WAVEGUIDE ANTENNA

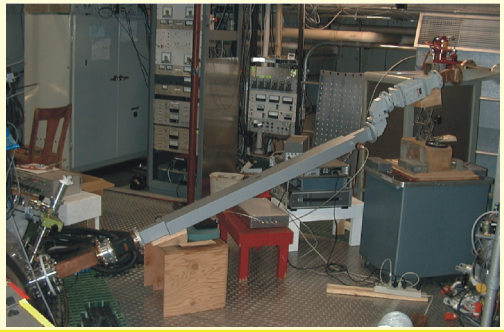


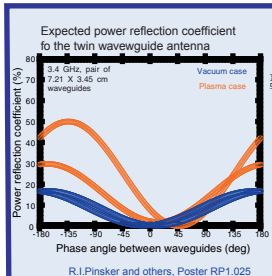


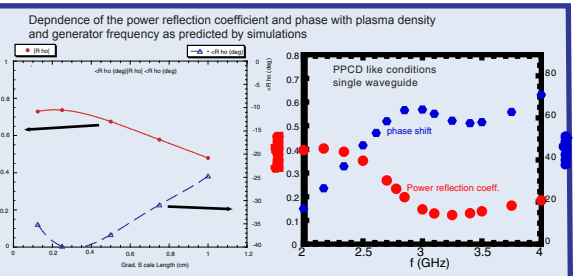
Gain and phase measurement schematic



Position of the antennas on the MST in poloidal plane

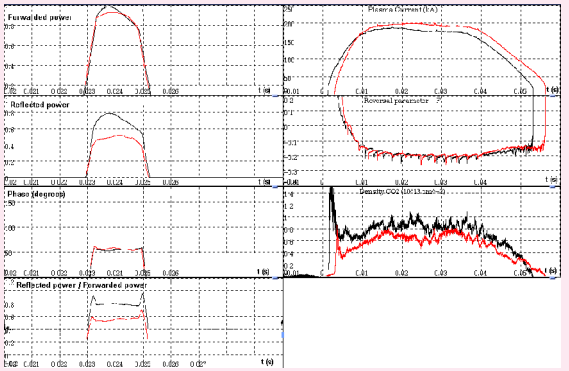




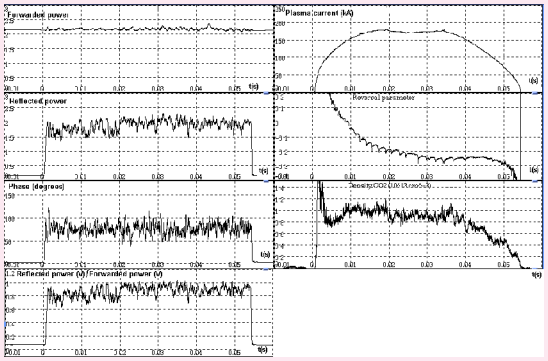


R.I.Pinsker and others, Poster RP1.025

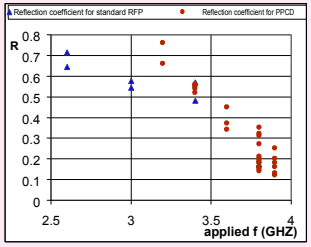
INITIAL RESULTS



TYPICAL EBW SIGNALS FOR TWO DIFFERENT DISCHARGES - REFLECTION COEFFICIENT AS LOW AS 55%
25kW INPUT POWER



TYPICAL SIGNALS FOR THE LOW POWER EXPERIMENT



FUTURE PLANS

*MEASURE COUPLING FOR THE TWIN WAVEGUIDE ANTENNA
*COMPARE THE COUPLING RESULTS WITH THEORETICAL PREDICTIONS
*FURTHER INCREASE IN THE INPUT POWER
*DETECTION OF THE X RAY EMISSION FROM FAST ELECTRONS PREDICTED BY NUMERICAL MODELING
*EDGE DENSITY MEASUREMENTS