

NSTX-U ECH/EBWH System

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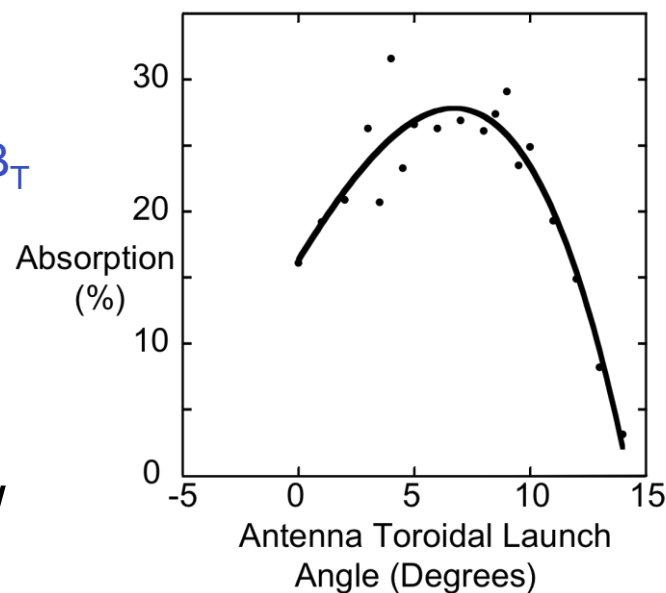
Gary Taylor

NSTX-U Facility Enhancement Brainstorming Meeting

February 8, 2012

28 GHz ECH System Supports Solenoid Free Start-up & Can be Upgraded as a Prototype EBWH System

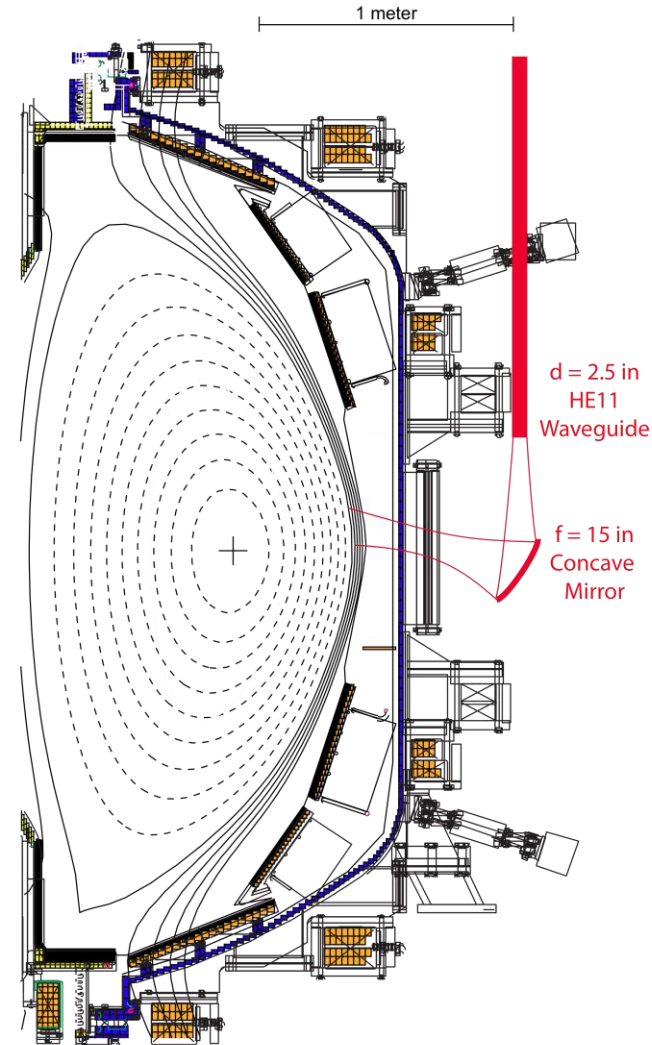
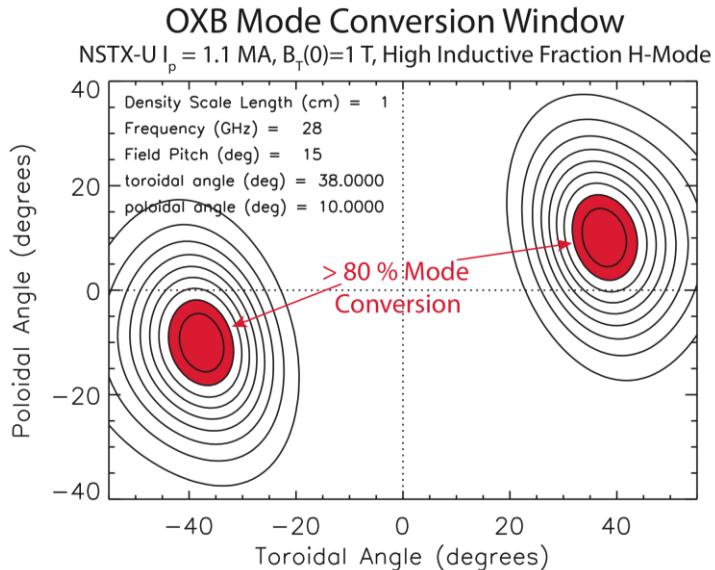
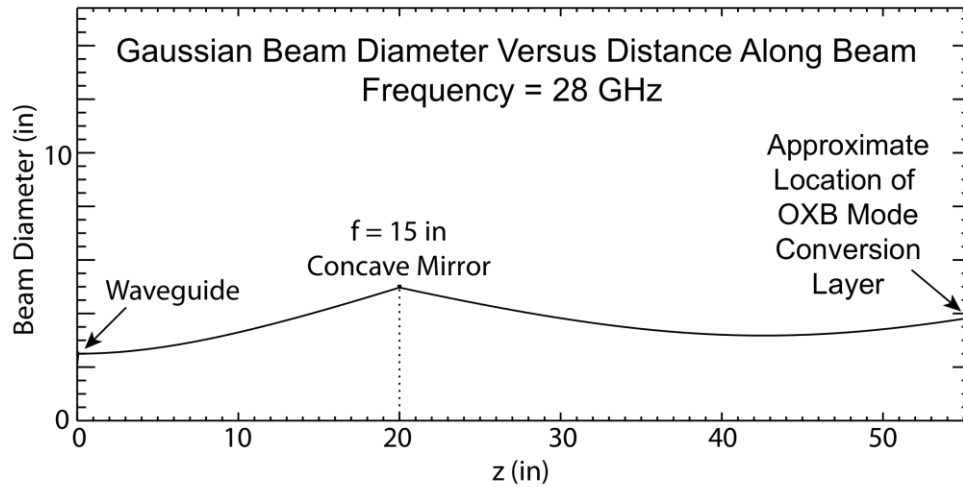
- Initially provide 10-50 ms, 0.5-1 MW pulses to support discharge start-up
 - Earlier analysis for NSTX $T_e \sim 25$ eV CHI start-up plasma predicted 25-30% absorption of 28 GHz second harmonic X-mode using a 7 degree toroidal launch angle
 - Need to model 28 GHz fundamental O-mode at $B_T(0) \sim 1$ T in NSTX-U, optical depth lower in O-mode, but T_e should be higher at higher B_T
- Upgrade later to O-X-B oblique launch EBWH system with 500 ms pulses at 1-2 MW
 - Use steerable mirror launcher near midplane



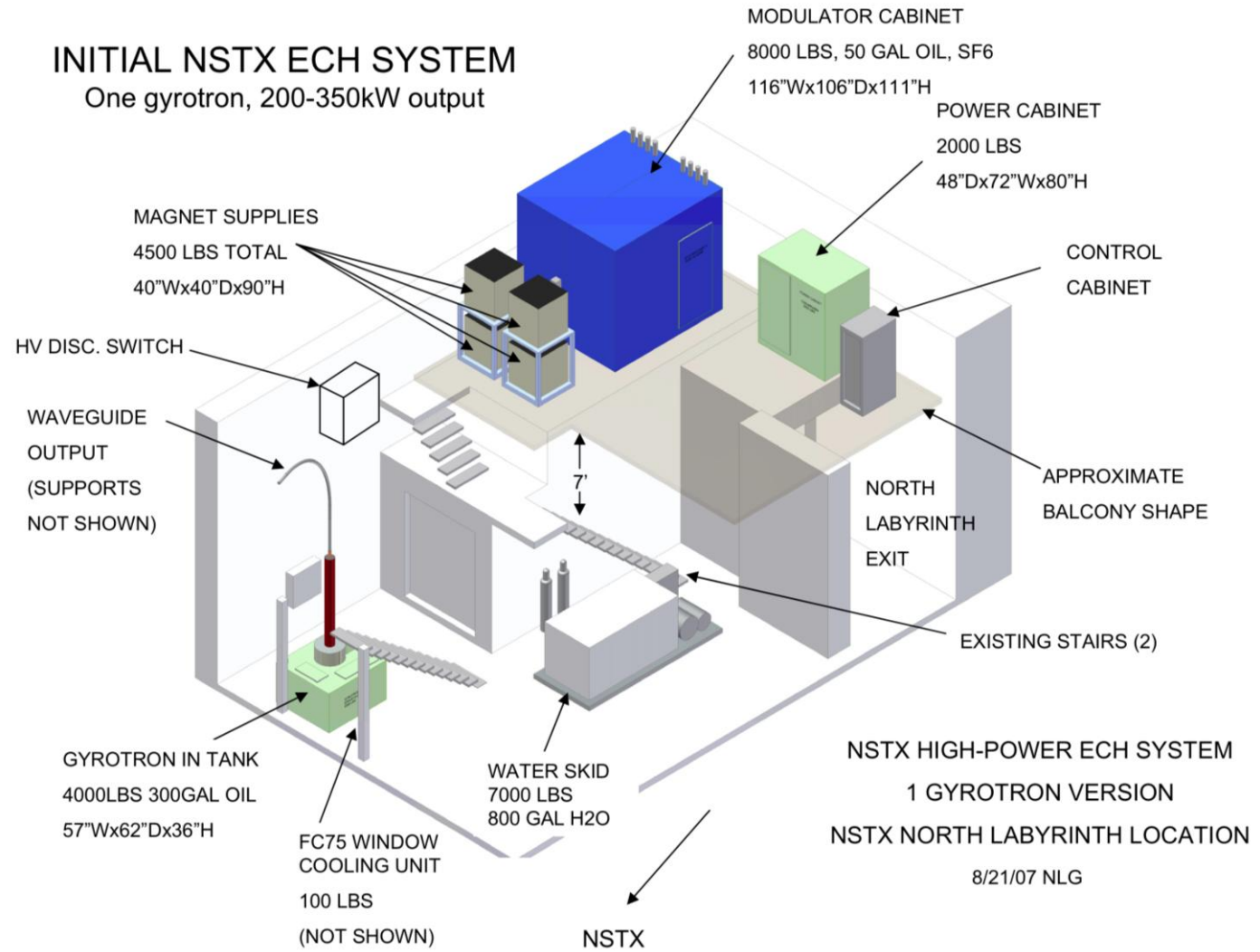
28 GHz X-mode second harmonic
ECH Modeling Results for NSTX
CHI Plasma

Conceptual Design for NSTX-U EBW O-X-B Antenna

- Low-loss HE11 2.5 inch circular corrugated waveguide & metal steerable mirror designed for 1 s, 2 MW 28 GHz pulses located outside the vacuum vessel



Gyrotrons and associated equipment will need to be located in TFTR Test Cell or in the south NB bay area



- Conceptual location in 2007 in NSTX Test Cell is occupied by second beam line