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Fast Ion Profiles with the Solid State Neutral Particle Analyzer Diagnostic

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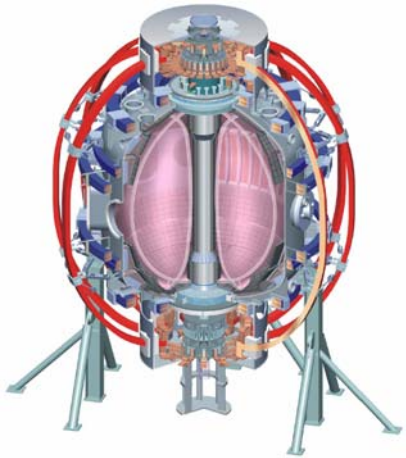

NSTX 2006 Results Review

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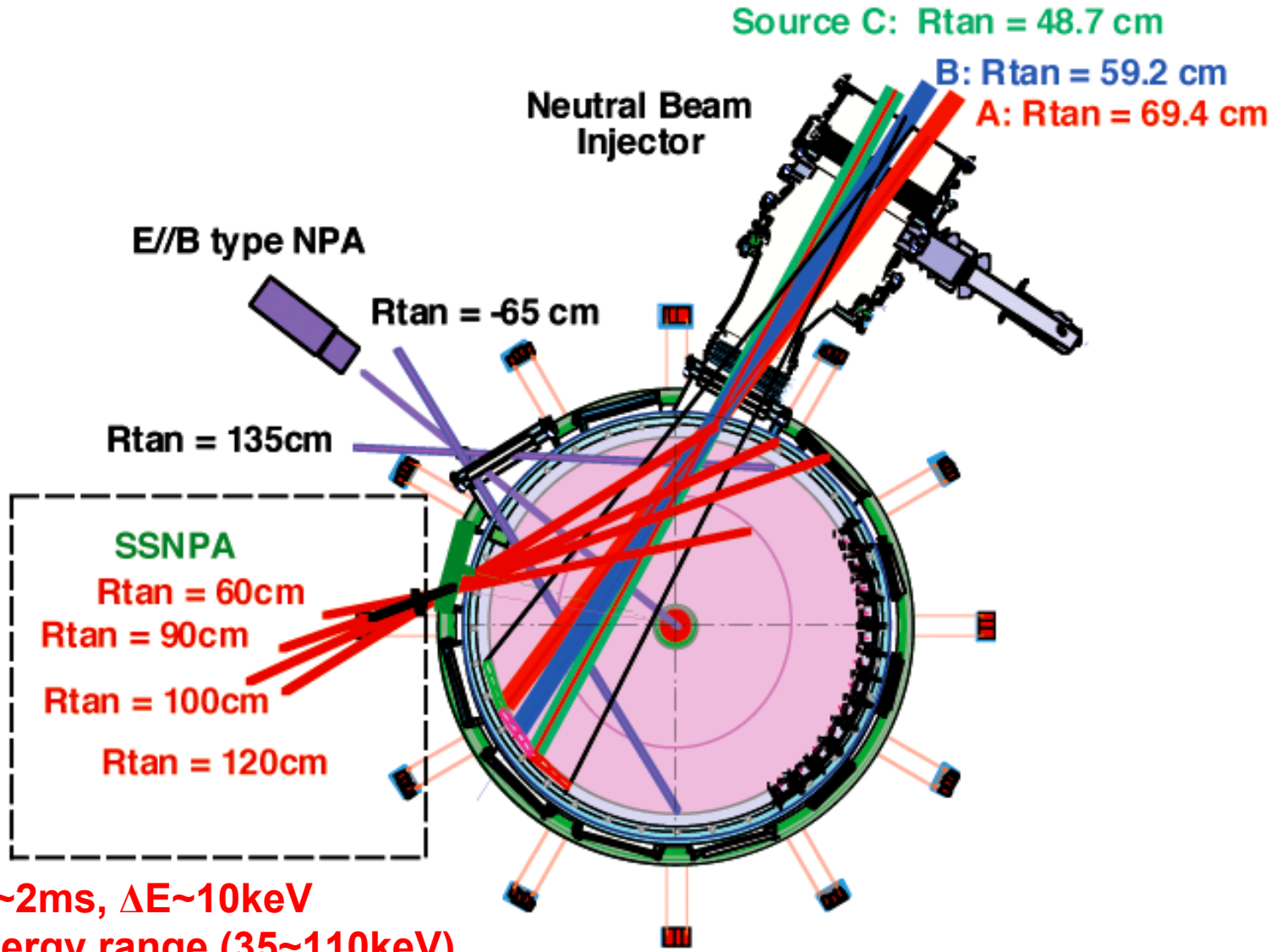
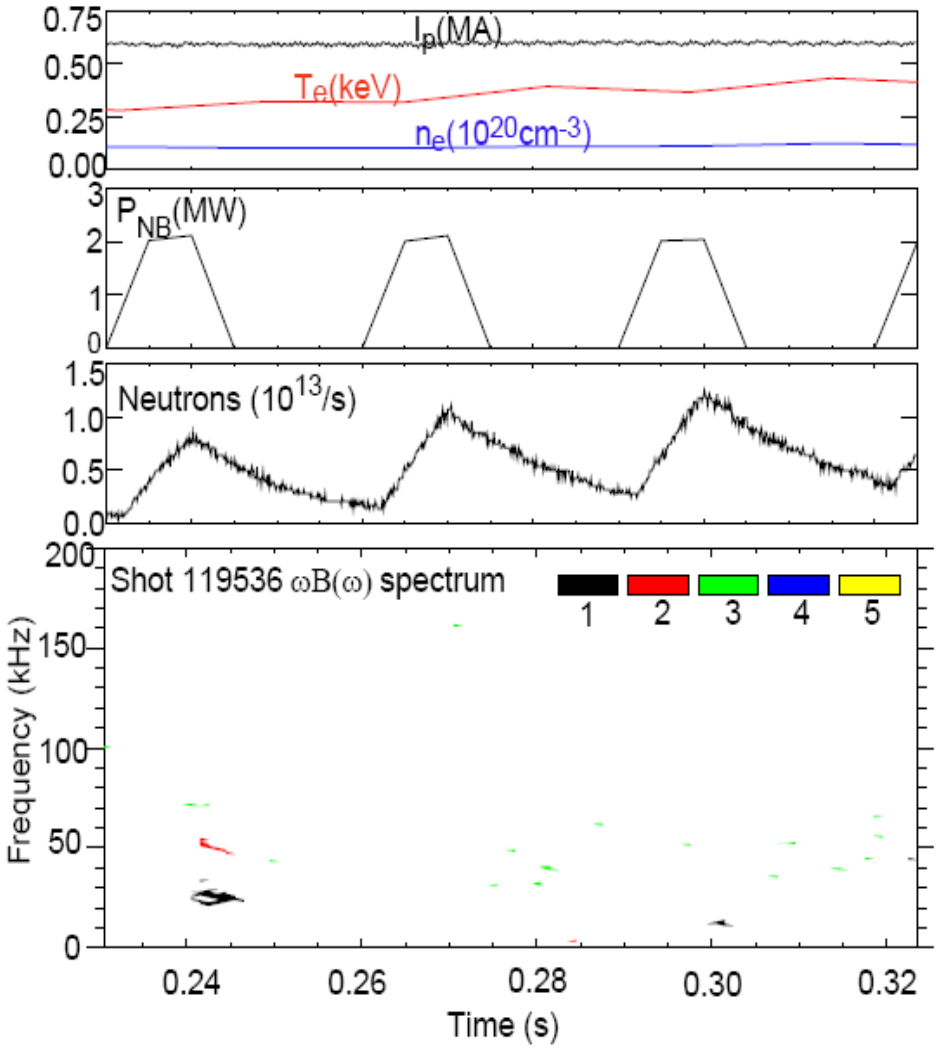
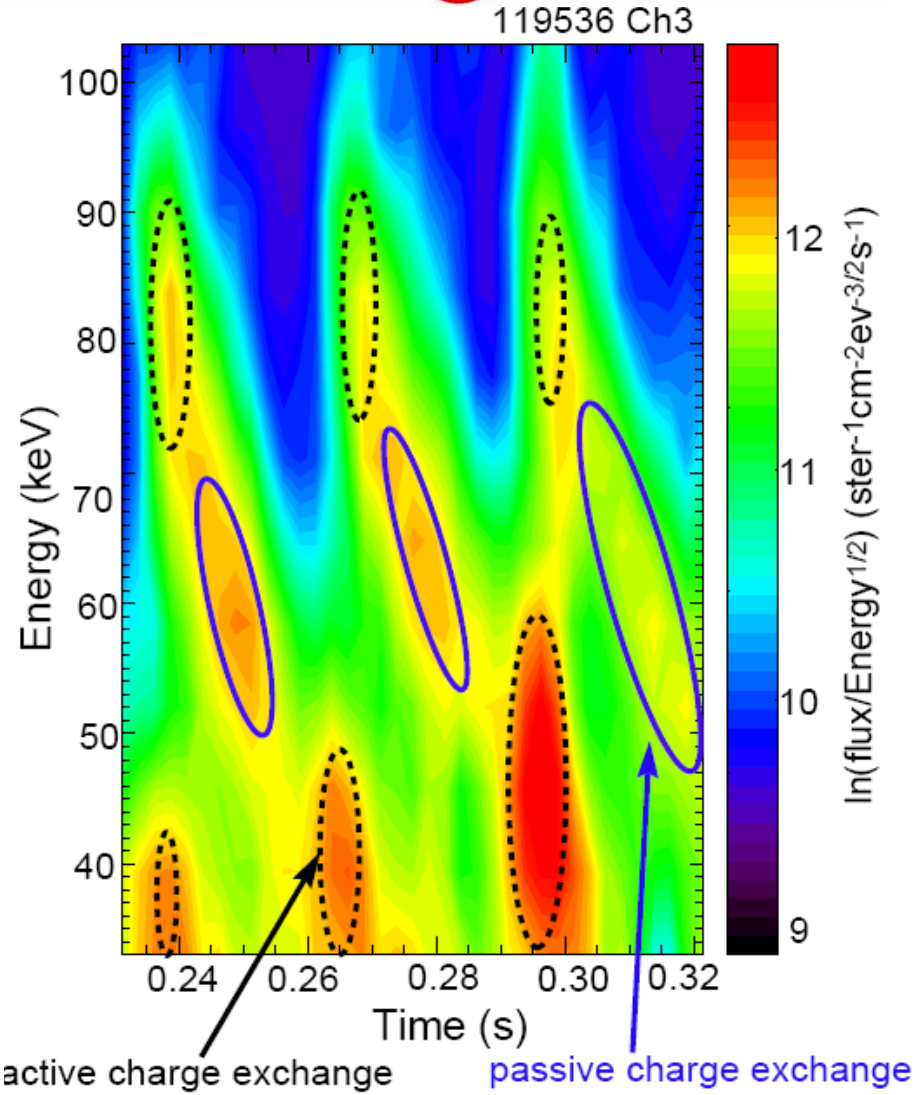
SSNPA Measures Fast Ions that Charge Exchange with Injected Neutral Beams



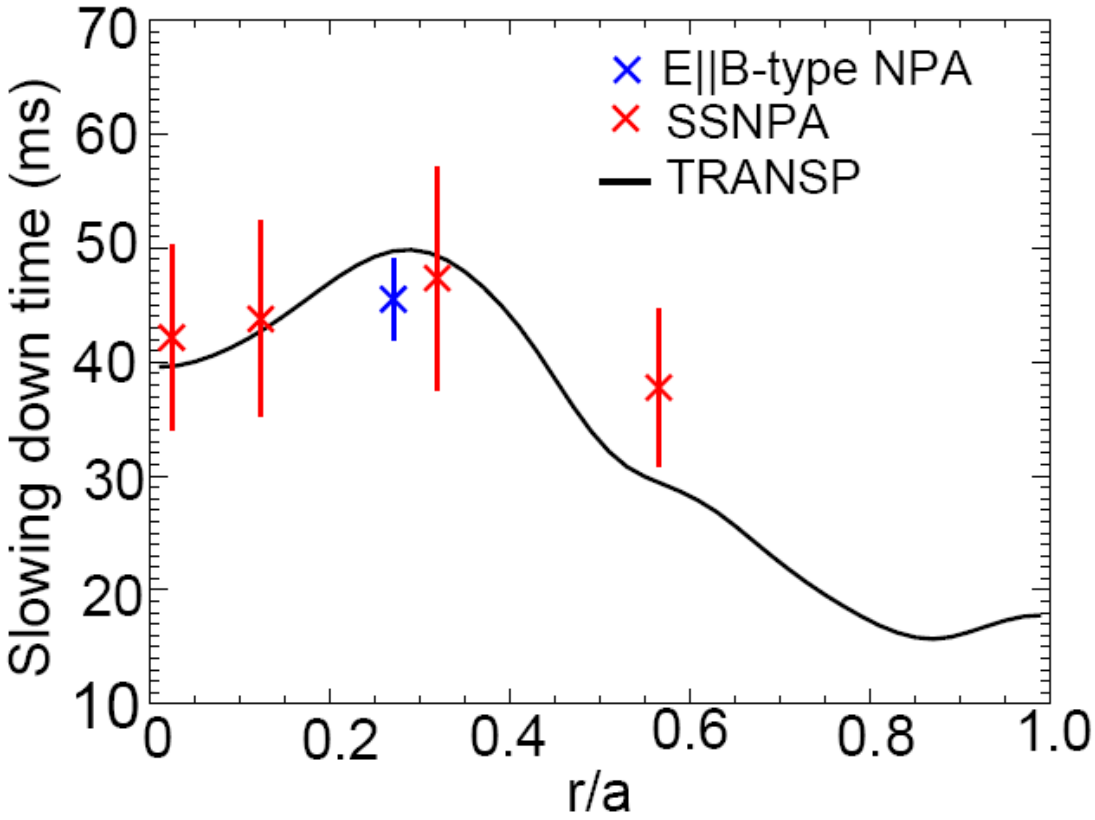
Δt~2ms, ΔE~10keV
Energy range (35~110keV)

Slowing Down of Beam Ions in MHD-quiescent Plasmas is Consistent with Classical Behavior



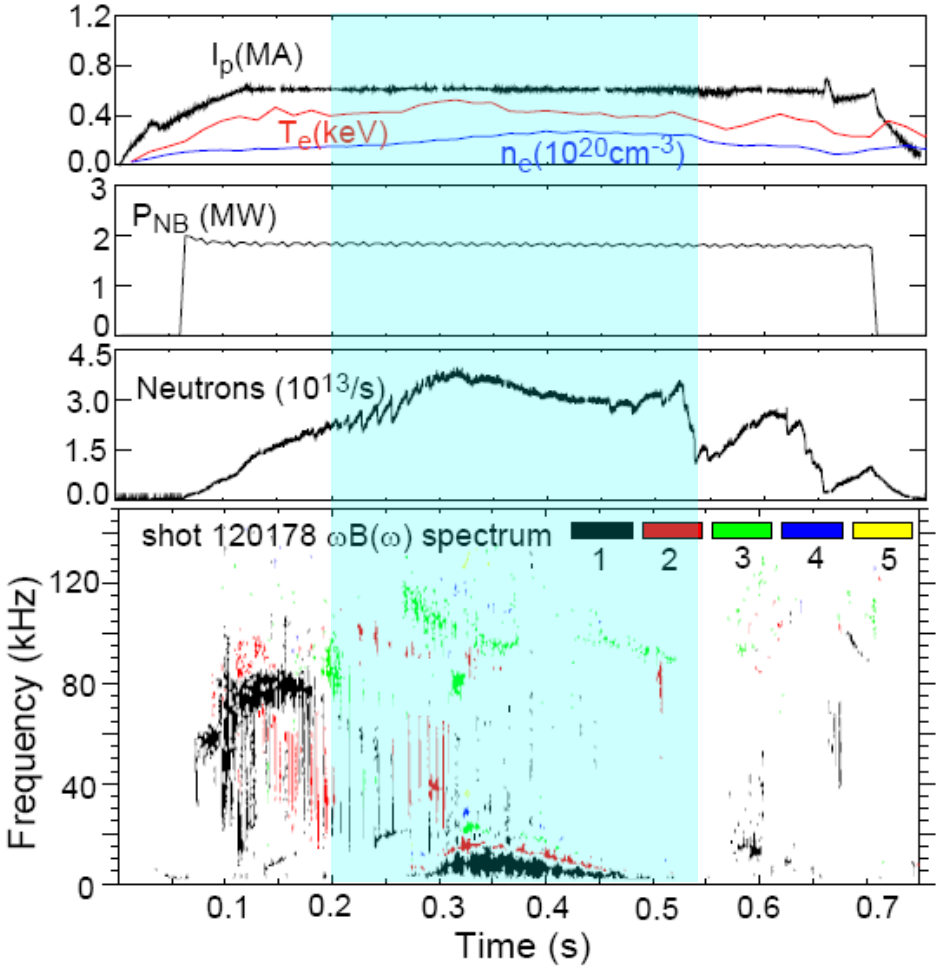


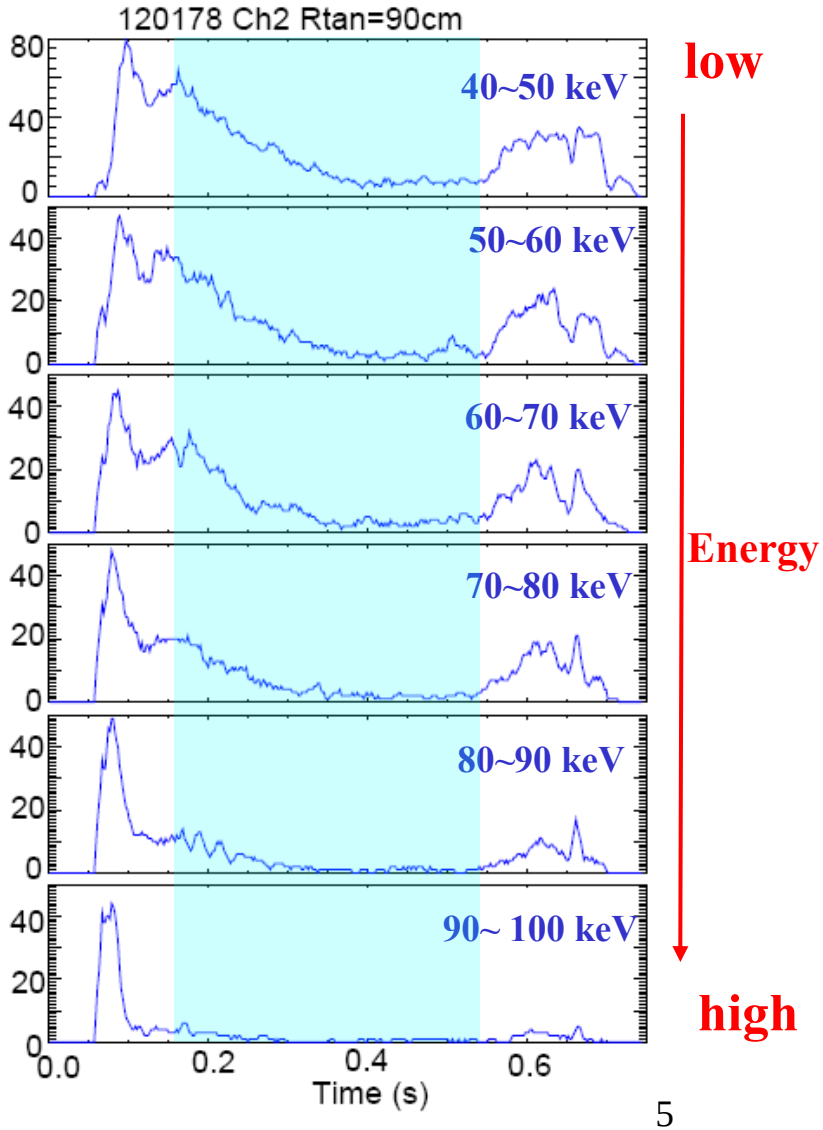
Slowing Down of Beam Ions in MHD-quiescent Plasmas is Consistent with Classical Behavior (cont'd)



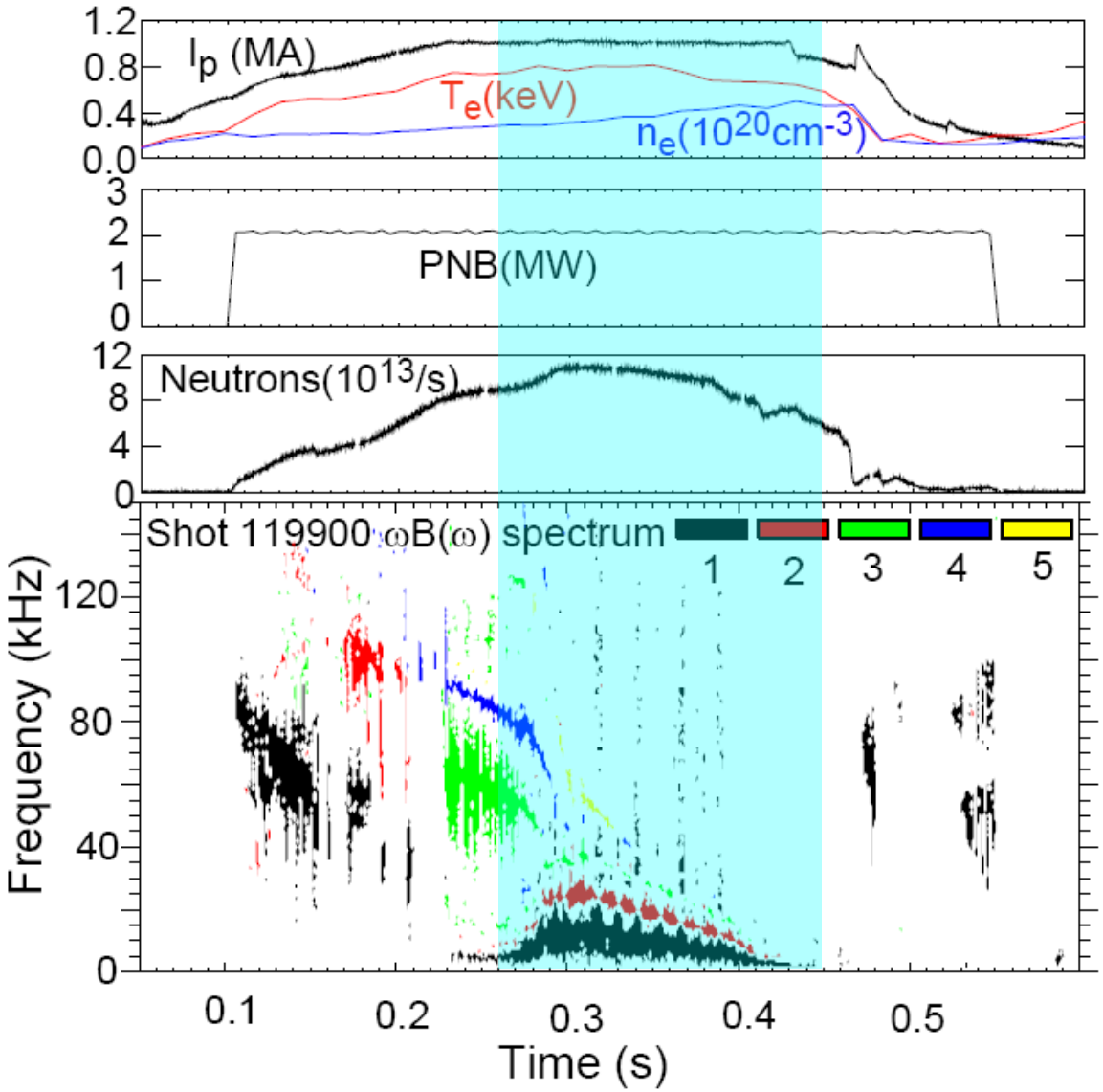
The decay time of the neutrons also agrees with the classical theory.

Case 1: All Four Chords are Depleted



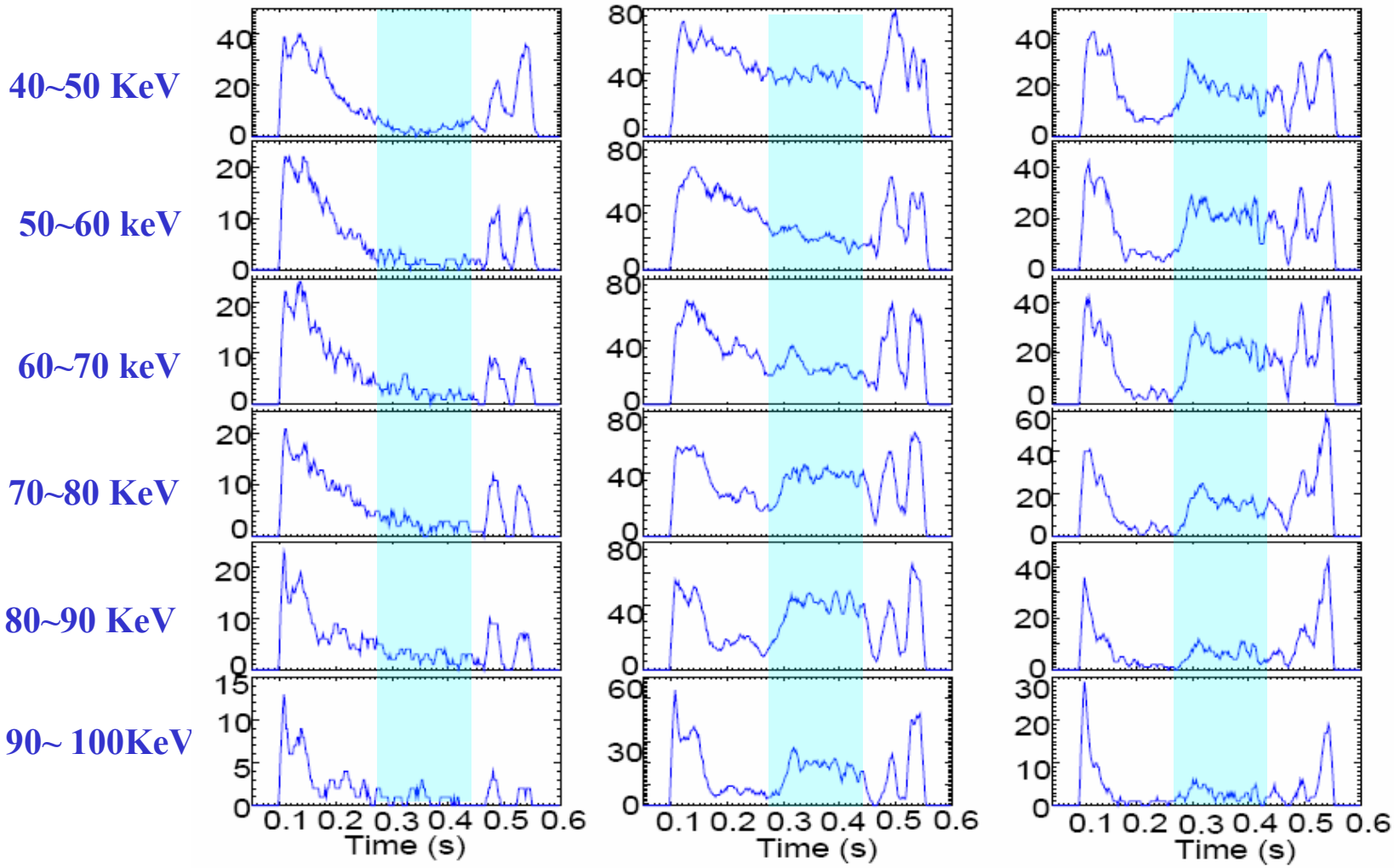


Case 2: Inner Chords Decrease, Outer Chords Increase



Case 2: Inner Chords Decrease, Outer Chords Increase (cont'd)

At t=0.25~0.45s, Ch1 decreased, Ch3 higher energy channels and Ch4 Increased.



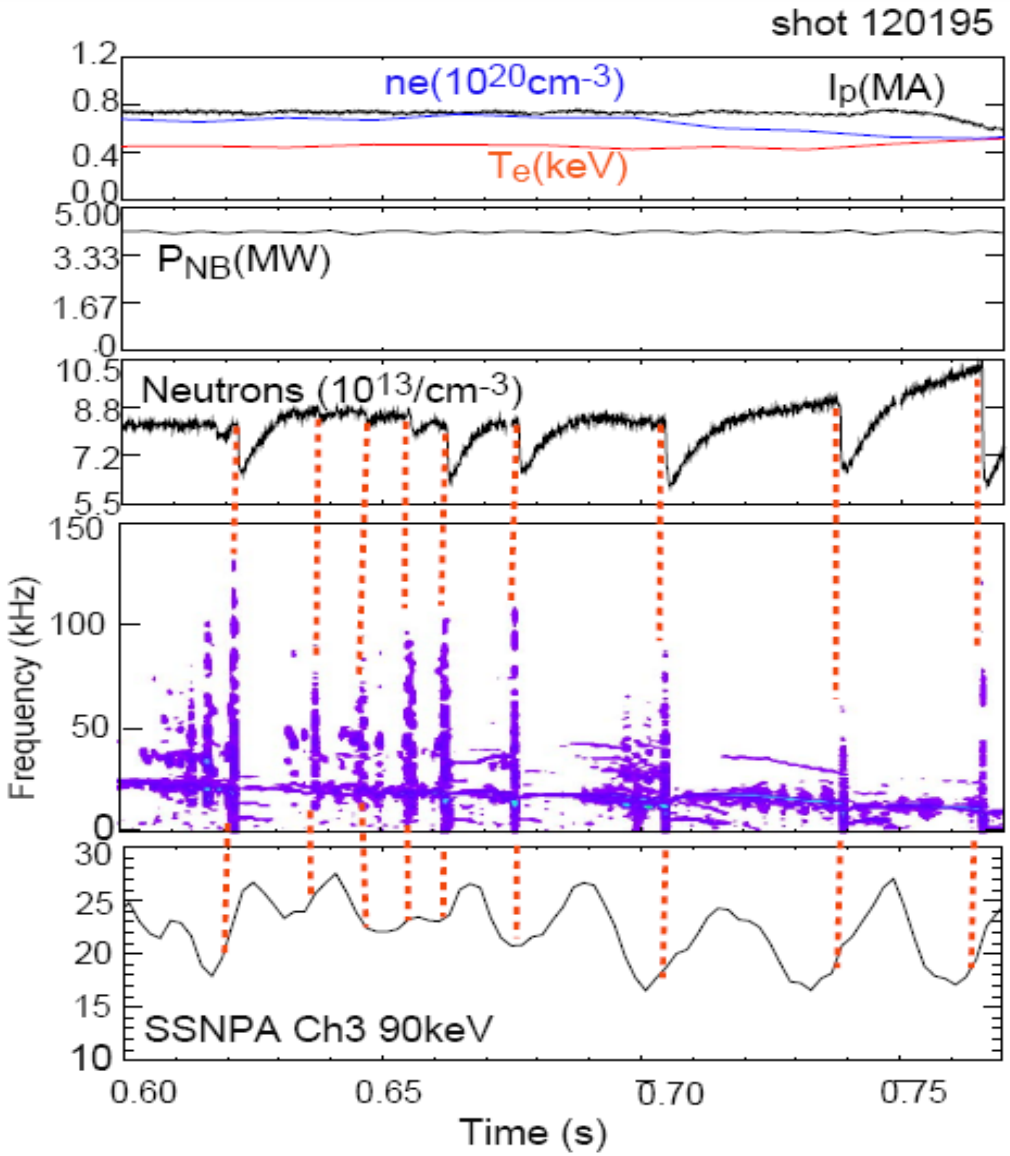
Shot 119900

Chord 1 Rtan=60cm

Chord 3 Rtan=100cm

Chord 4 Rtan=120cm

Case 3: Some Channels are Correlated with Neutron Drops



- **Some channels of SSNPA are correlated with neutron drops and MHD activity.**
- **The dips lead, bursts lag.**
- **Larger effects on high energy channels.**

Summary

- **In MHD-quiescent Plasmas, fast ions behave classically.**
  - **Slowing down of full energy beam ions is observed and slowing down time is consistent with classical theory;**
  - **Neutron decay time also agrees with classical theory;**
  - **Plan to check pitch angle scattering.**

- **In the presence of MHD activity:**
  - **Signals of some SSNPA channels are often correlated with neutron drops and MHD activity;**
  - **Several different types of SSNPA behavior are observed and not fully understood;**
  - **Plan to select typical cases and study the effects of MHD activity on fast ion distribution.**