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HHFW absorption in Neutral-Beam heated NSTX plasmas

XP -1012

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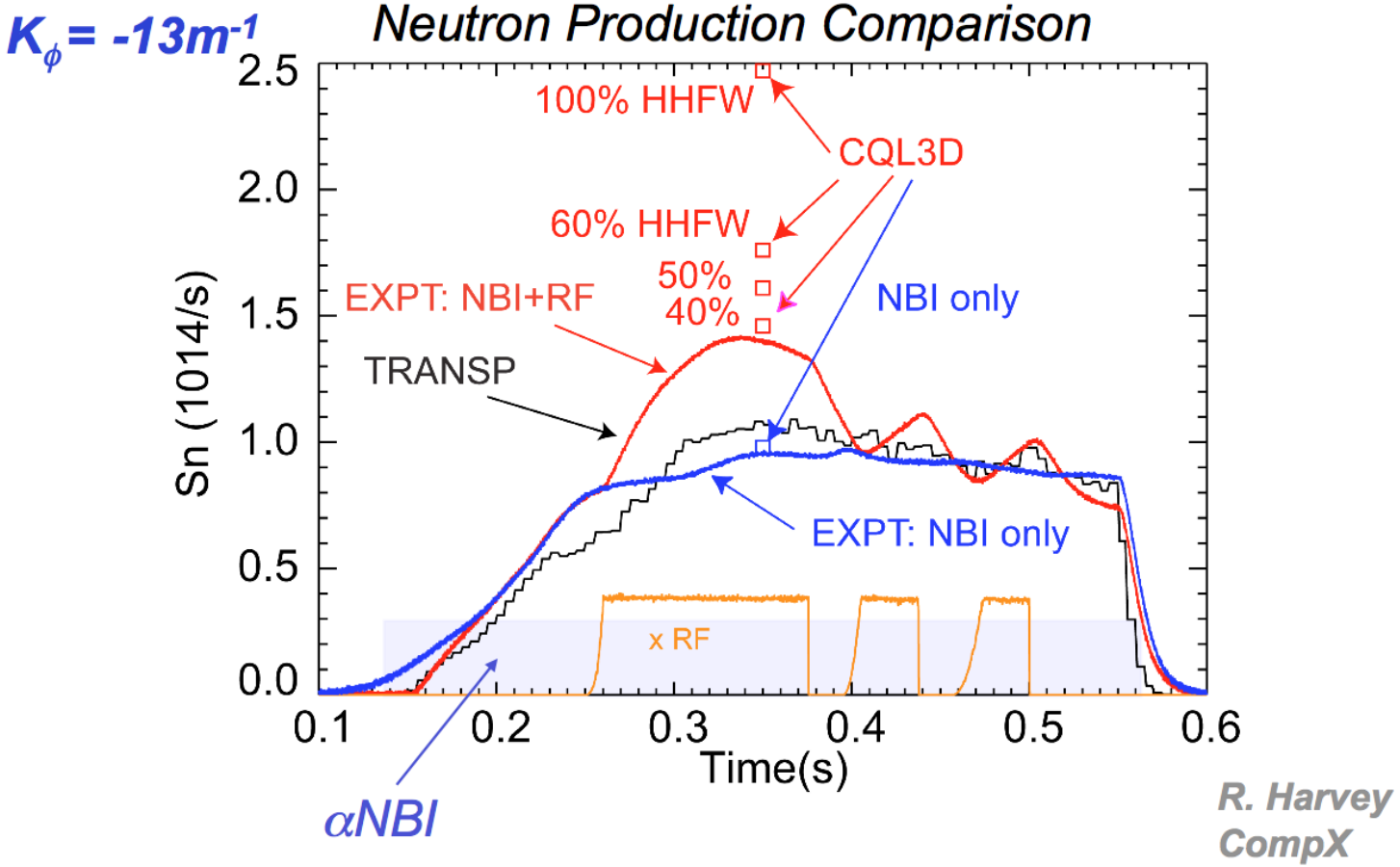
<u>Goal:</u> characterize the fraction of HHFW power that is absorbed in the core plasma

Assigned run time:
1 day

HHFW power coupled to the core plasma during NB injection is mostly absorbed by fast ions



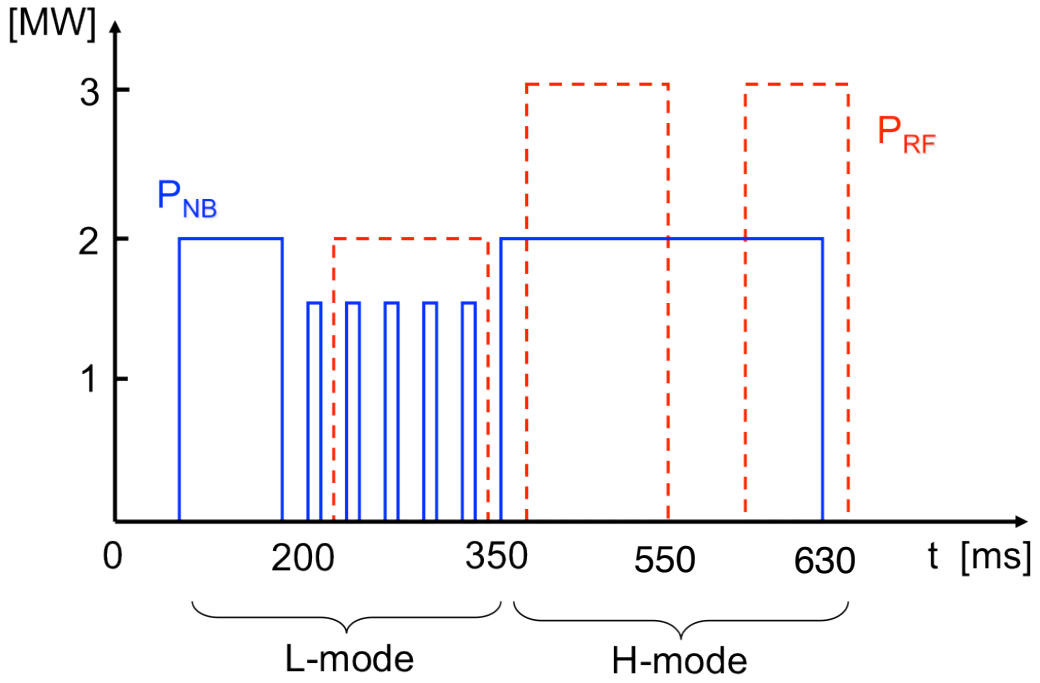
Need to characterize RF absorption as a function of RF phasing,

L vs. H-mode plasmas, outer gap, magnetic field

Look at fast ion profile, spectrum to infer absorbed fraction

Target discharge will include both L and H-mode phases

- L-mode until ~350 ms, optimized for FIDA measurements
  - Similar to 2008 FIDA experiment on RF absorption by fast ions
  - NB sources: A @90kV for MSE, C @75kV modulated 10/20ms ON/OFF
- H-mode after ~350 ms, low NB power (2MW) to minimize MHD
  - Two RF pulses at P_{RF} ~ 3MW, NB source A @ 90kV
  - Add NB source B @ 60-90kV if no transition to H-mode after 350ms



Run plan for 1 day XP, ~24 *good* shots

- Establish baseline scenario: **4 shots**
  - Modify sh#128741, 130608 and check for L-H transition at ~350ms
  - Start with Btor=5.5kG, Ipl=900kA, outer gap 4cm, RF phasing 13m-1, n0~4x1019m-3 @ 400ms
- Start scans: **total 12 shots**
  - Scan RF phase: 13m-1, 8m-1, 3m-1 (max 3 shots) 3 shots
  - For each phase, scan outer gap: 4cm, 6cm, 8cm 3 shots
  - For each value of outer gap, take a *NO RF* reference shot 3 shots
- Identify "best case" and scan Btor: 4.5kG, 3.5kG **max 6 shots**
- Identify "best case" @ Btor=5.5kG
  - Scan NB injection voltage (source C) **as time permits**

Machine requirements / diagnostics

- Machine requirements/prerequisites:
  - Develop target discharge during XMP-64 / RF conditioning
    - Make sure we can trigger L -> H transition at ~350ms
  - HHFW system conditioned, available P_{rf} ~ 4MW
  - Low impurity level (in particular, low oxygen) for FIDA

- Required diagnostics:
  - All fast ion diagnostics (FIDA, NPA, ssNPA, sFLIP)
  - Plasma profiles (MPTS, CHERS, MSE) & magnetics