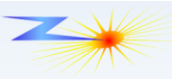


Z2011 TREX 6a data

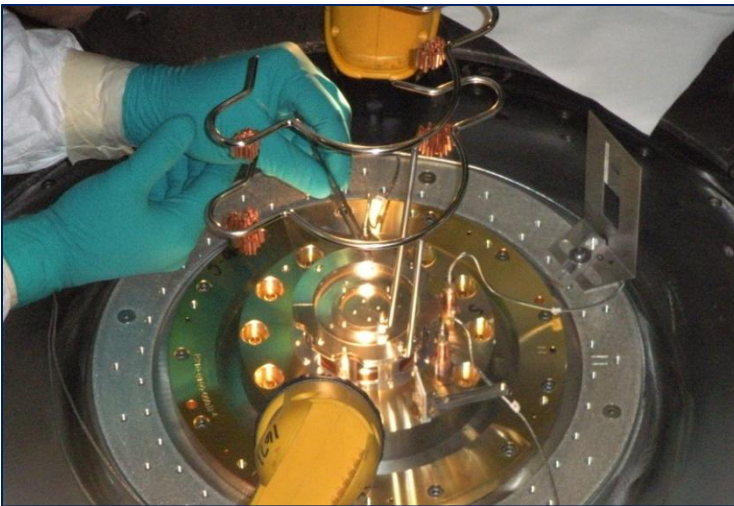
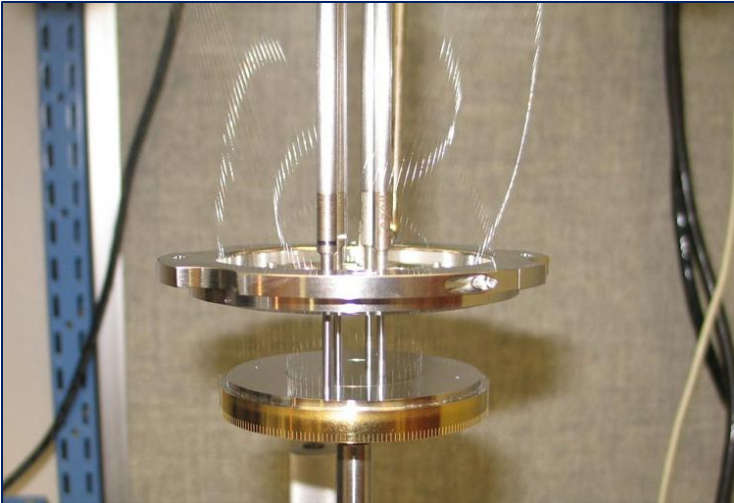
Line-widths of Mn He- α for T_i

D.J. Ampleford, Y. Maron, C. Jennings, B. Jones *et al.*,

(Data files are attached for all line-outs plotted here)



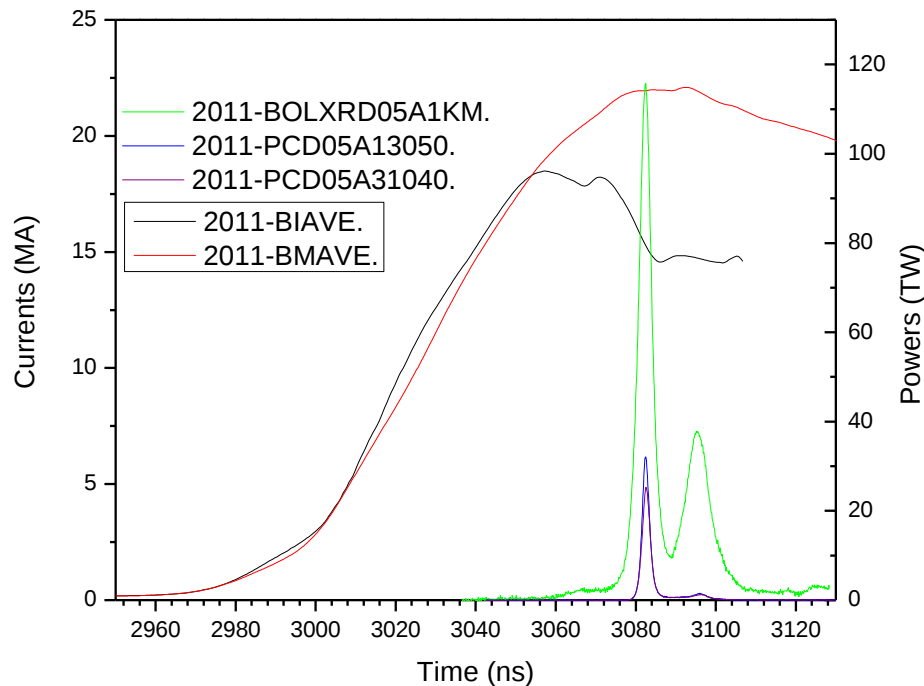
Z2011 setup



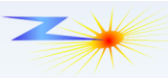
- **Z2011 (Hardware set A0090-C)**
 - 70mm on 35mm nested wire array
 - 7.95 μ m Stainless Steel 304 wires
 - 104 wires in outer, 52 in inner
- **Total mass: 1.23mg (0.61mg/cm)**
 - 2cm array lengths
 - Outer: 8.2mg
 - Inner 4.1mg
- **Hardware used curved feed to load**
- **Setup very similar, but lower mass than Z1995 ('optimal' setup)**



Z2011 summary of powers and currents

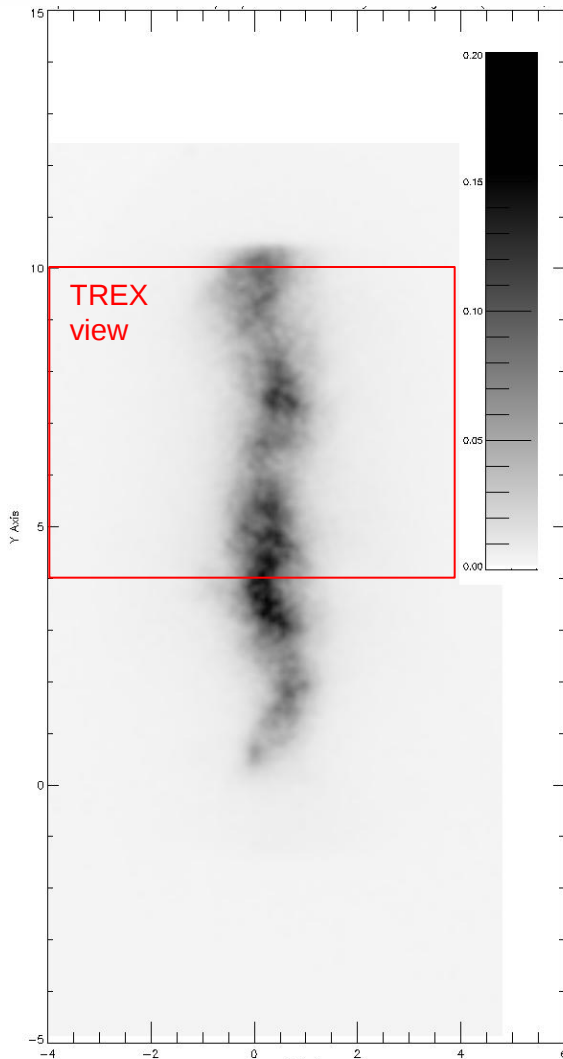


- Radiated ~90kJ of SS K-shell (two PCDs shown with 2 different filters)
- K-shell power peaked at ~5.5TW
- Peak MITL current 22MA
- Peak load current 18MA
- All values need double checking soon
- Second peak needs more investigation

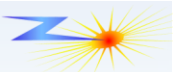


MLM K-shell channel at peak indicates 1mm pinch diameter

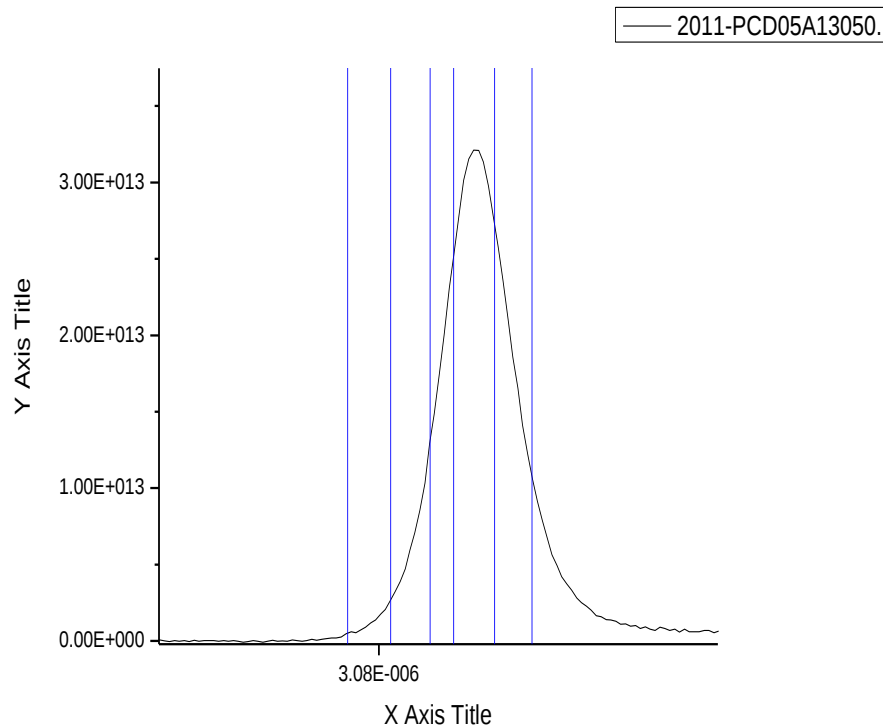
- Filtered 10mils Kapton
- Some uniformity seen along length of pinch
- Typically ~1mm diameter locally
- Other times available if useful



16: Nov 29 11:04 2010 Date: Jun 09 14:23 2010
16: c:\users\desktop\j\j\j\Documents\002-Propel\2011\2011_L_Micro-D_Images\2011_L_mlm.jpg



TREX 6A frame times for Z2011

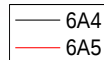


- Times relative to K-shell peak are
 - 1: -3.3ns (3079.2)
 - 2: -2.2ns (3080.3)
 - 3: -1.2ns (3081.3)
 - 4: -0.6ns (3081.9)
 - 5: +0.5ns (3082.9)
 - 6: +1.4ns (3083.9)
- Each frame has ± 0.2 ns timing uncertainty

Analysis using previous processing (but processed film not saved and lineout widths unknown)

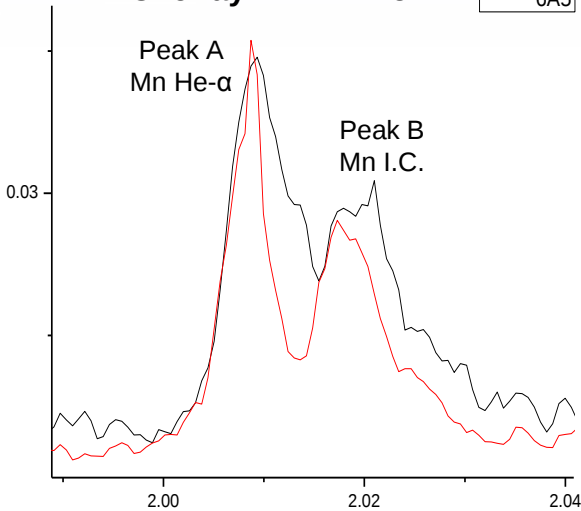


Overlay Fr 4 + Fr 5

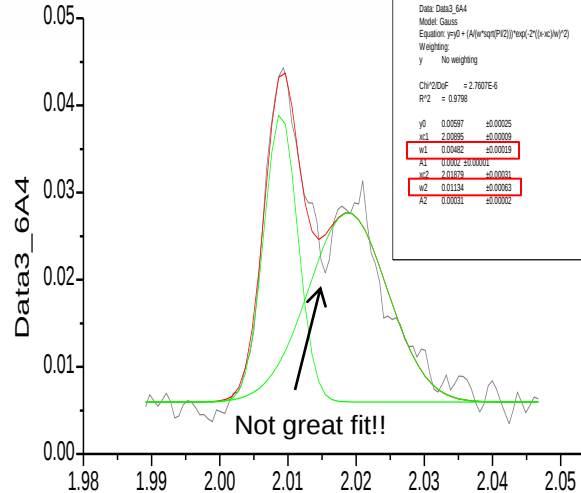


Peak A
Mn He- α

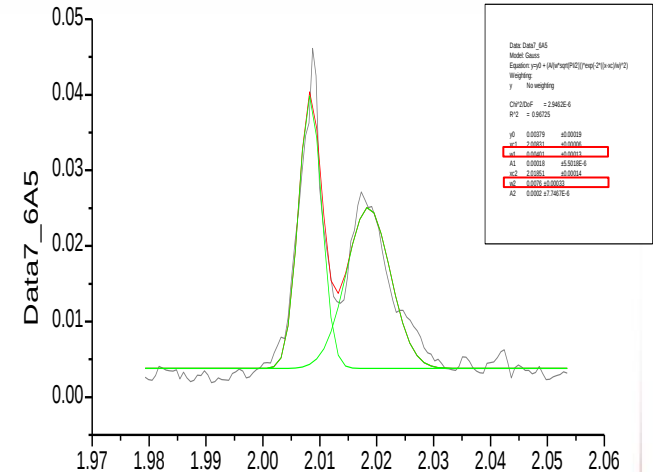
Peak B
Mn I.C.



Frame 4 with fit



Frame 5



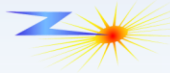
- Taking account of instrument broadening find considerable drop in effective temperature over x-ray pulse
 - $T_{i,eff} \sim 45\text{eV}$ to $\sim 25\text{eV}$ in $\sim 1\text{ns}$
 - i.e. $T_i < 40\text{eV}$, 20eV
- Loss in temperature shows KE in width dissipated quickly, therefore can compare measured and predicted equilibration rates
 - Measured equilibration = predicted???
- $\sim 40\text{eV}$ would need to be lower to fully represent dip
 - Present fits are 2-peak Gaussian fits in Origin
 - Would still lead to $>20\text{eV}$ width
- All numbers are considerably lower than $T_i \sim 200\text{eV}$ in Haines et al.

Back of the envelope fitting and analysis

	fr4-MnHe-a	fr4-MnIC	fr5-MnHe-a	fr5-MnIC
delta L	0.00482	0.01134	0.00401	0.0076
lambda	2.01	2.01	2.01	2.01
Lamb/dLamb	417.012448	177.248677	501.246883	264.473684
Instrum	900	900	900	900
Instr corr L/dL	470.57475	180.789449	603.510484	276.689938
m_p c^2/(8 kb ln 2)	178500000	178500000	178500000	178500000
M atom	54.938	54.938	54.938	54.938
Temp	4.43E+04	3.00E+05	2.69E+04	1.28E+05
Temp (keV)	44.2847121	300.030154	26.9241144	128.092686

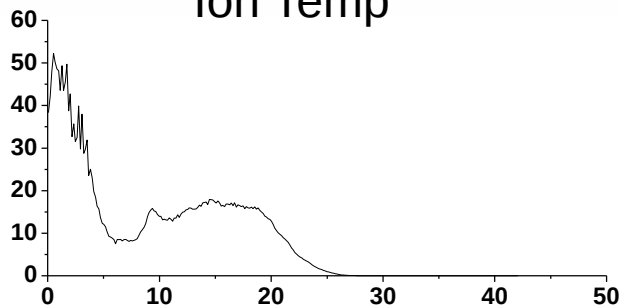
Gorgon data gives ion temperature and mass density profiles

Chris/Stephanie now ready to include Mn He- α emissivity in Gorgon

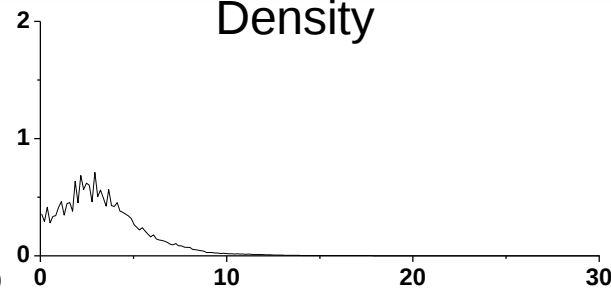


3083

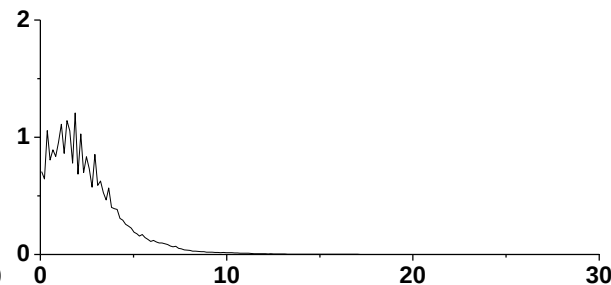
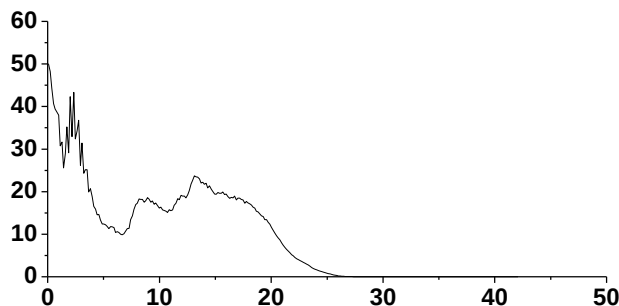
Ion Temp



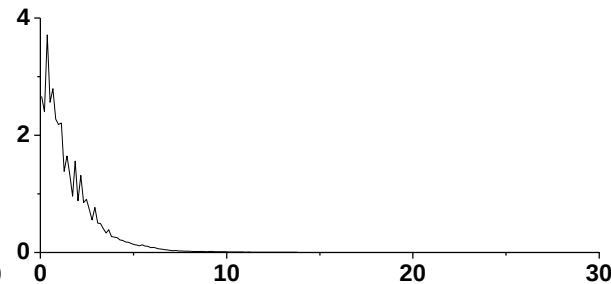
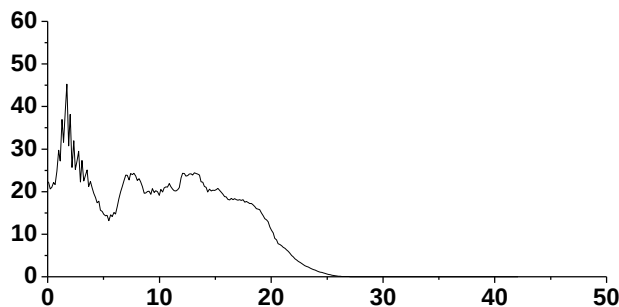
Density

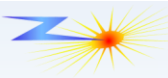


3084



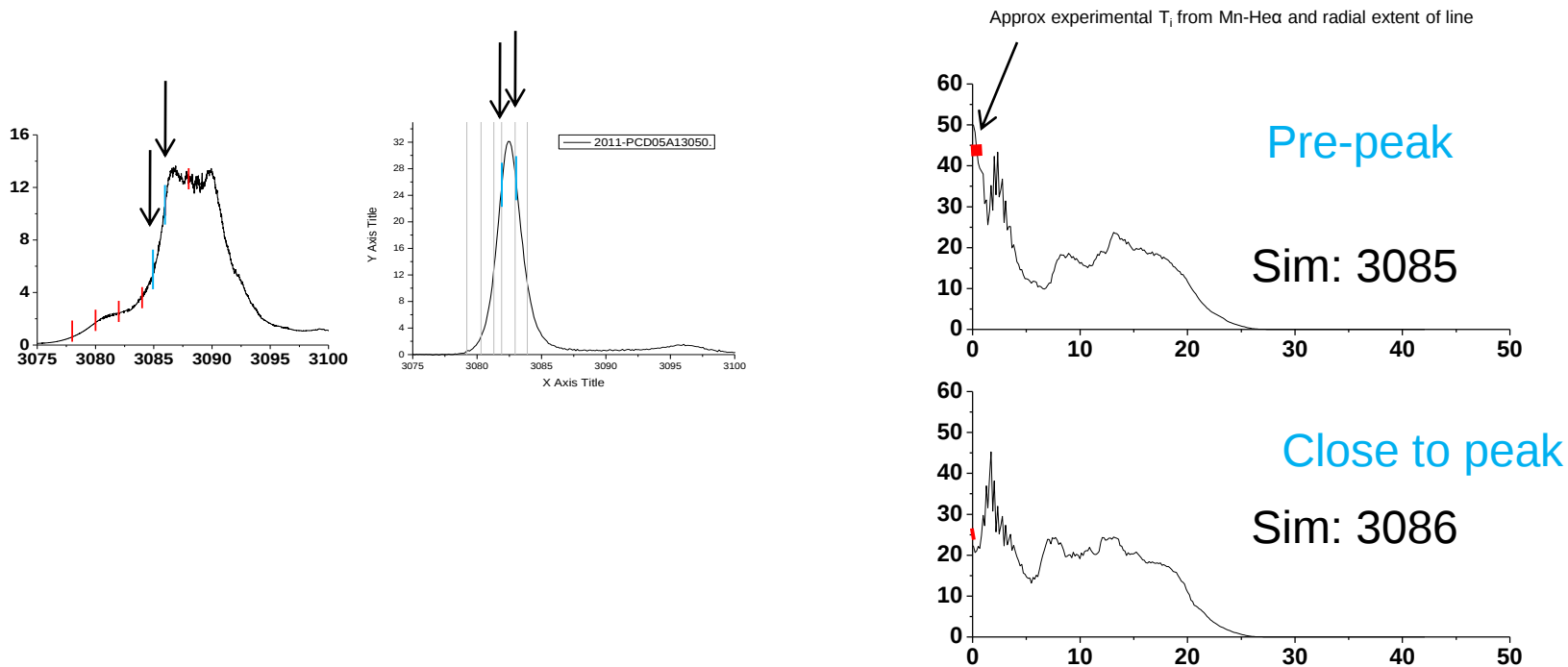
3085





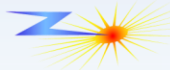
Gorgon MHD simulations are able to reproduce drop in T_i

- On axis T_i in simulation is similar magnitude to experimental data

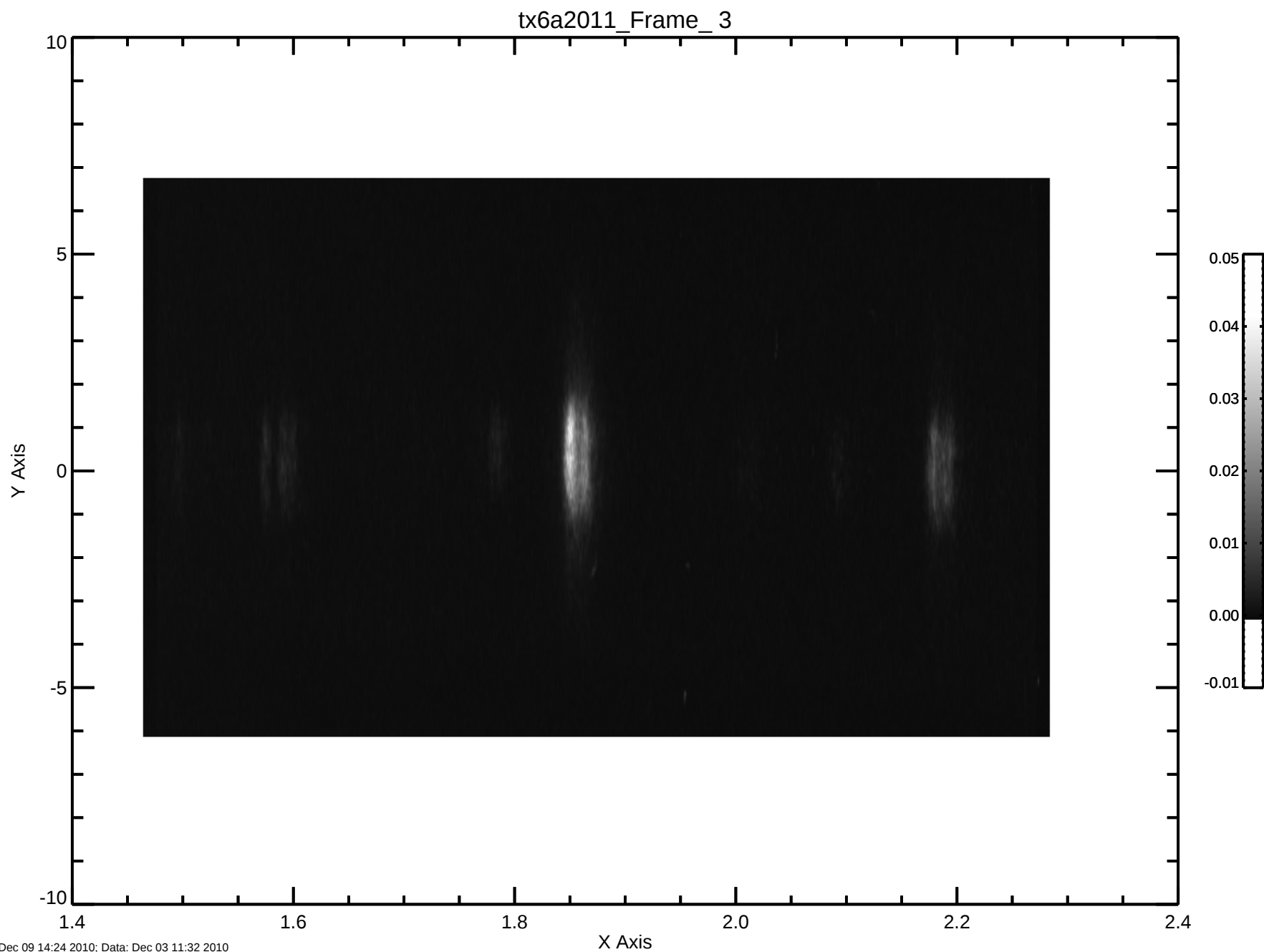


- Future simulations will include tabulated emissivity of specific lines, so should be able to produce simulated line profiles
 - T_i weighted by emission strength, with instrument resolution, radially resolved

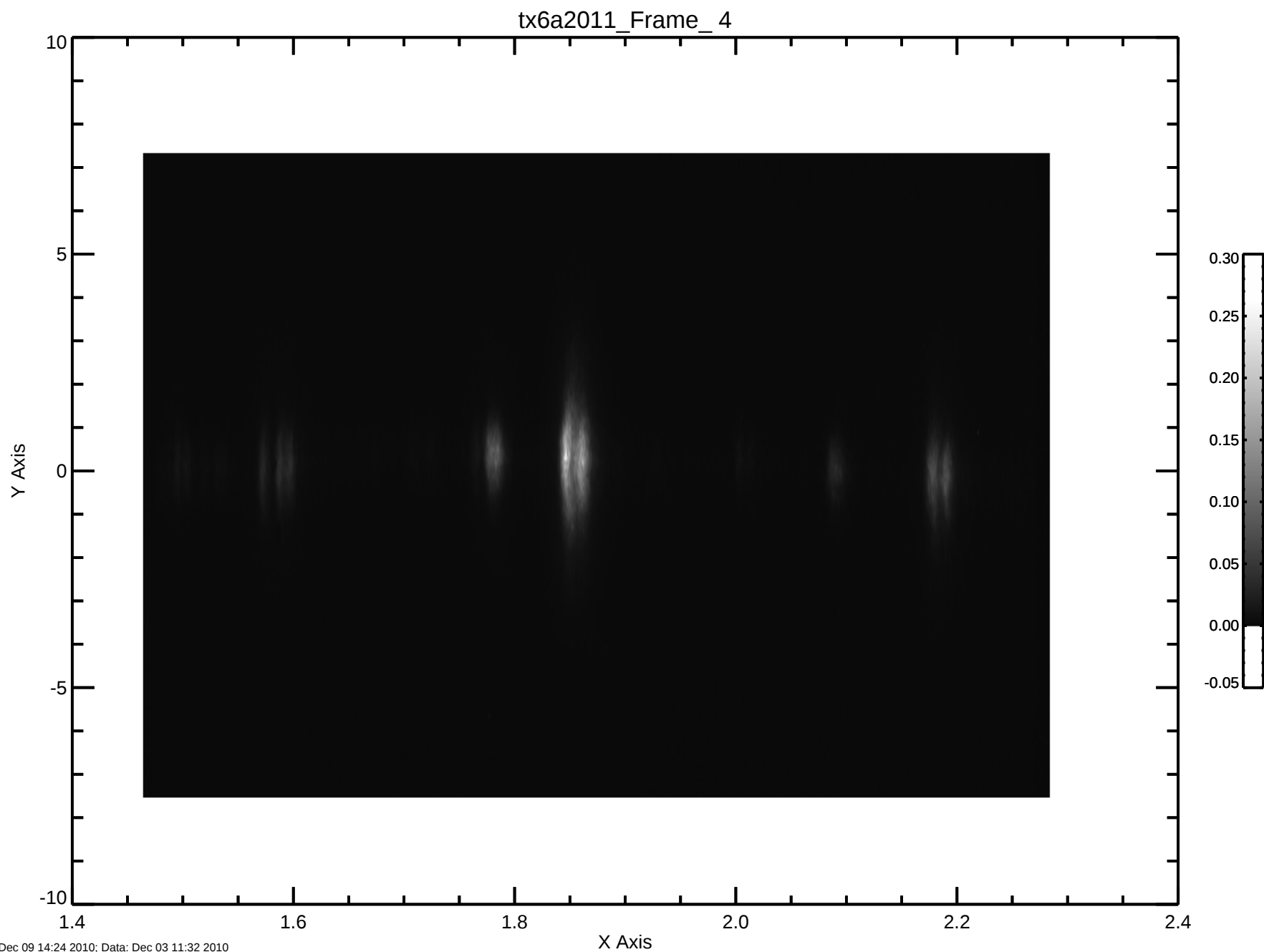
Reprocessed TX6A for Z2011



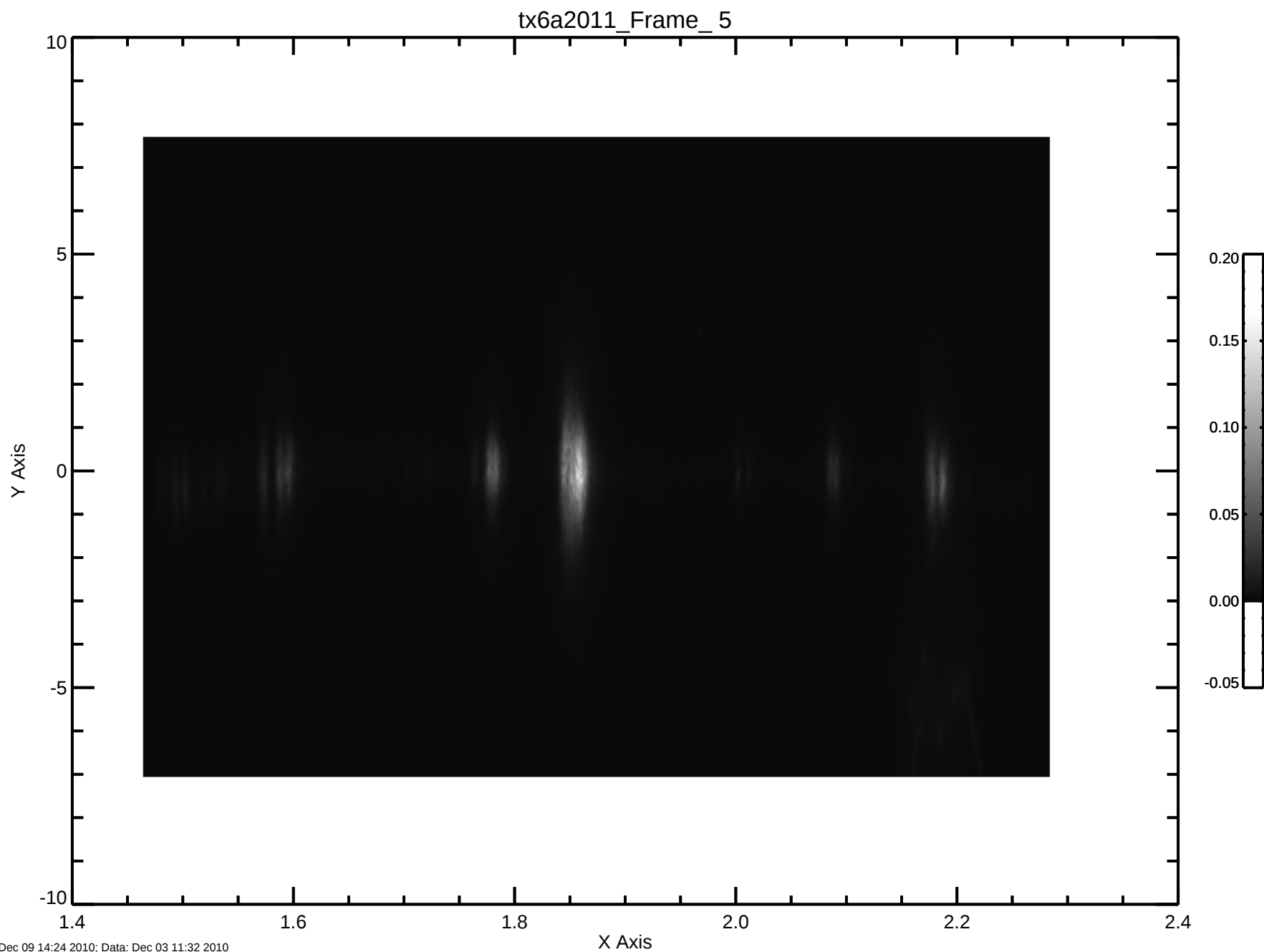
- **More carefully processed**
 - Step wedge for film correction
 - E-Xray used for dispersion assignment and crystal and filter corrections
 - Routines and all intermediate images now saved so easily repeatable
 - Center of radial lineout through Cr Ly- α used to define center of each frame
 - Not all lines perfectly centered on this
- **Following slides summarize data that is included in attached data files**
 - 4 frames have good intensity data
 - Spectral lineouts taken on axis, .5mm and 1mm off axis
 - Most lineouts use 500 μ m width for lineout, but one on-axis uses 1000 μ m
 - Naming convention of files shows shot, frame, radial location, width of lineout
 - Locations shown on following slides (colored lines on images)
 - Radial lineouts taken at multiple spectral locations
 - Many at lines (Fe He- α , Fe Ly- α , Cr He- α , Cr Ly- α , Me He- α , Ni He- α , Fe He- β)
 - Some across continuum (1.650 $\text{\AA}$, 1.945 $\text{\AA}$)
 - Spectral extent chosen to match lines
 - Naming convention of files shows shot, frame, spectral center, spectral width
 - Locations shown on following slides (colored lines on images)
 - Few slides summarize zoomed in processed spectra and lineout for the Mn He- α line of interest (similar can be produced for other lines)



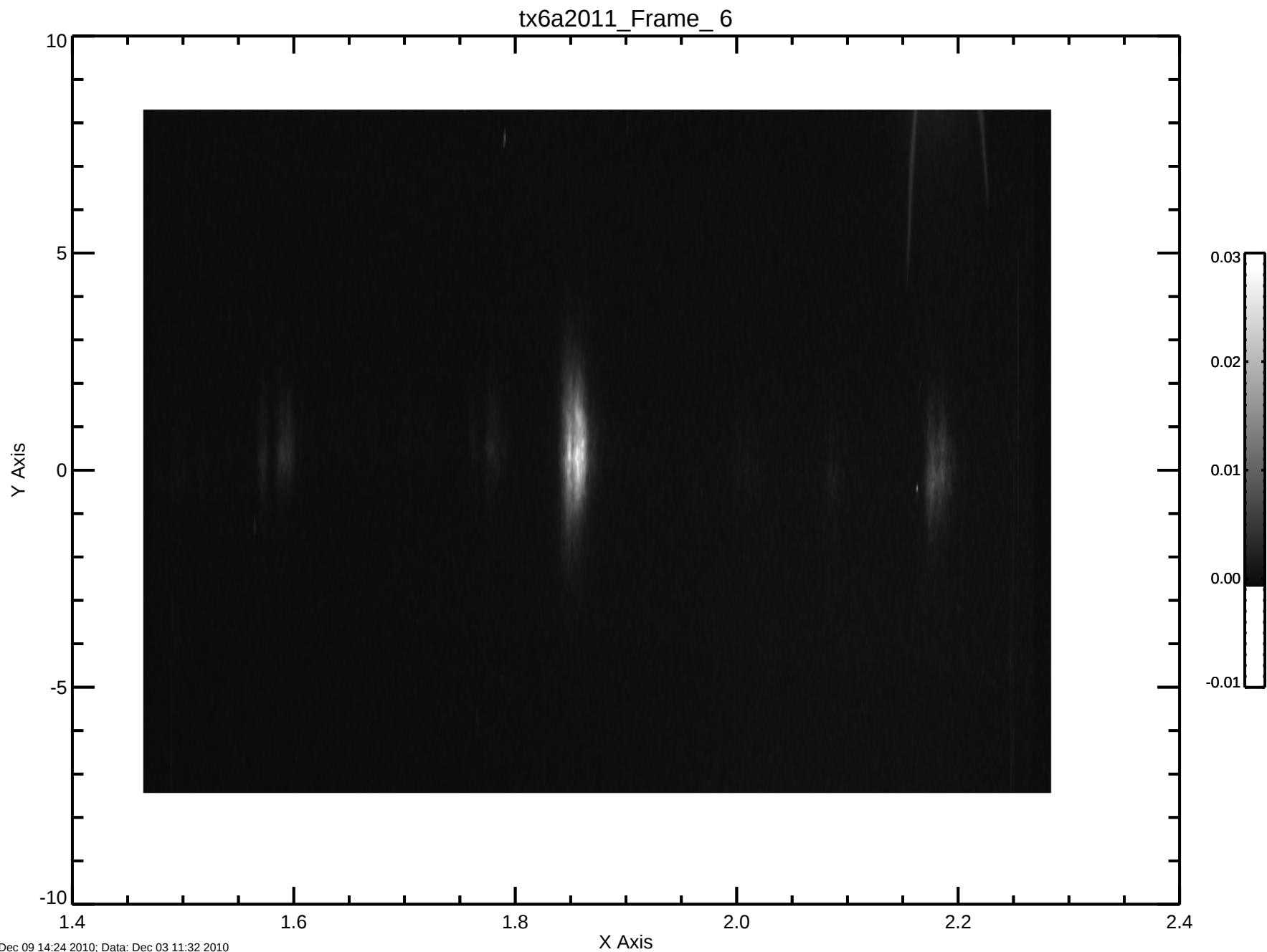
Plot: Dec 09 14:24 2010; Data: Dec 03 11:32 2010
File: C:\Users\damplef.SANDIA\Documents\K-shell sources & RES\Z2011 line width analysis\Micro_D\z2011_tx6a.pff_DJAstep_exray120310.pff



Plot: Dec 09 14:24 2010; Data: Dec 03 11:32 2010
File: C:\Users\damplef.SANDIA\Documents\K-shell sources & RES\Z2011 line width analysis\Micro_D\z2011_tx6a.pff_DJAstep_exray120310.pff

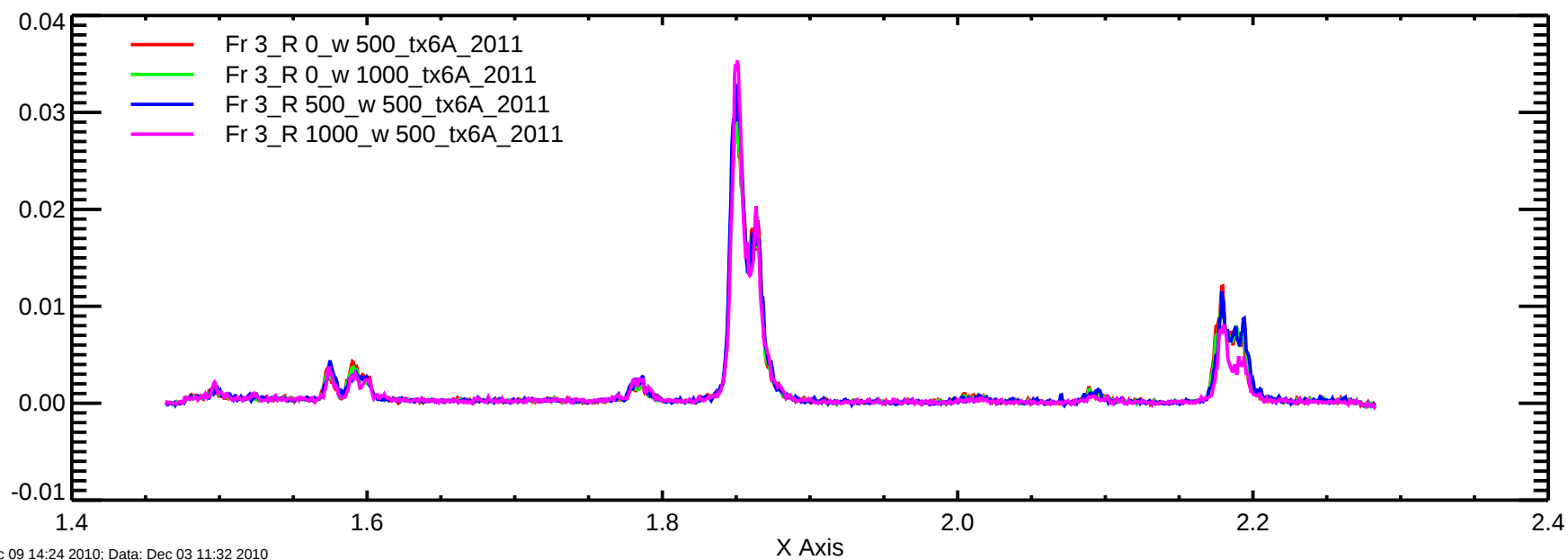
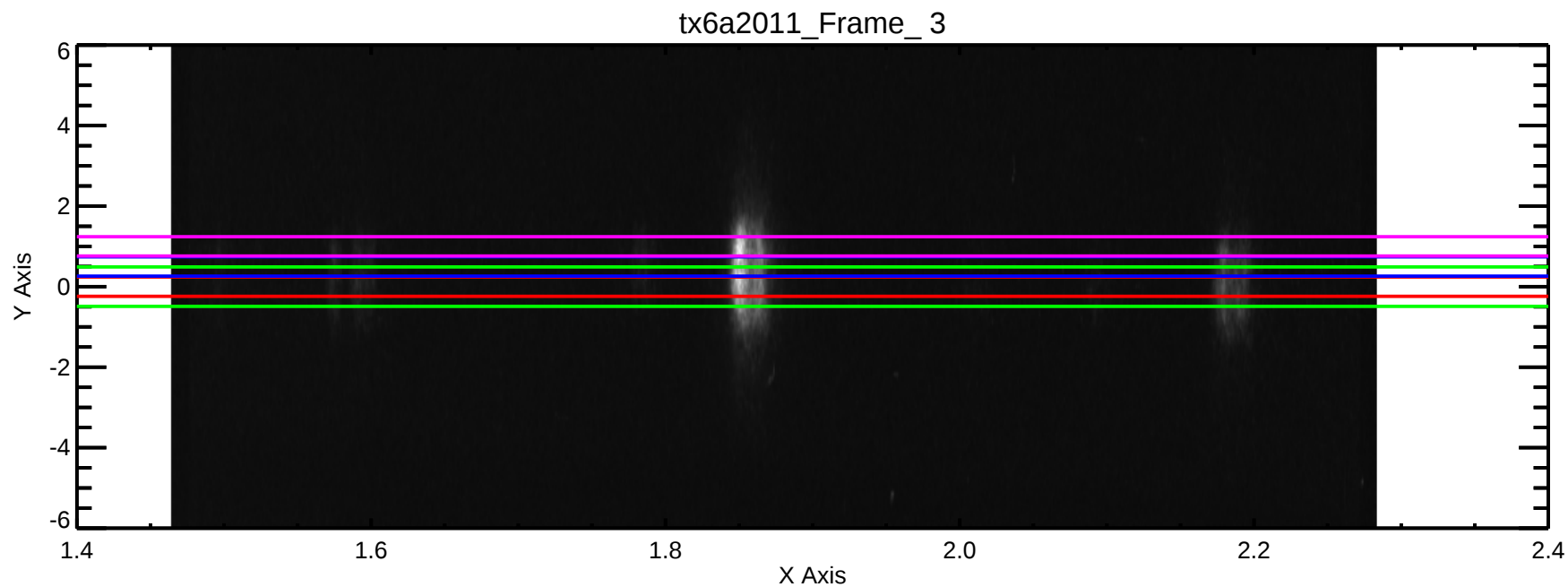


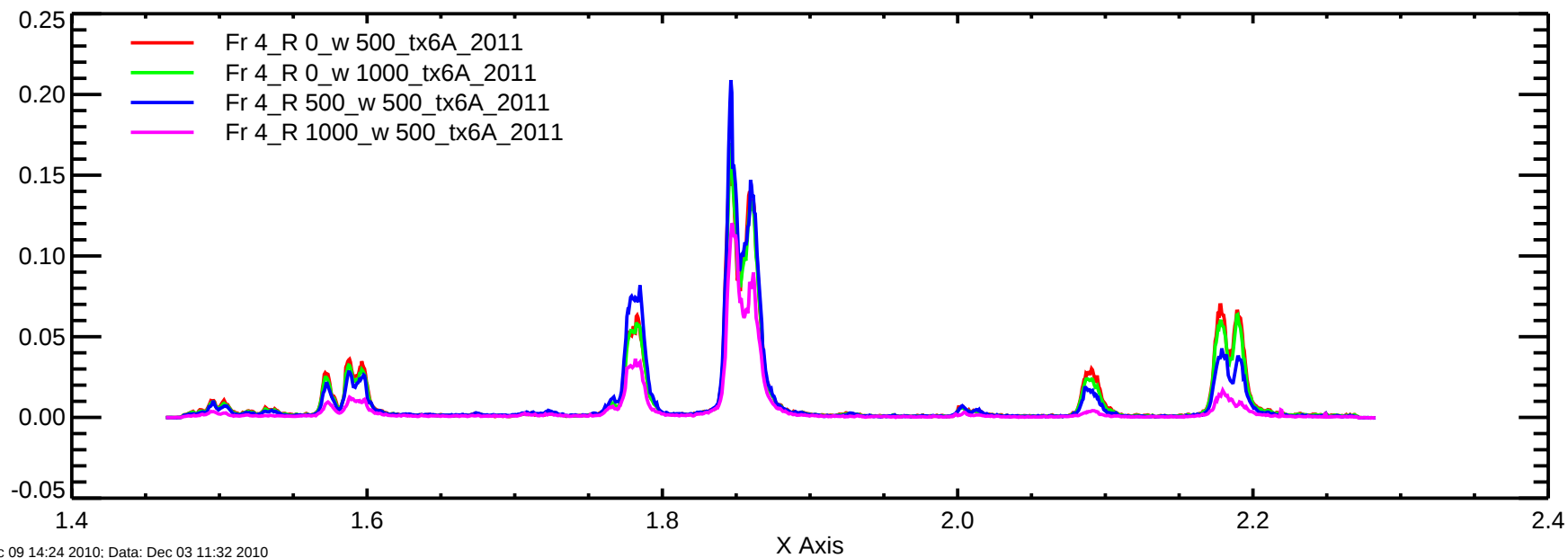
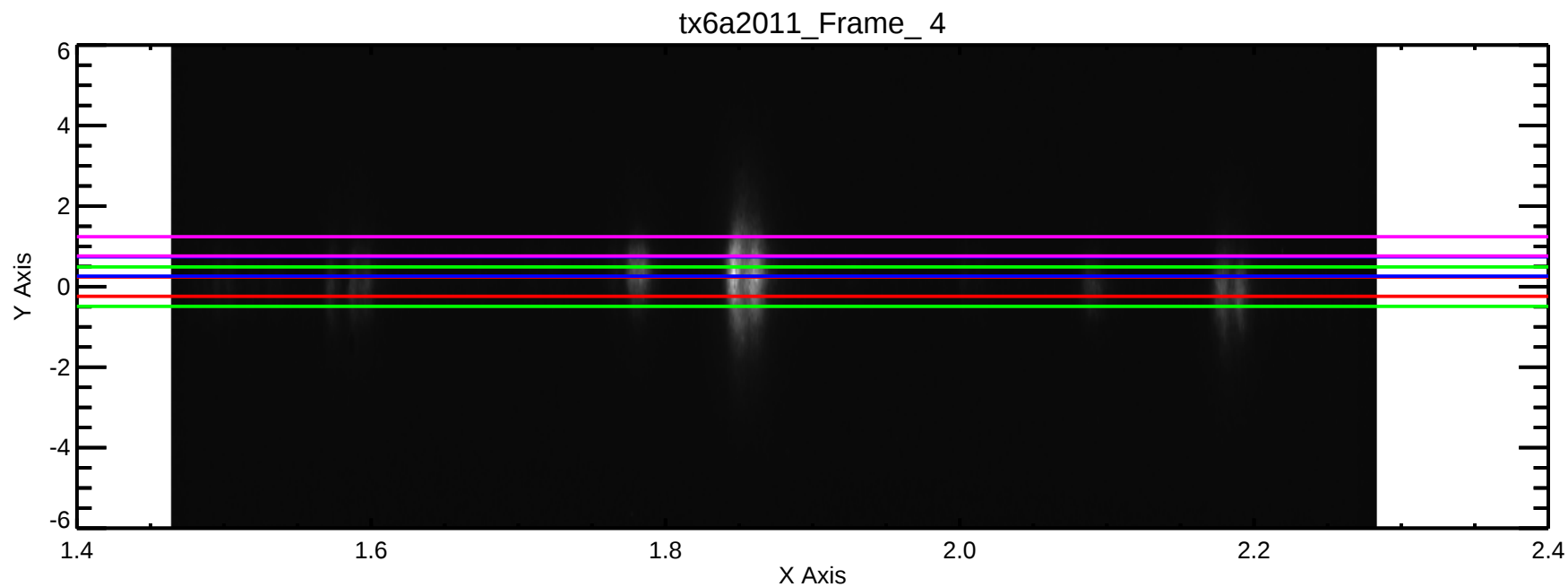
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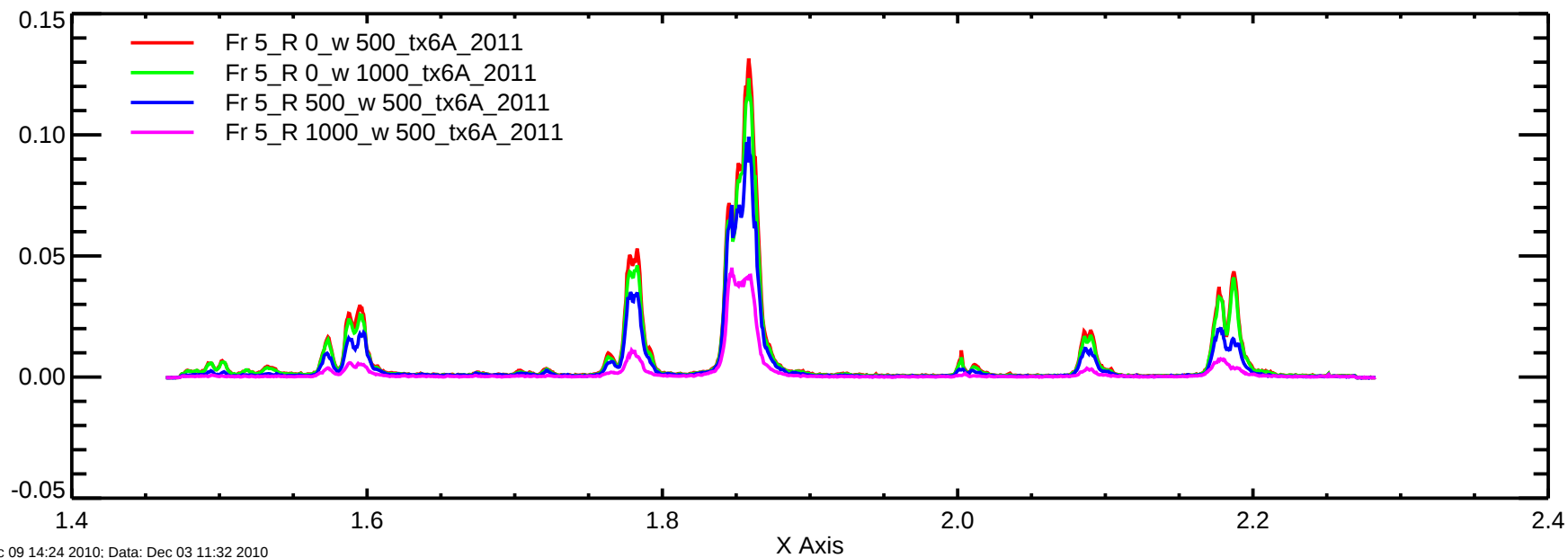
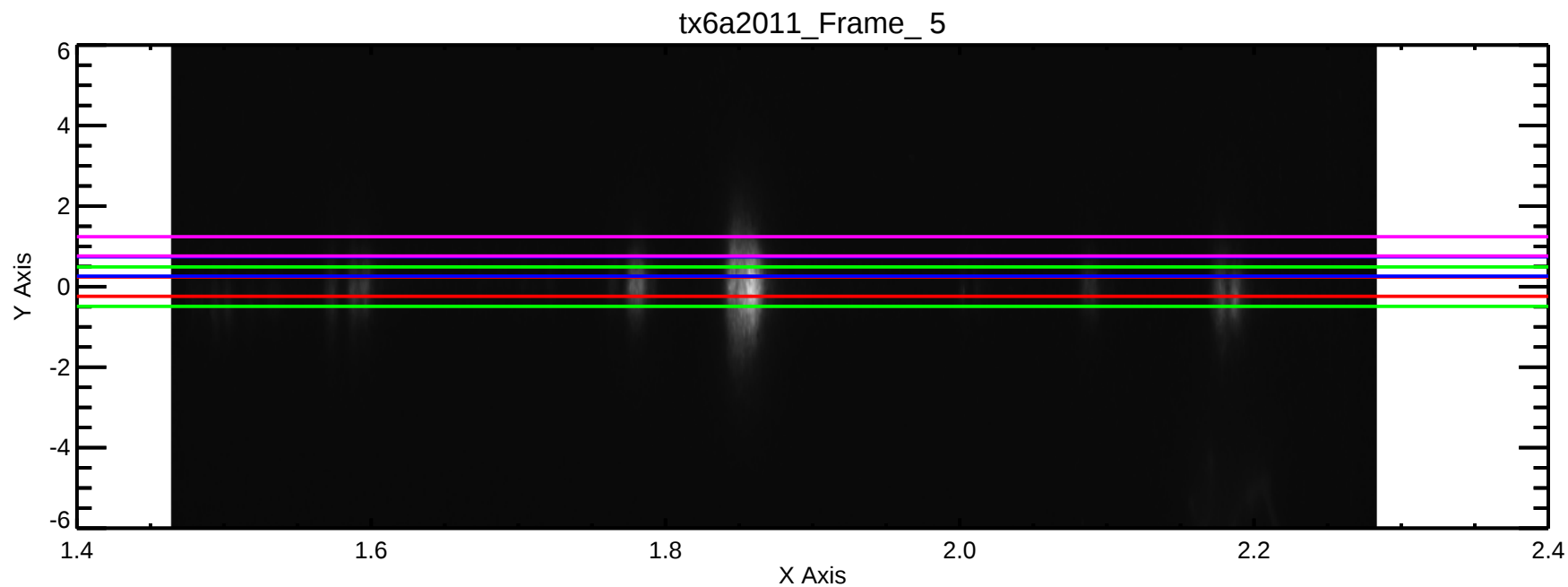


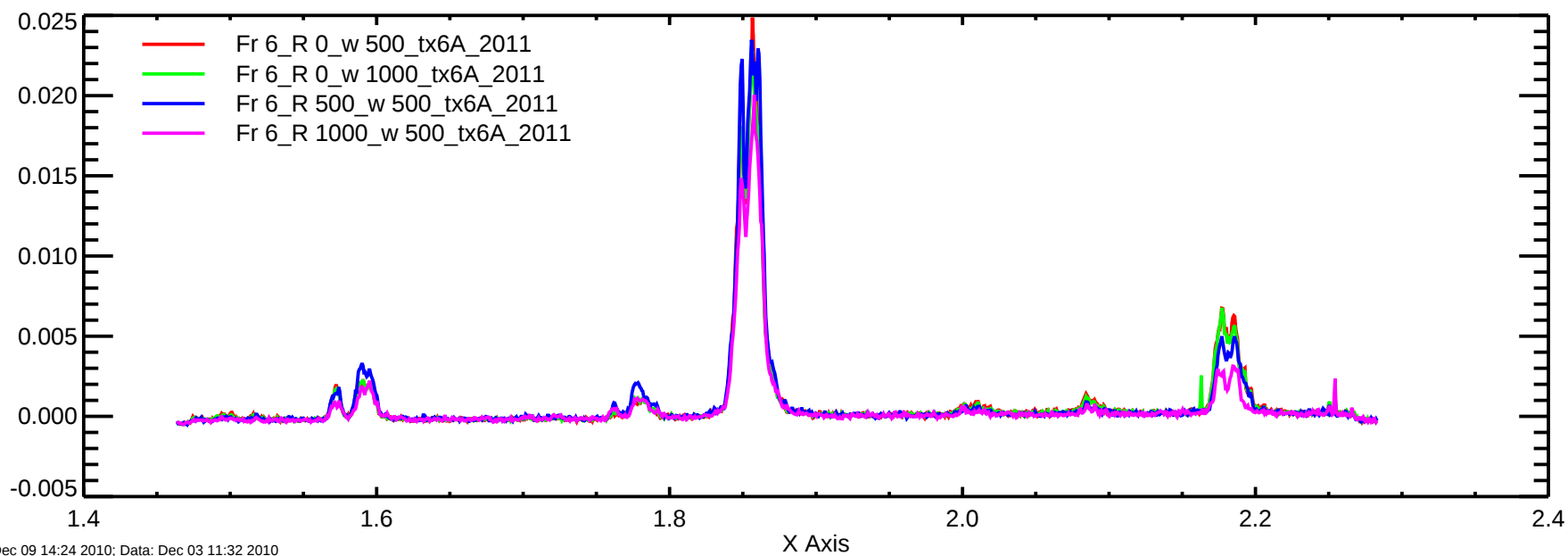
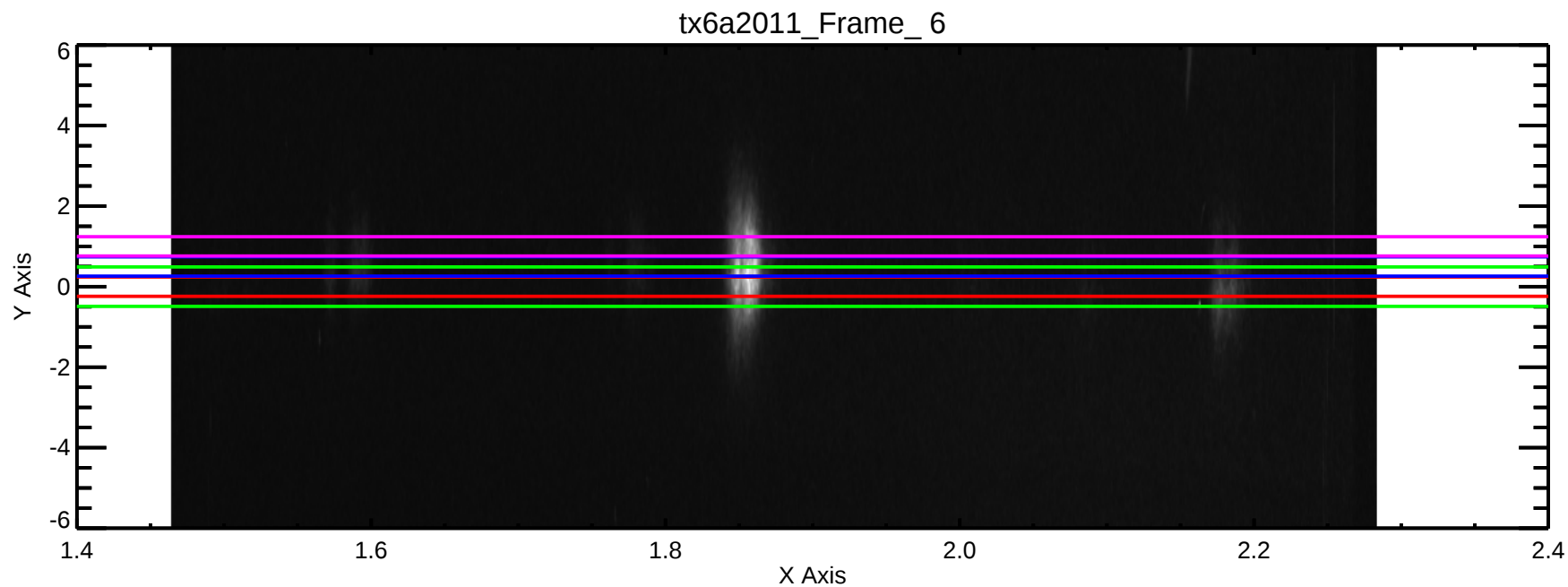
Plot: Dec 09 14:24 2010; Data: Dec 03 11:32 2010

File: C:\Users\damplef.SANDIA\Documents\K-shell sources & RES\Z2011 line width analysis\Micro_D\z2011_tx6a.pff_DJAstep_exray120310.pff









Plot: Dec 09 14:24 2010; Data: Dec 03 11:32 2010

File: C:\Users\damplef.SANDIA\Documents\K-shell sources & RES\Z2011 line width analysis\Micro_D\z2011_tx6a.pff_DJAstep_exray120310.pff

