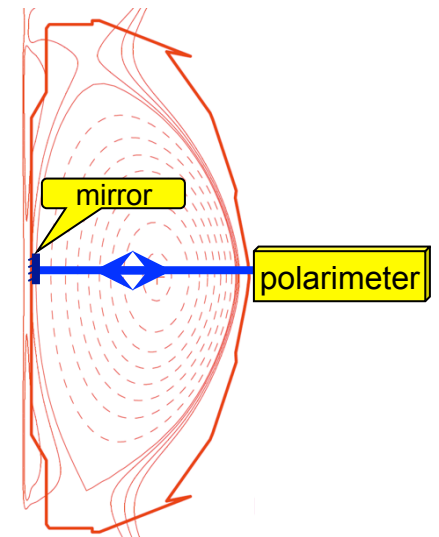
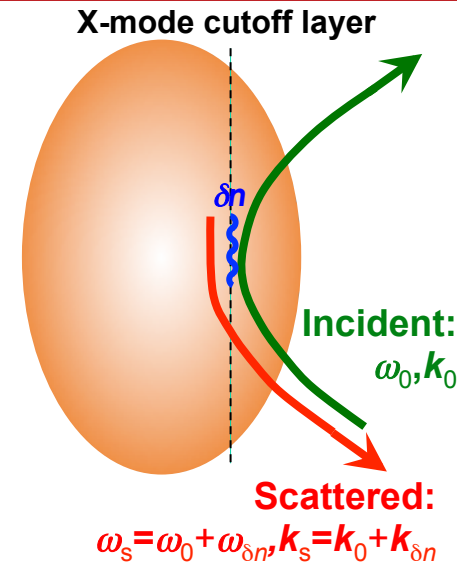


# UCLA working at DIII-D to develop microwave diagnostics for NSTX-U

- Doppler backscattering being developed for AE  $\delta v_\theta$  ( $\Rightarrow \delta E_r$ )
  - Proposed for NSTX-U
  - UCLA system already existing at DIII-D: currently used for equilibrium flow and GAMs
- Radial chord 1-mm polarimeter (J. Zhang)
  - Ready on install on NSTX when TF fault occurred
  - Under testing in DIII-D plasmas – Promising results

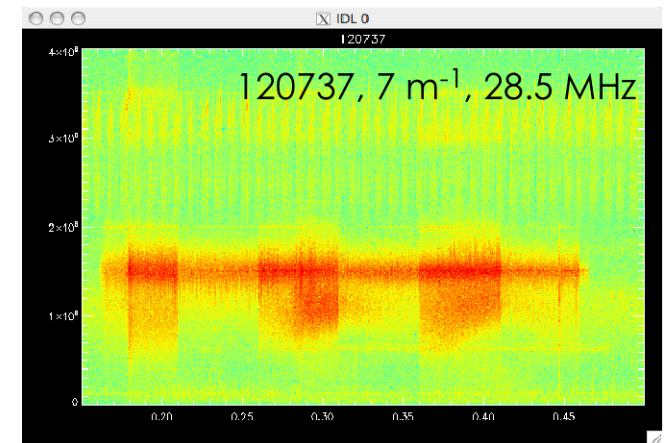
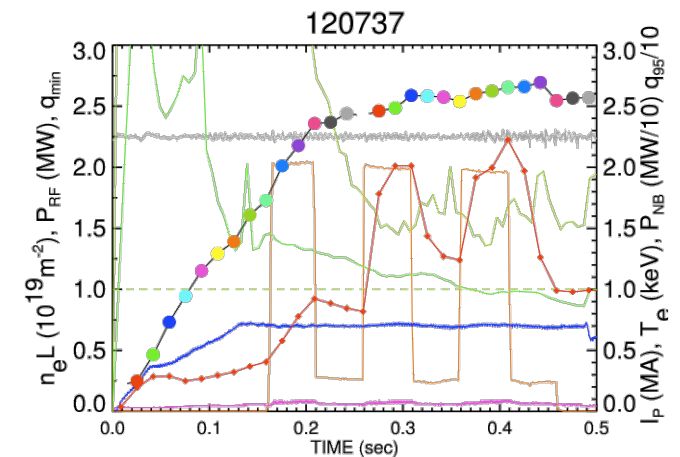


## Include in 5-year plan: diversify AE internal diagnostics

- Well-developed internal AE diagnostics focus on  $\xi_r$  ( $\Rightarrow \delta E_\theta$ ):
  - $\delta n \Rightarrow \sim \xi_r \nabla n_0$ : Reflectometry, BES
  - $\delta T_e \Rightarrow \sim \xi_r \nabla T_{e0}$ : ECE (used in conventional tokamaks, may work in NSTX-U)
- Measuring other fields facilitates stronger comparison with theory
  - $\delta B_r, \delta B_\theta, \delta B_\phi, \delta v_\theta$  ( $\Rightarrow \delta E_r$ )
  - other fields...?
- Diagnostics currently under development, or potentially developable
  - $\delta B_r$ : Polarimetry, fast MSE(?)
  - $\delta v_\theta$ : Doppler backscattering, BES(?)
  - other diagnostics?

# Include in 5-year plan: measure internal HHFW field structure

- HHFW field structure measurement *inside* NSTX-U desirable:
  - Comparison with theory in HHFW current drive & heating studies
  - Measure beat-wave “drive” for AEs
- Reflectometers can locally measure HHFW  $\delta n$ 
  - Test of principle in NSTX, 2006
  - sensitivity to HHFW demonstrated
- Multi-channel system can probe HHFW field structure inside NSTX-U (far from antenna)
  - Dedicated system: ~ \$100K
  - Single channel proof-of-principle system: ~\$25K



S. Kubota, NSTX Results Review, July 26-27, 2006, PPPL