Fast Ion Absorption Dependence on B_t and $k_{||}$ with HHFW in NSTX

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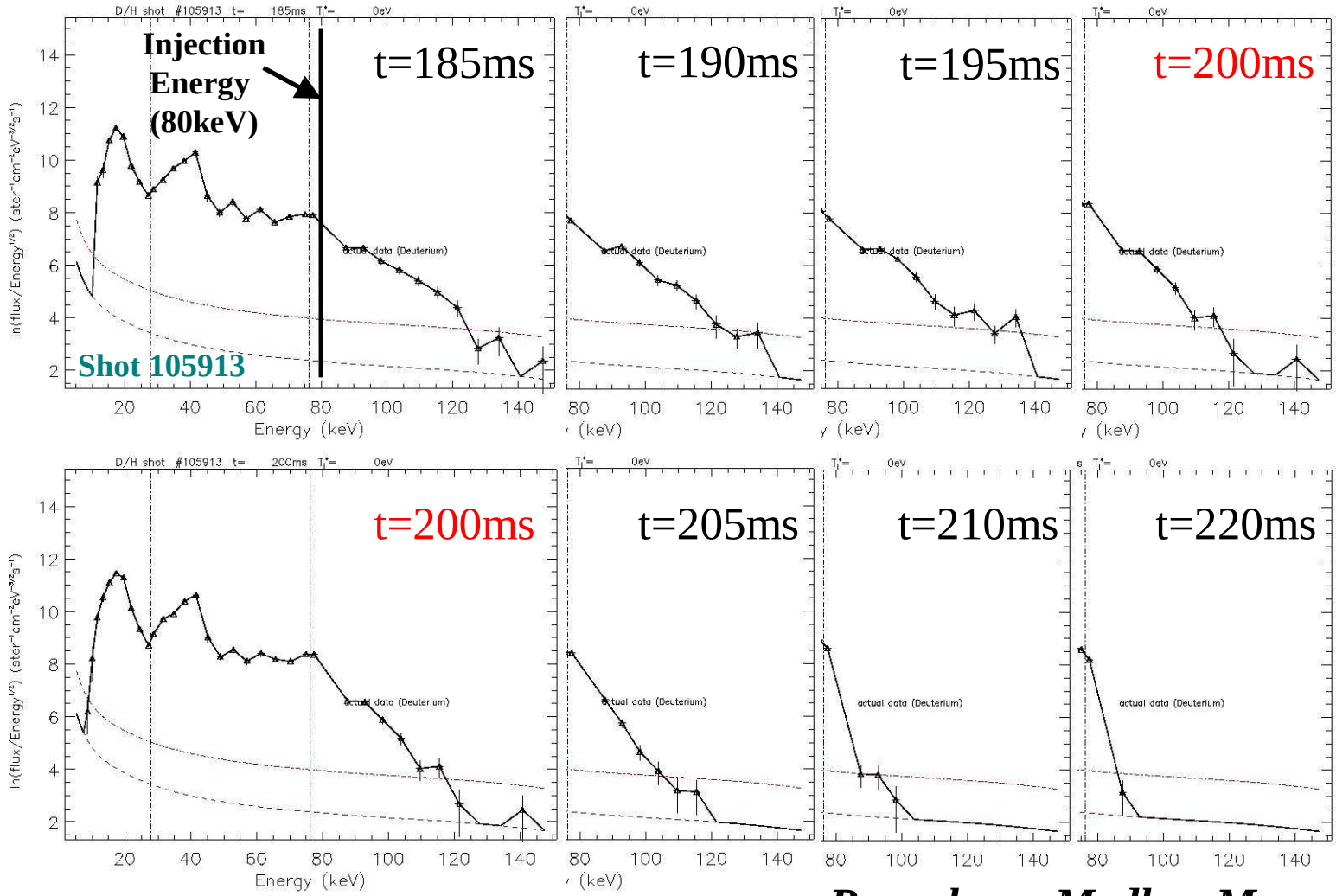
Introduction

- Ion absorption critically important to assessing viability of HHFW in STs
- Experimental evidence of HHFW interaction with NBI
  - NPA, neutron rates, Fast Lost Ion Probe
- Computational evidence
  - HPRT, TRANSP, CURRAY
- Need to expand data set, determine dependence on B_t on axis and launched $k_{||}$

NPA shows fast ion tail build-up and decay

- HHFW turns off at t=200ms
- NBI Source A on throughout

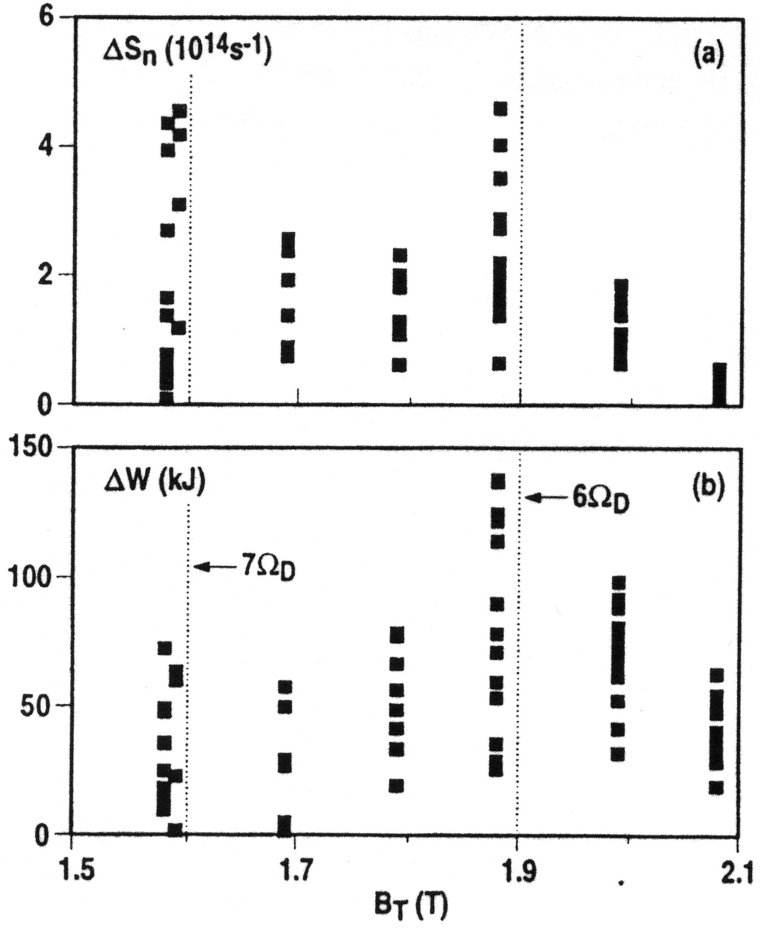
- D^+ tail extends to 140keV
- Tail saturates in time during HHFW



Rosenberg, Medley, Menard

Fast Ion Absorption vs. B_T

DIII-D

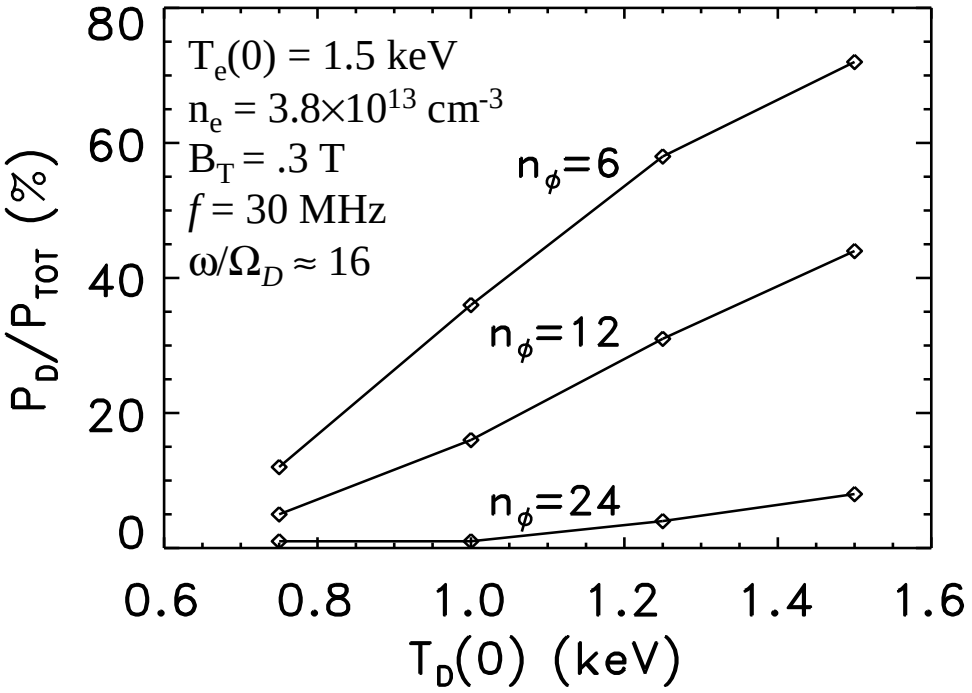


C.C. Petty, '95

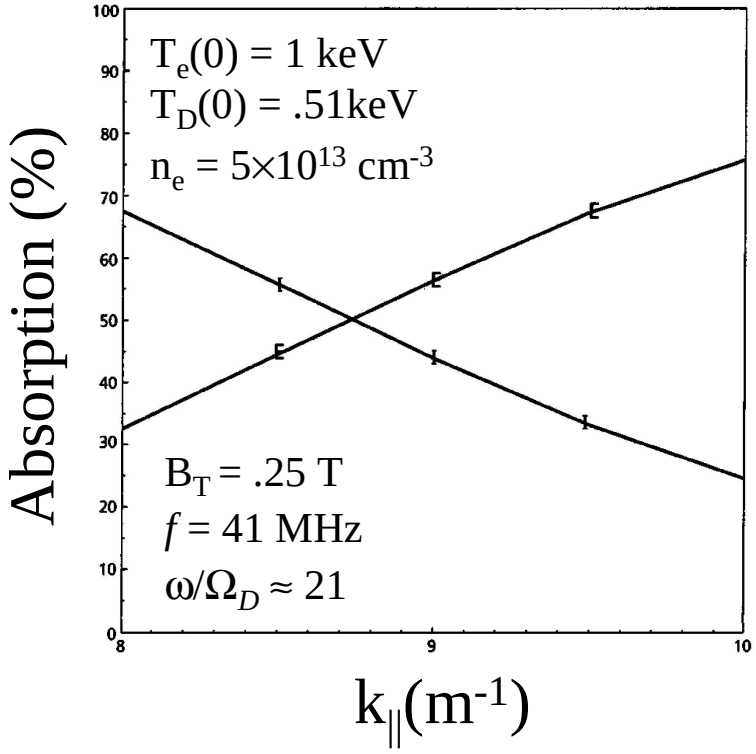
- $\Delta S_n = S_n - S_{calc}$ anomalous neutron rate
- $\Delta W = W_{tot} - W_{th} - W_{beam}$ anomalous stored energy
- Peaks at on-axis resonances
- overall trend over multiple, higher $\Omega_D(0)$ in ST untested

Absorption vs. $k_{||}$, T_D

Menard, ’99

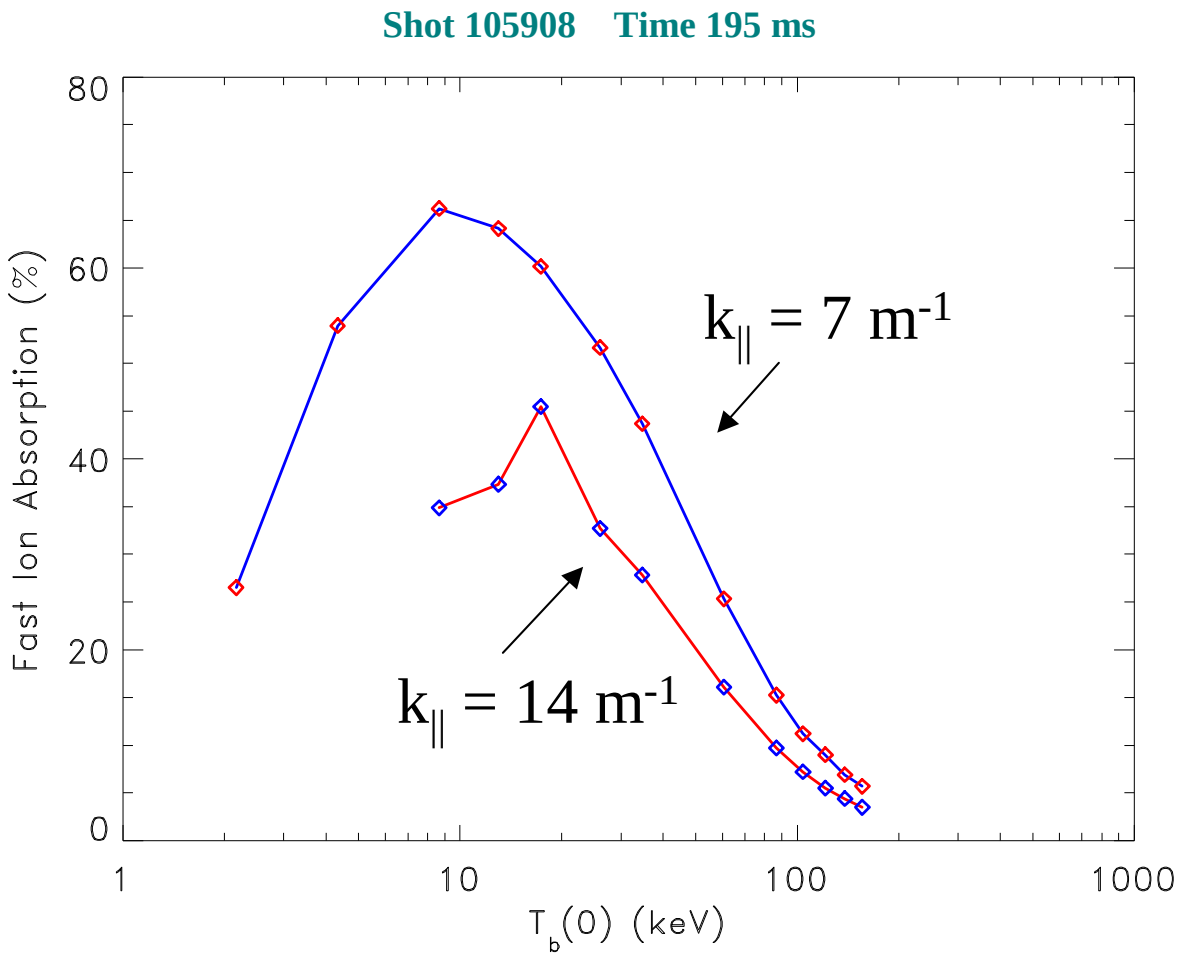


Lashmore-Davies, ’98



- Enhanced ion absorption with lower $k_{||}$ predicted

Absorption vs. $k_{||}$, Fast Ion Temp



- Fast ion absorption larger for lower $k_{||}$, peaks at lower $T_b(0)$
- Absorption still small near 140 keV

A Plan

- Scan $B_T(0)$ through multiple resonances to observe peak and inter-resonance dependence
- Vary $k_{||}$ between similar shots to test prediction of greater ion absorption for lower $k_{||}$
- Scan beam energy to examine prediction of lower absorption for higher energy above 20 keV
  - Resonance shifting?
- Scan NPA with identical conditions to aid in determining the fast ion distribution function