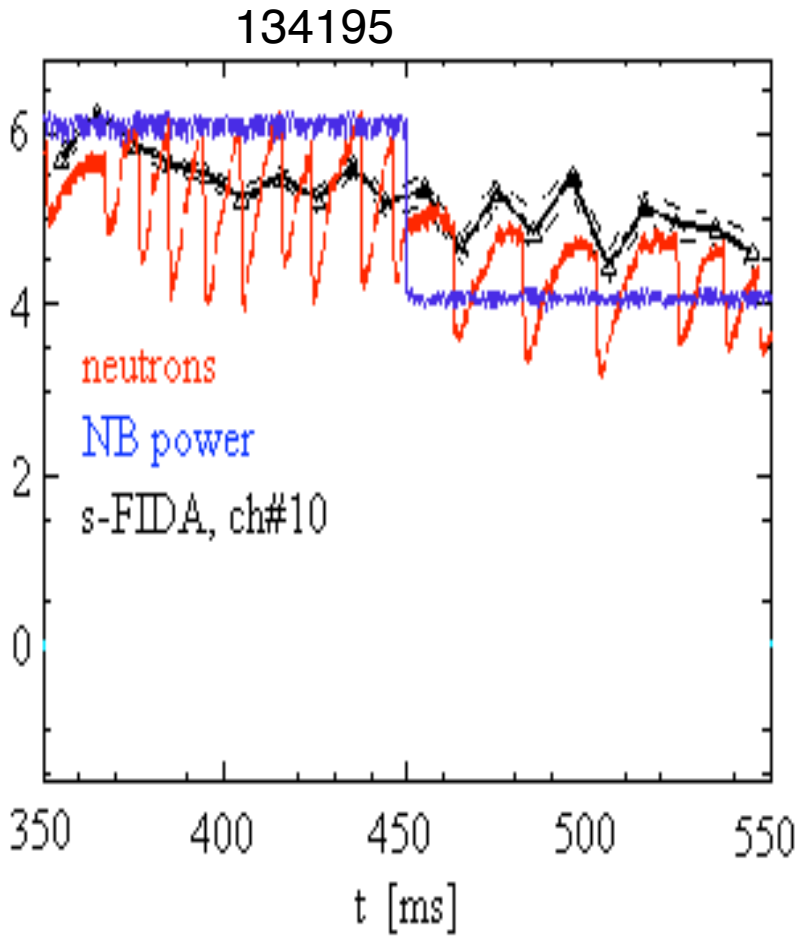
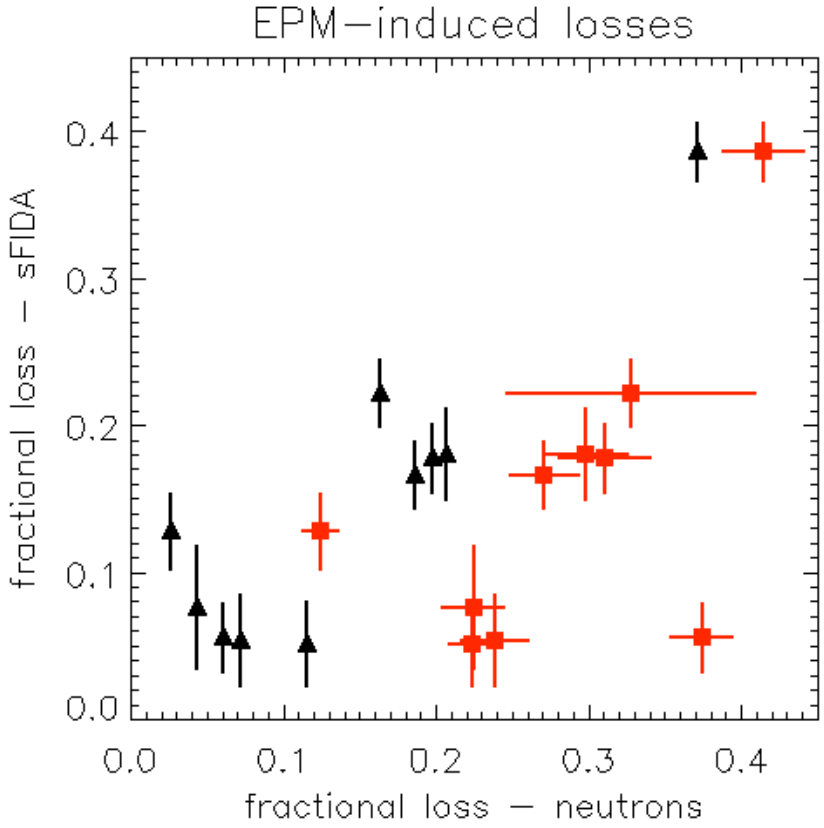
EPMs warrant further study in 2010

- EPM bursts cause large (≤35%) loss of NB ions in NSTX
- Show signatures of stochastic transport & loss of fast ions
- Have avalanche character
- Are prominent loss processes in NSTX
- Appear all the time during I_p ramp up

Neutron drops correlate with drops in FIDA confined beam ion density

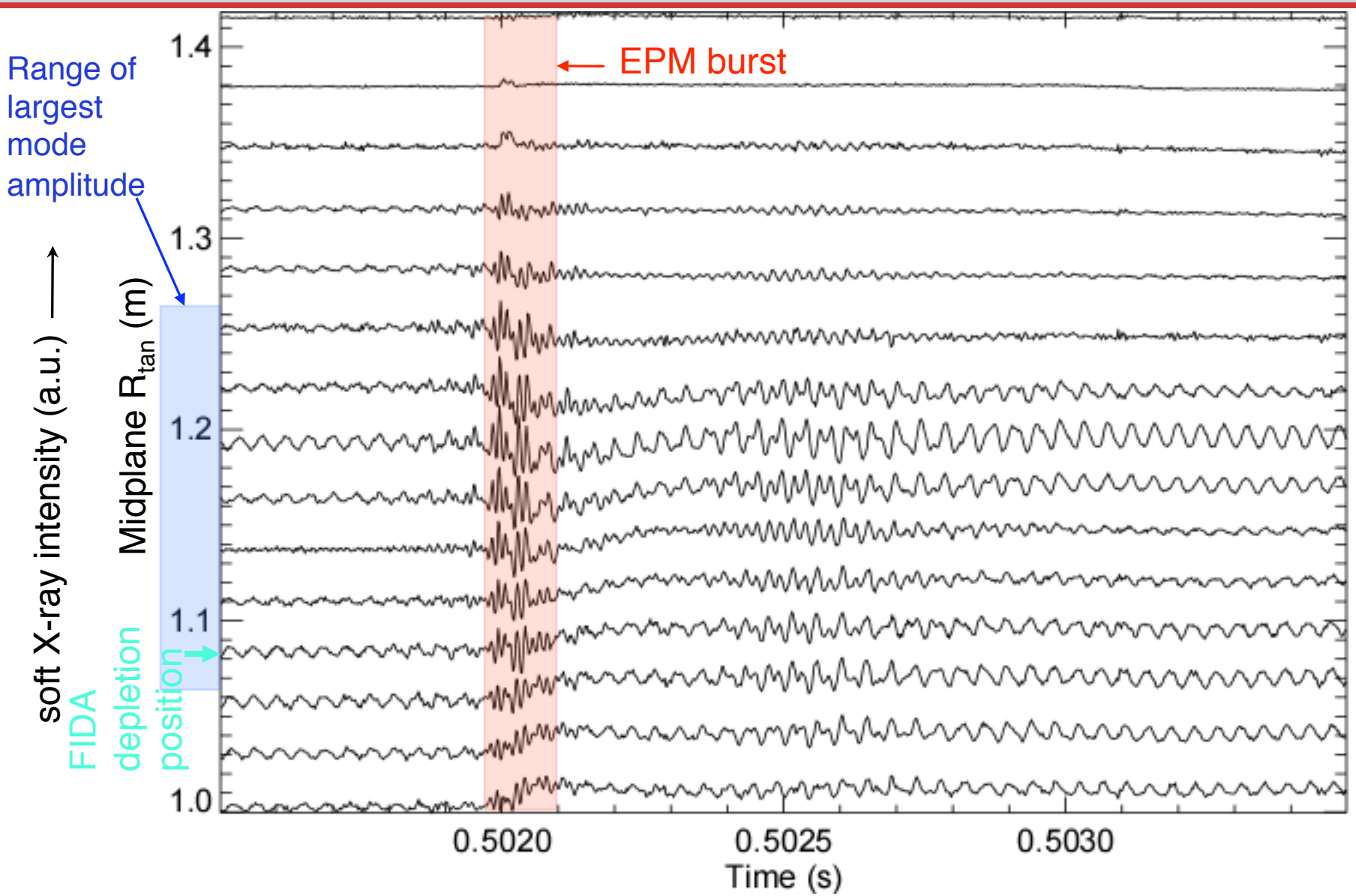




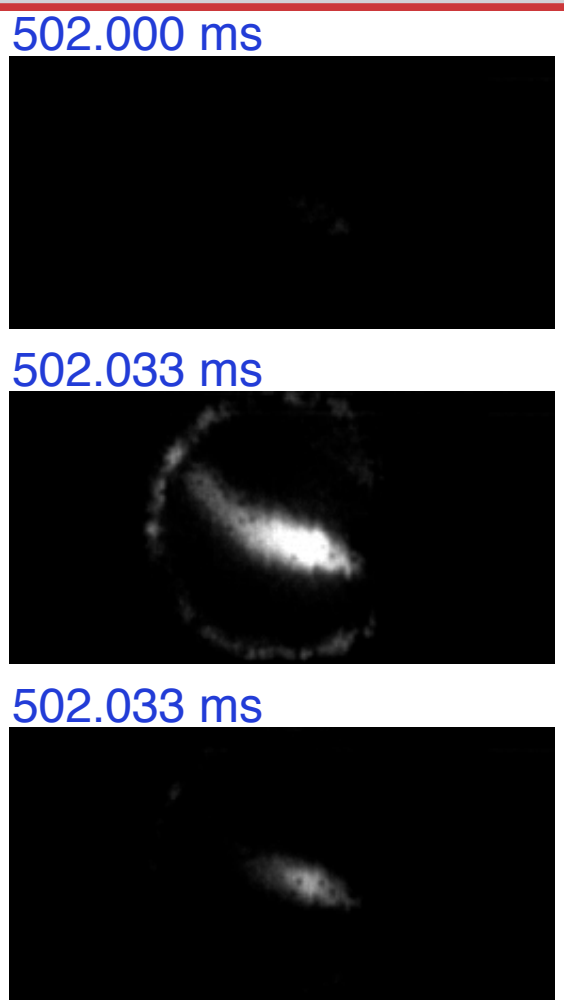
Red: raw neutron data

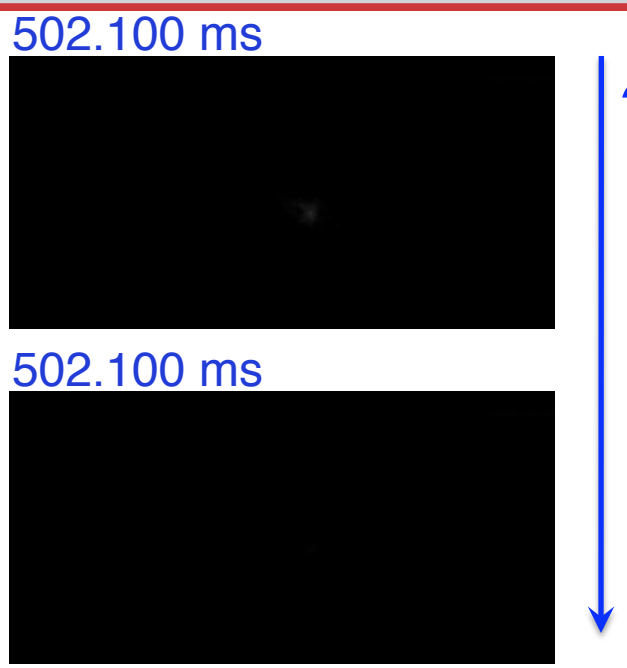
Black: neutron data integrated over same time bins as FIDA

Soft X-ray array shows area of significant internal mode amplitude roughly matches region of beam ion depletion



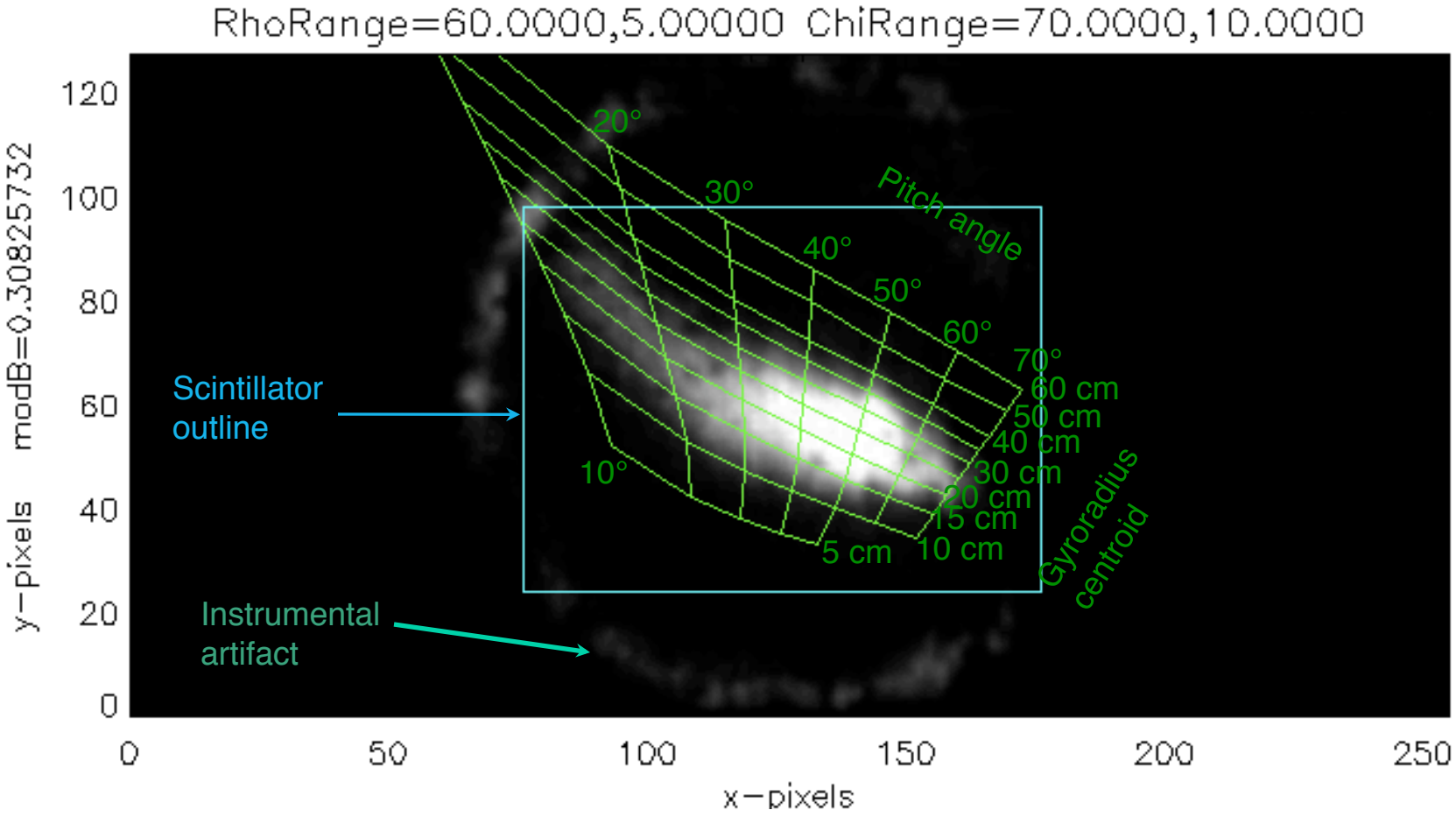
Scintillator probe shows fast ion loss takes <100 μs





- Successive frames shown, at rate of 30,000 frames/s
- Loss arises & vanishes within 2-3 frames (67-100 μs)
- >1/3 of beam population lost during this short time!

Loss covers wide range of pitch angle and gyroradius



- Pitch angle range spans ~15° (very parallel) to 70° (quite perp)
- Gyroradius range much wider than instrumental function

Potential 2010 EPM XP

- Repeat 700 kA & 1 MA shots taken in 2009
- Use BES to get additional information about mode radial structures—compare with NOVA calculations
- Run sFLIP camera at 100,000 frames/s to better resolve beam ion loss evolution
- Apply rotational braking to get mode dispersion relation (unfinished 2009 work)