

# Chandra Calibration Status



IACHEC Meeting March 25, 2013

# Newly Released Calibration Products

## ACIS

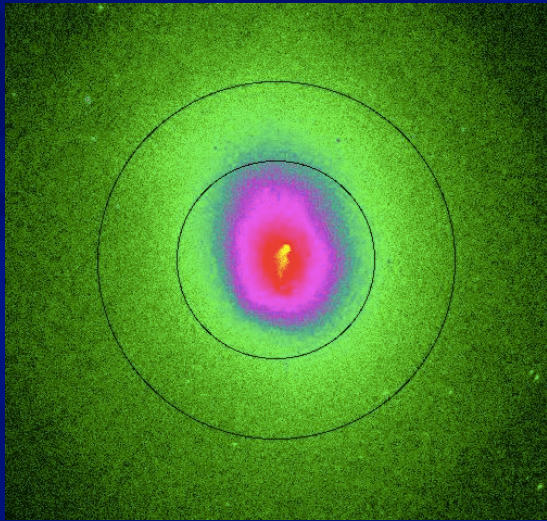
- Updated ACIS contamination model
- A set of time-dependent ACIS QE maps (one for every two years)

## HRC

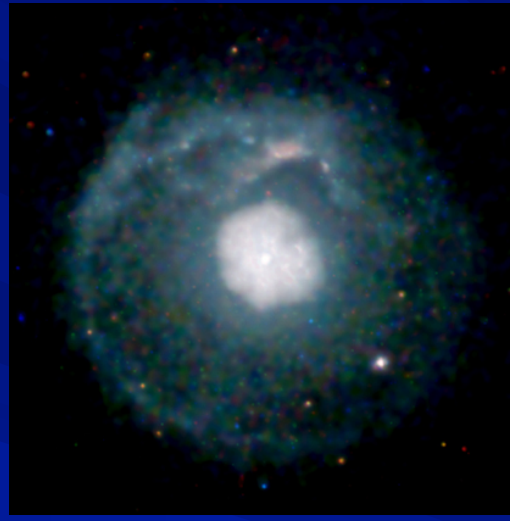
- The HRC-S high voltage setting was increased in March 2012 to mitigate the effects of the declining gain and QE
- Improved HRC –S and HRC-I de-gap maps – This affects the centroid of the 0<sup>th</sup> order image in LETG spectra and the wavelength scale.
- New gains and QE for the new HRC-S high voltage setting

# Chandra Internal Cross-Calibration Studies

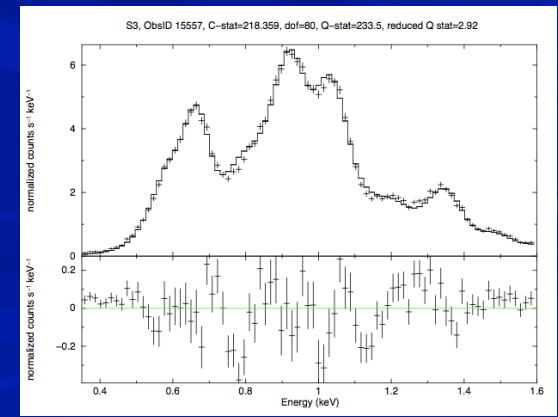
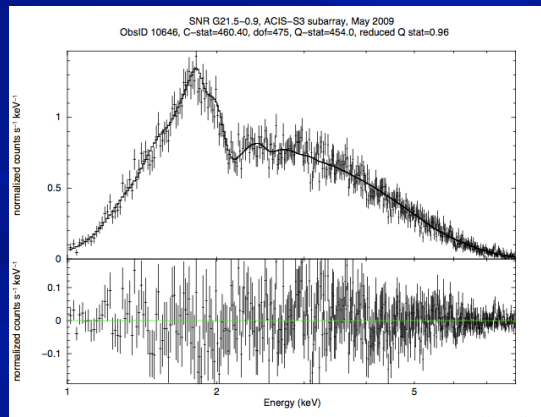
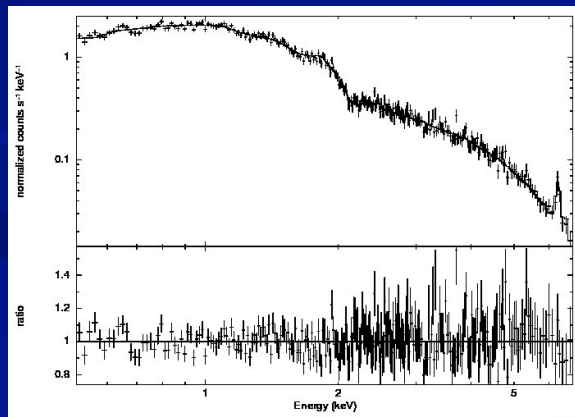
Abell 1795



G21.5-09

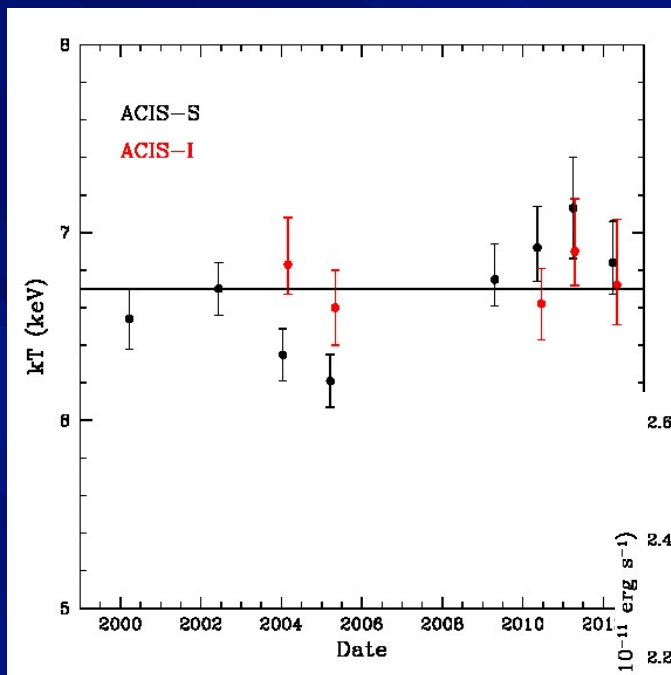


E0102-72

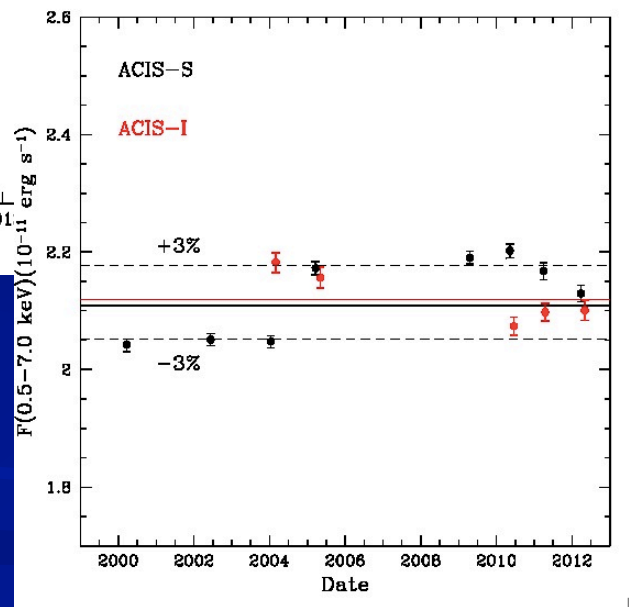
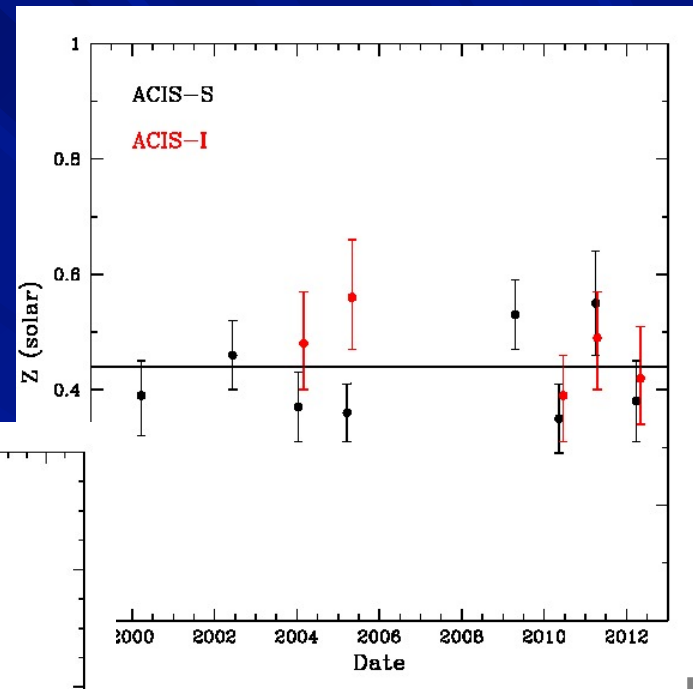


# Abell 1795 Cross-Calibration Results

## On-Axis Observations



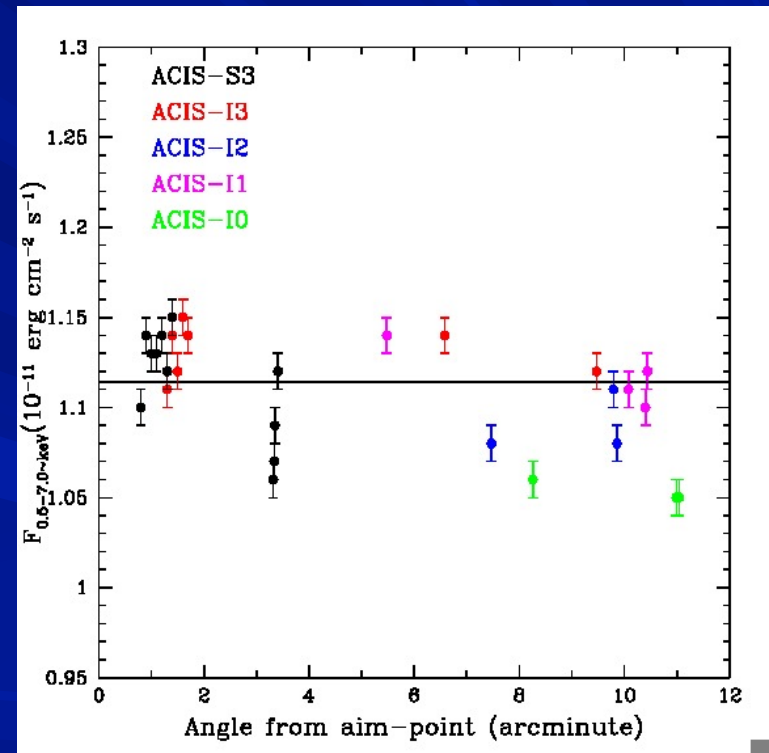
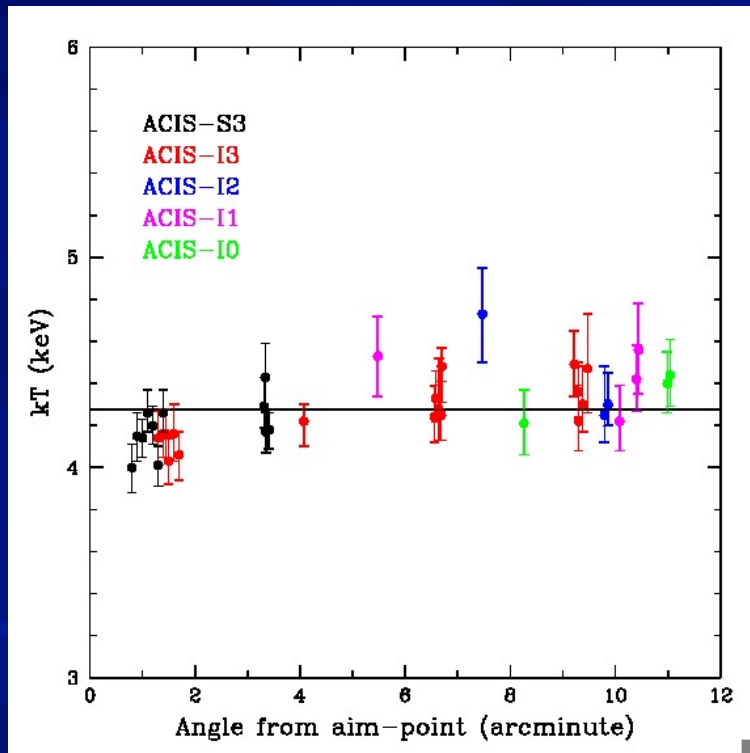
phabs\*apec  
 $N_H = 1.2e20 \text{ cm}^{-2}$   
 $z = 0.062$



# Abell 1795 Cross-Calibration Results

## Off-Axis Observations

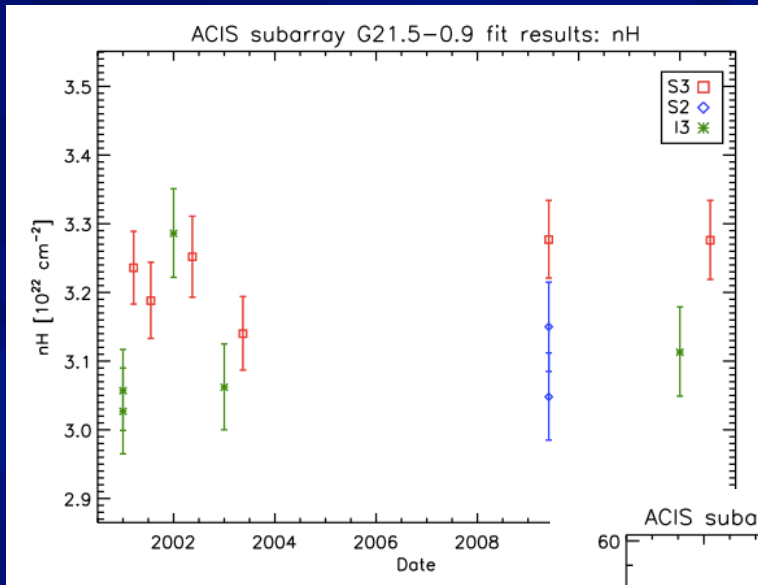
phabs\*apec  
 $N_H = 1.2e20 \text{ cm}^{-2}$   
 $z = 0.062$



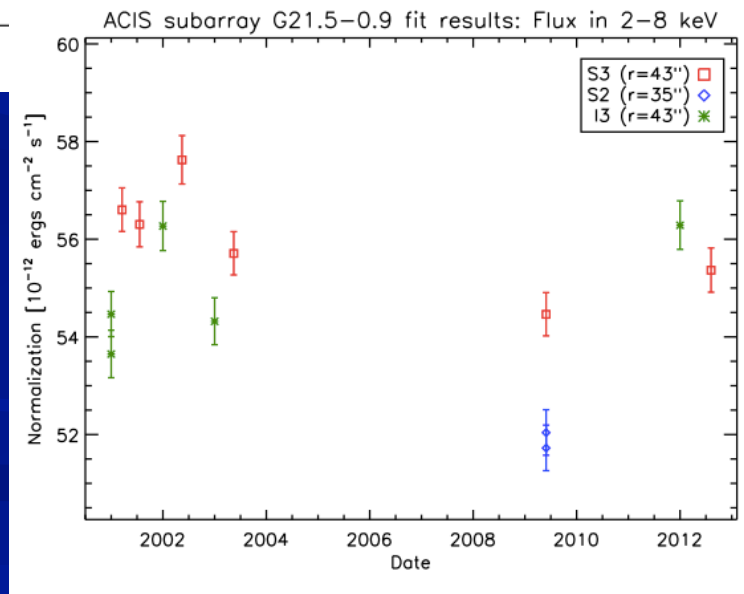
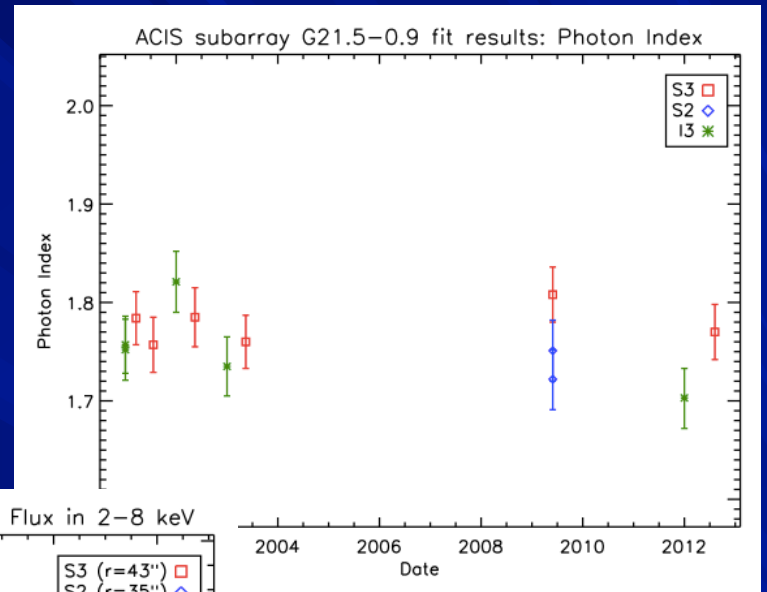


# G21.5-09 Cross-Calibration Results

## On-Axis Observations



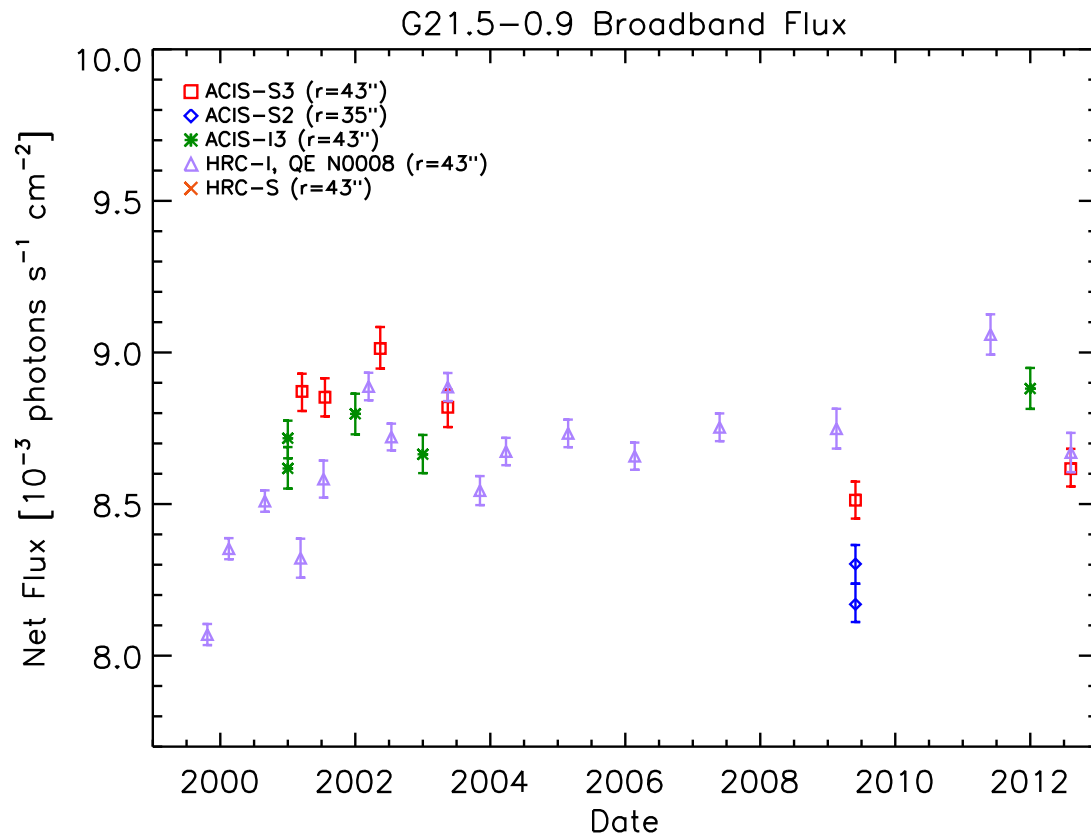
phabs\**pow*



# G21.5-09 Cross-Calibration Results

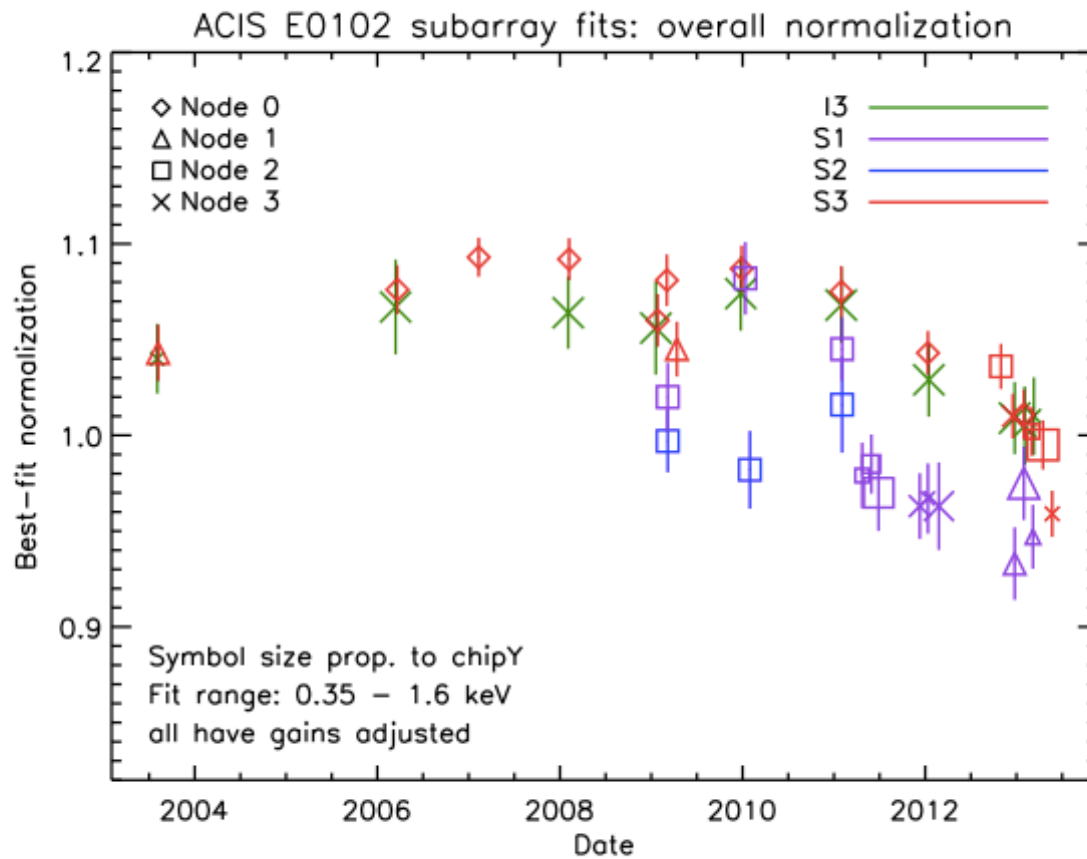
## On-Axis Observations

phabs\*pow



# E0102-72 Cross-Calibration Results

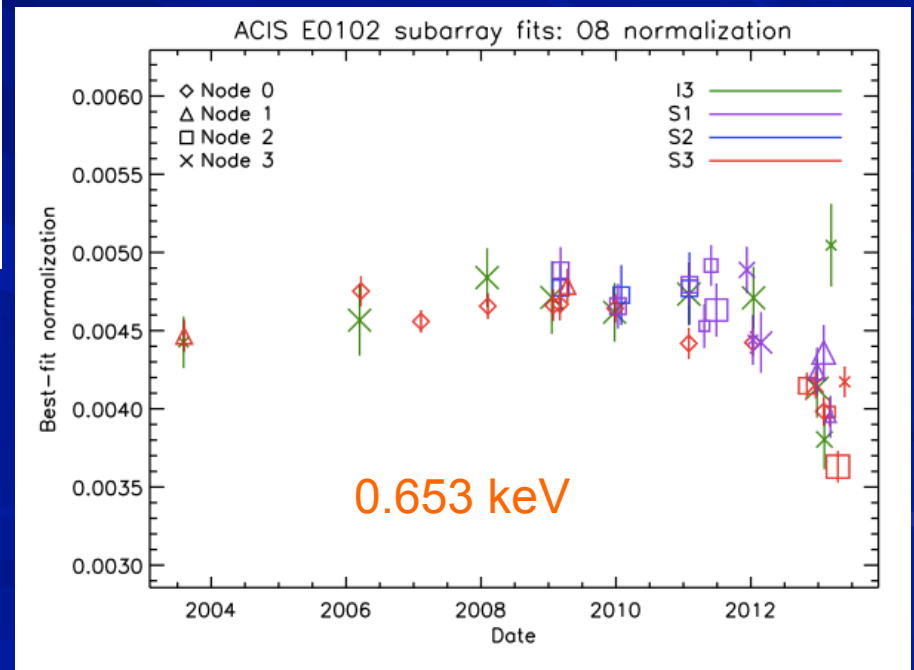
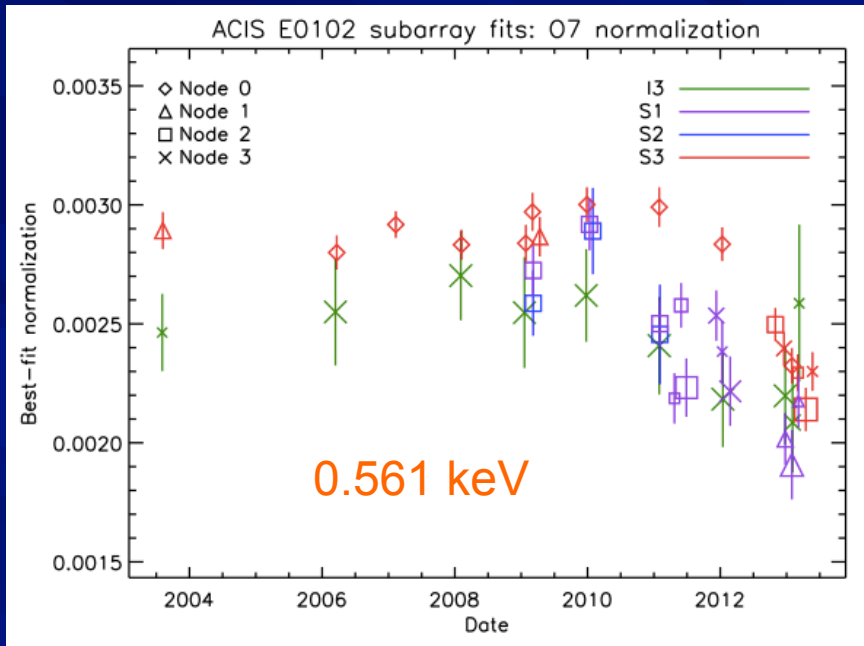
## IACHEC Model





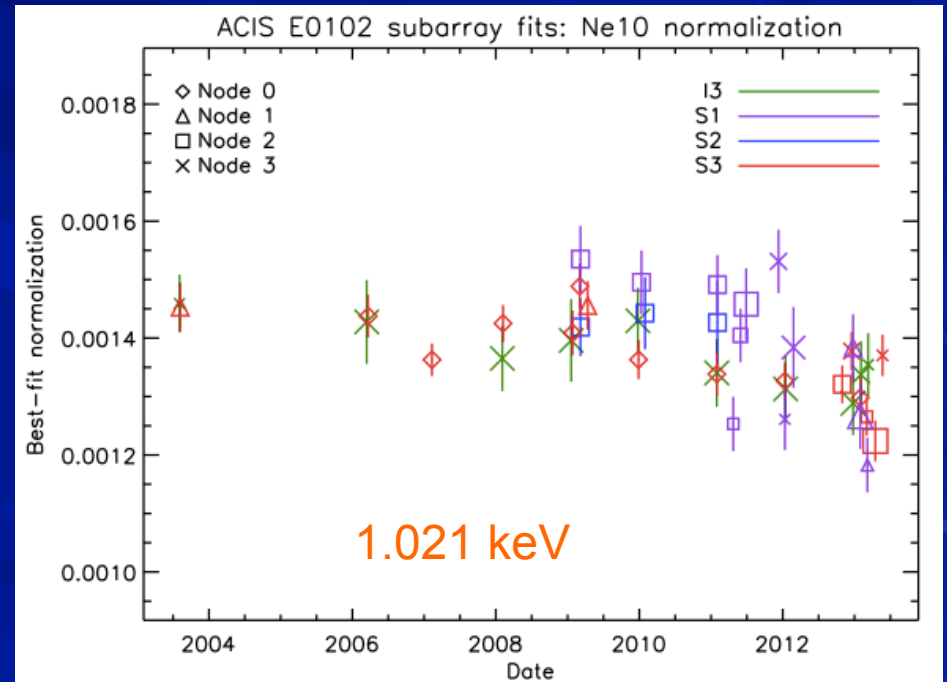
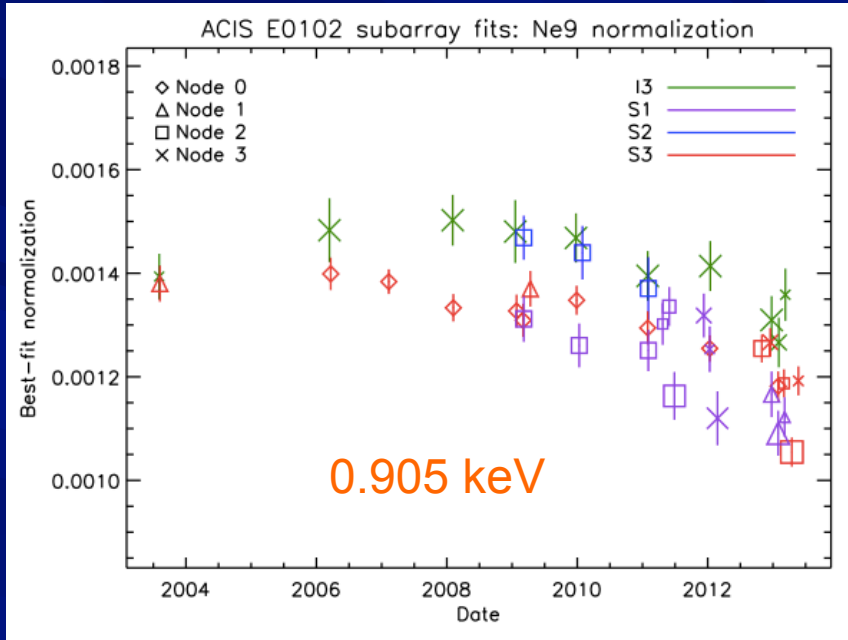
# E0102-72 Cross-Calibration Results

## IACHEC Model



# E0102-72 Cross-Calibration Results

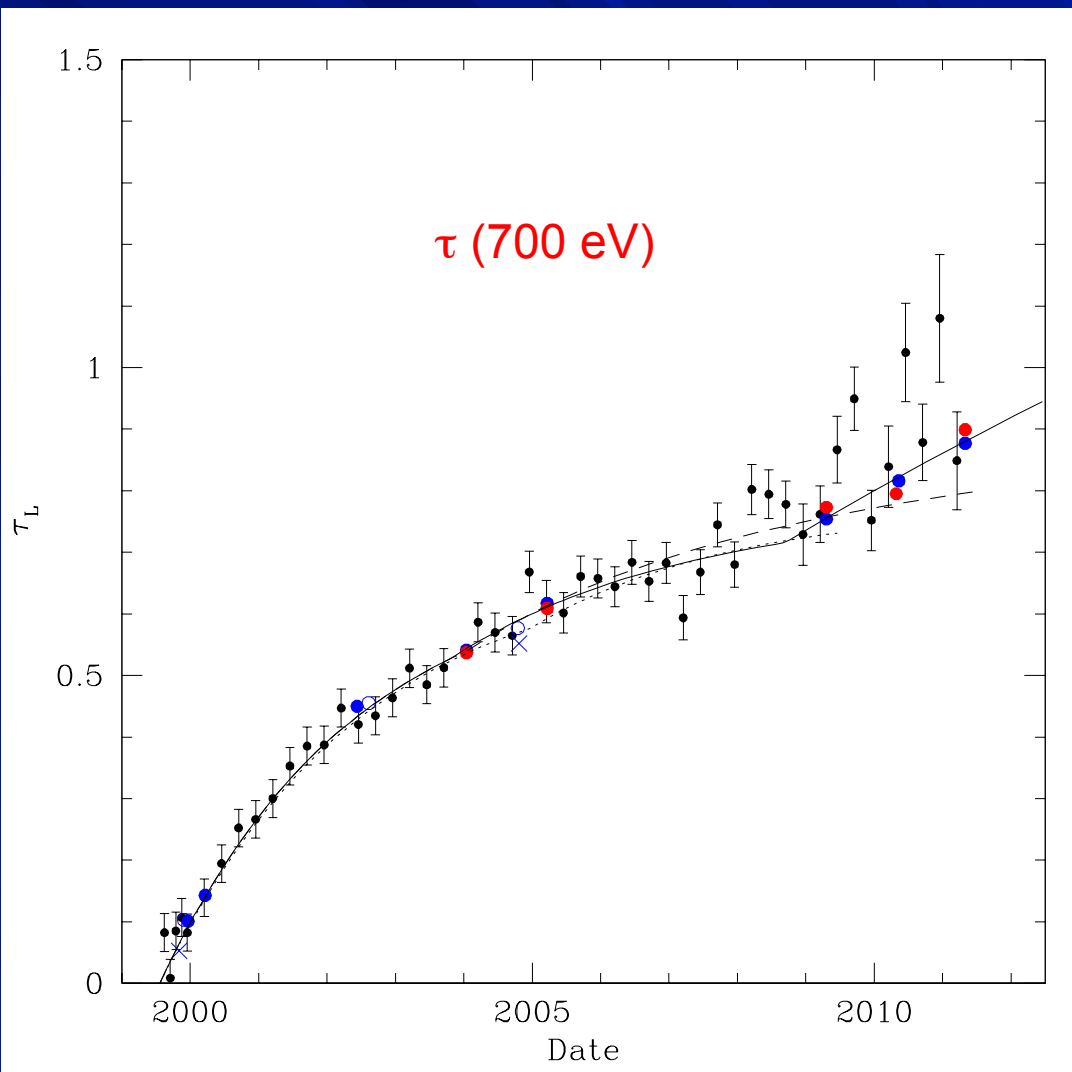
## IACHEC Model



# ACIS Contamination Model N007

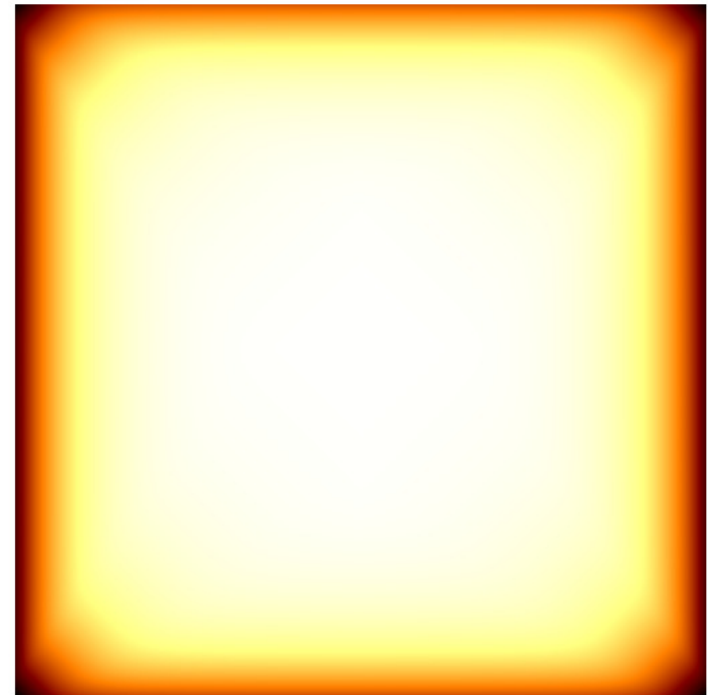
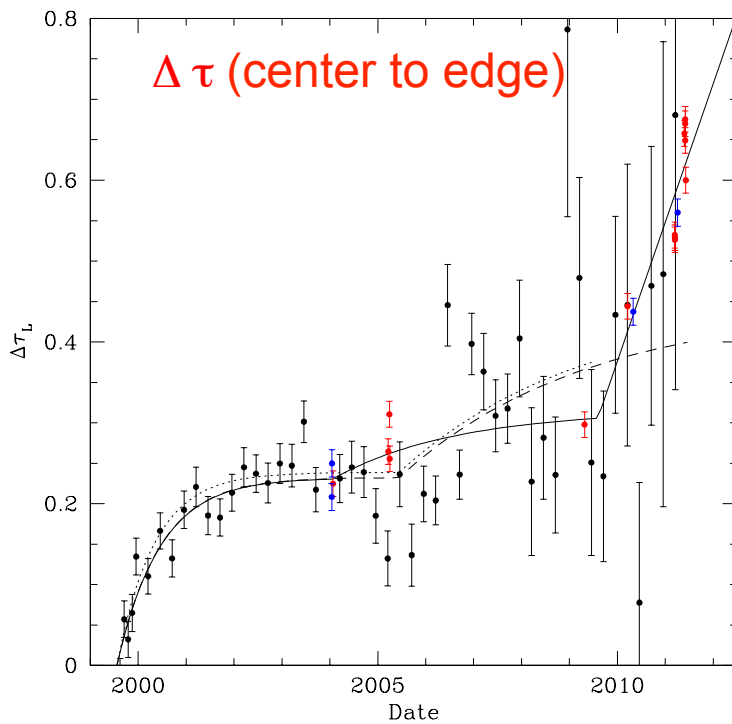
Updated time-dependence

Black data points are ECS measurements and red and blue data points are ACIS-I and ACIS-S observations of A1795

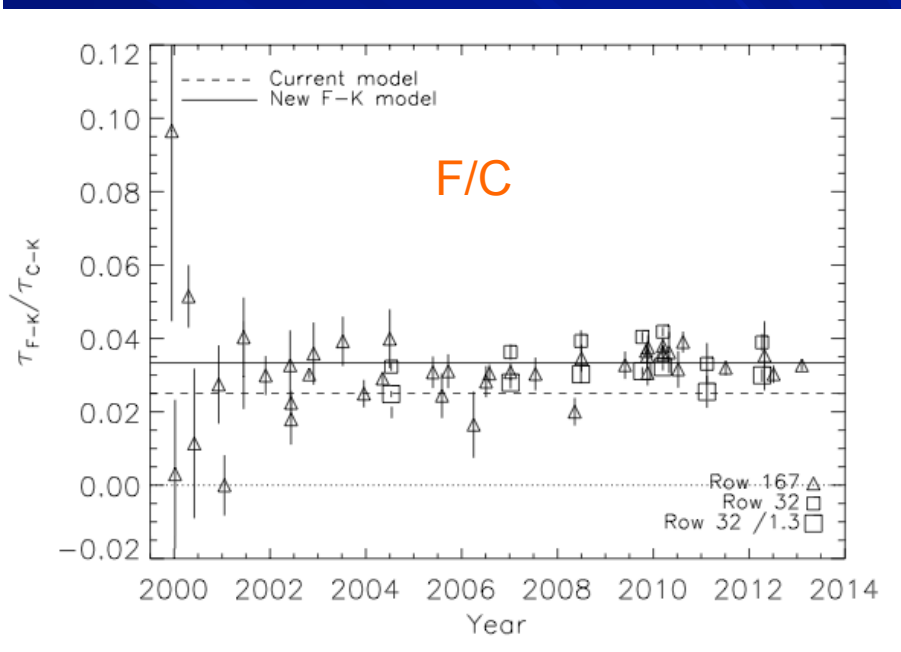
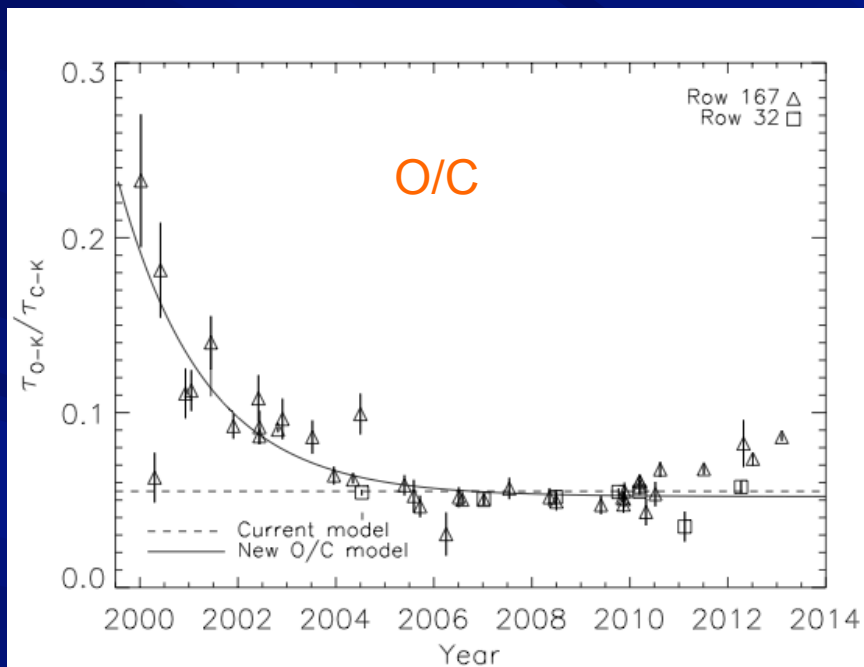


# ACIS Contamination Model N007

Updated spatial distribution model

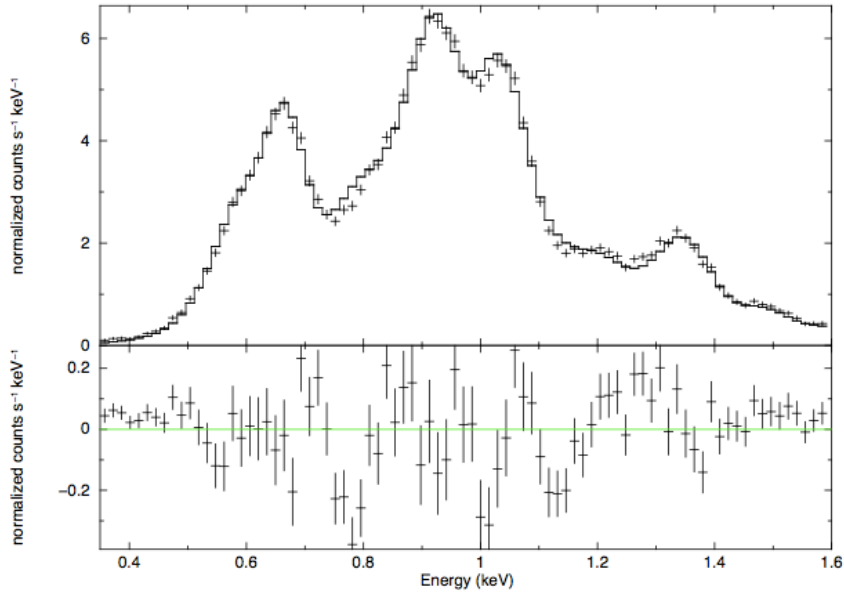


# Latest Results on ACIS Contamination



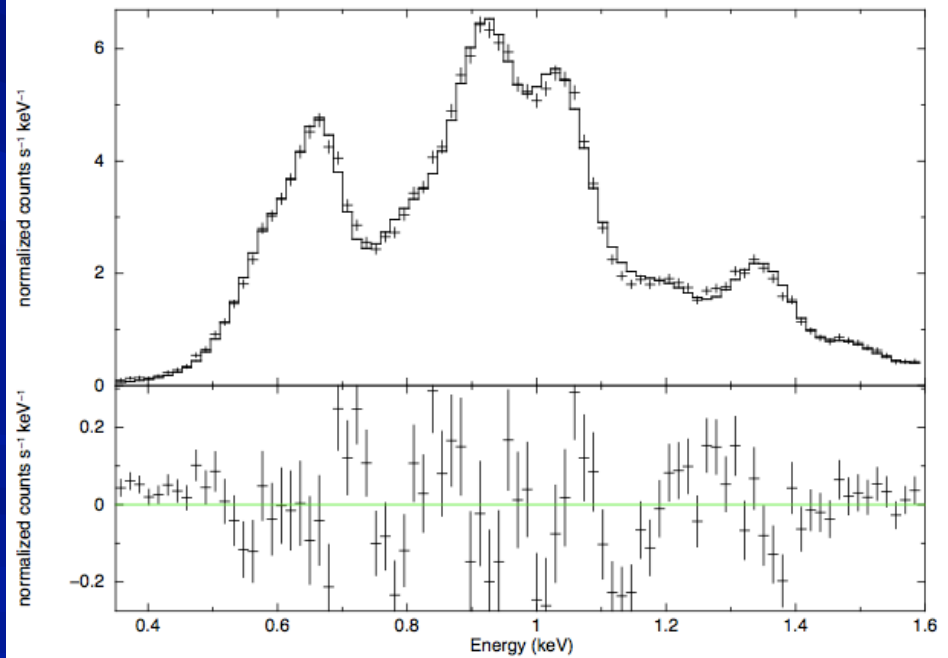
# Spectral fits to E0102-72 with additional O-K edge absorption

S3, ObsID 15557, C-stat=218.359, dof=80, Q-stat=233.5, reduced Q stat=2.92



jbrown 7-Feb-2

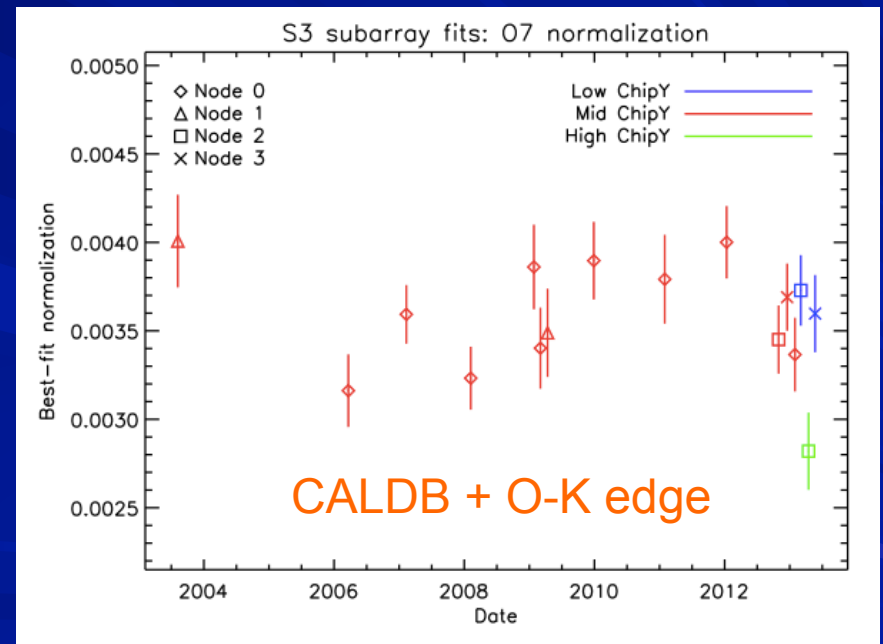
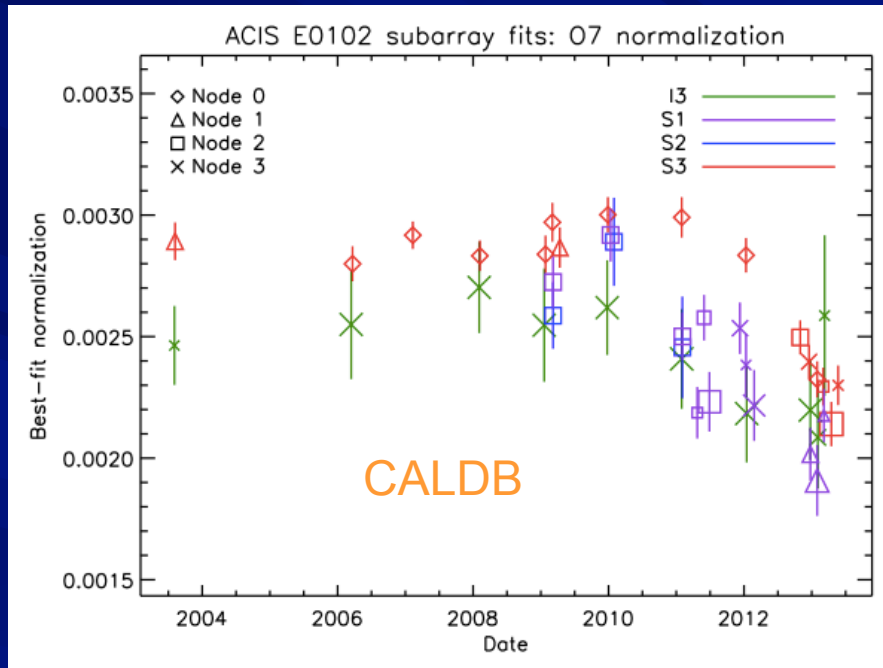
IACHEC E0102 model + O-K edge  
S3, ObsID 15557, C-stat=190.979, dof=79, Q-stat=204.3, reduced Q stat=2.59



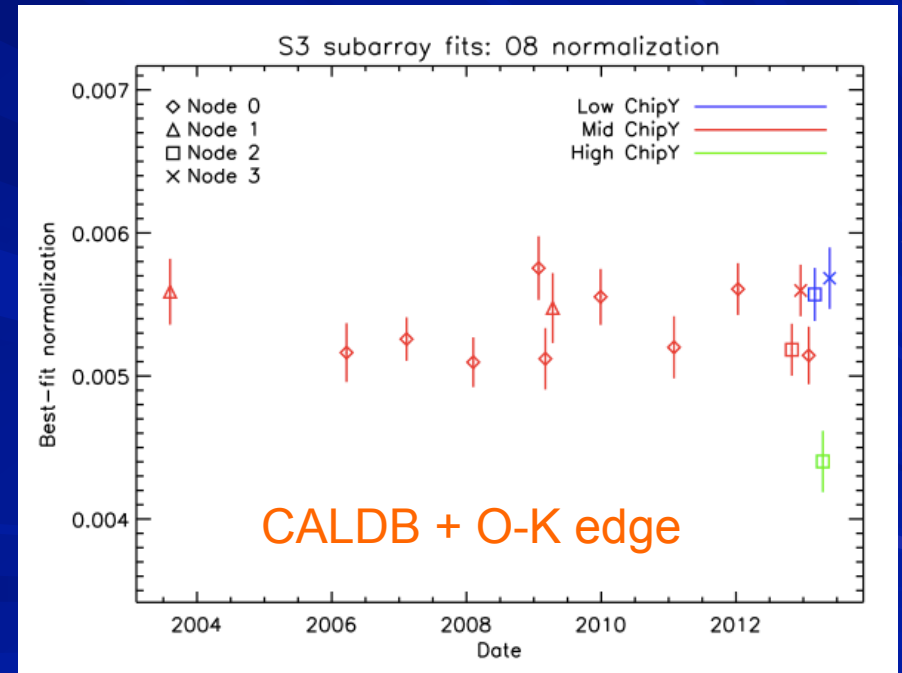
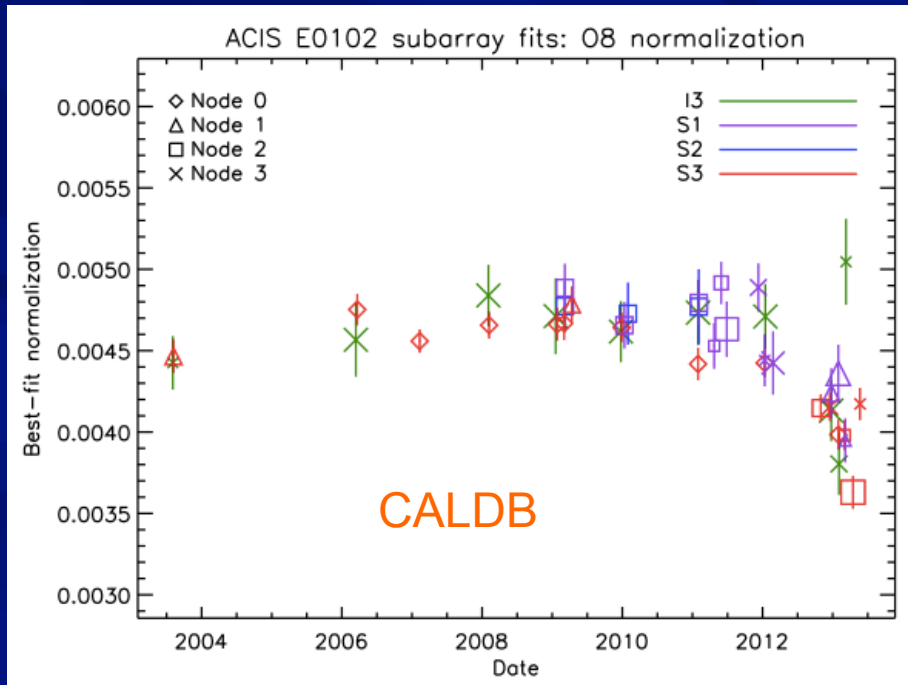
jbrown 27-Feb



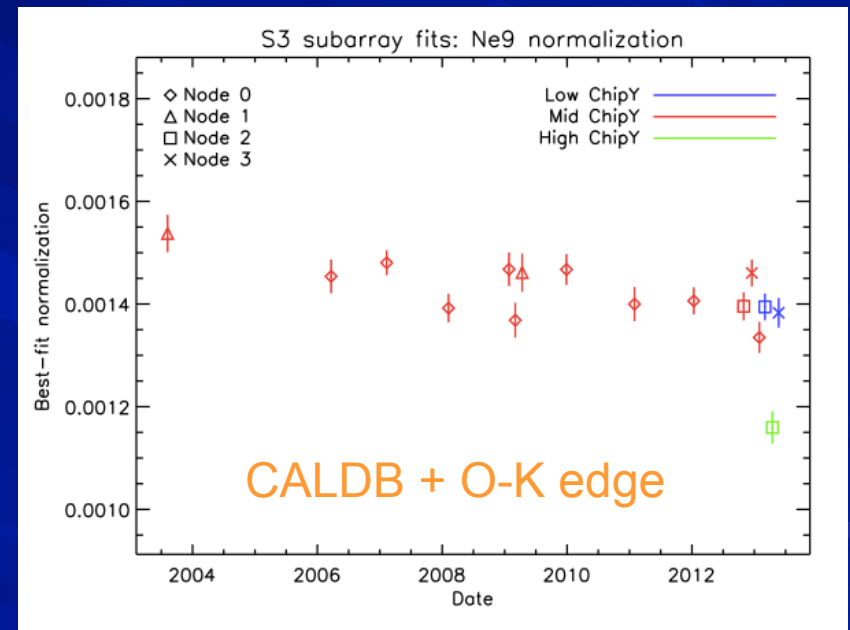
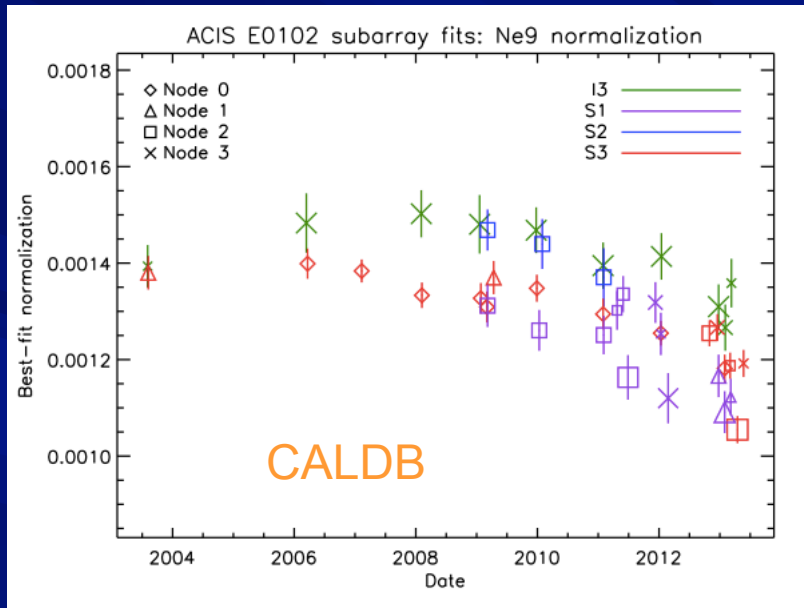
# E0102-72 spectral fits



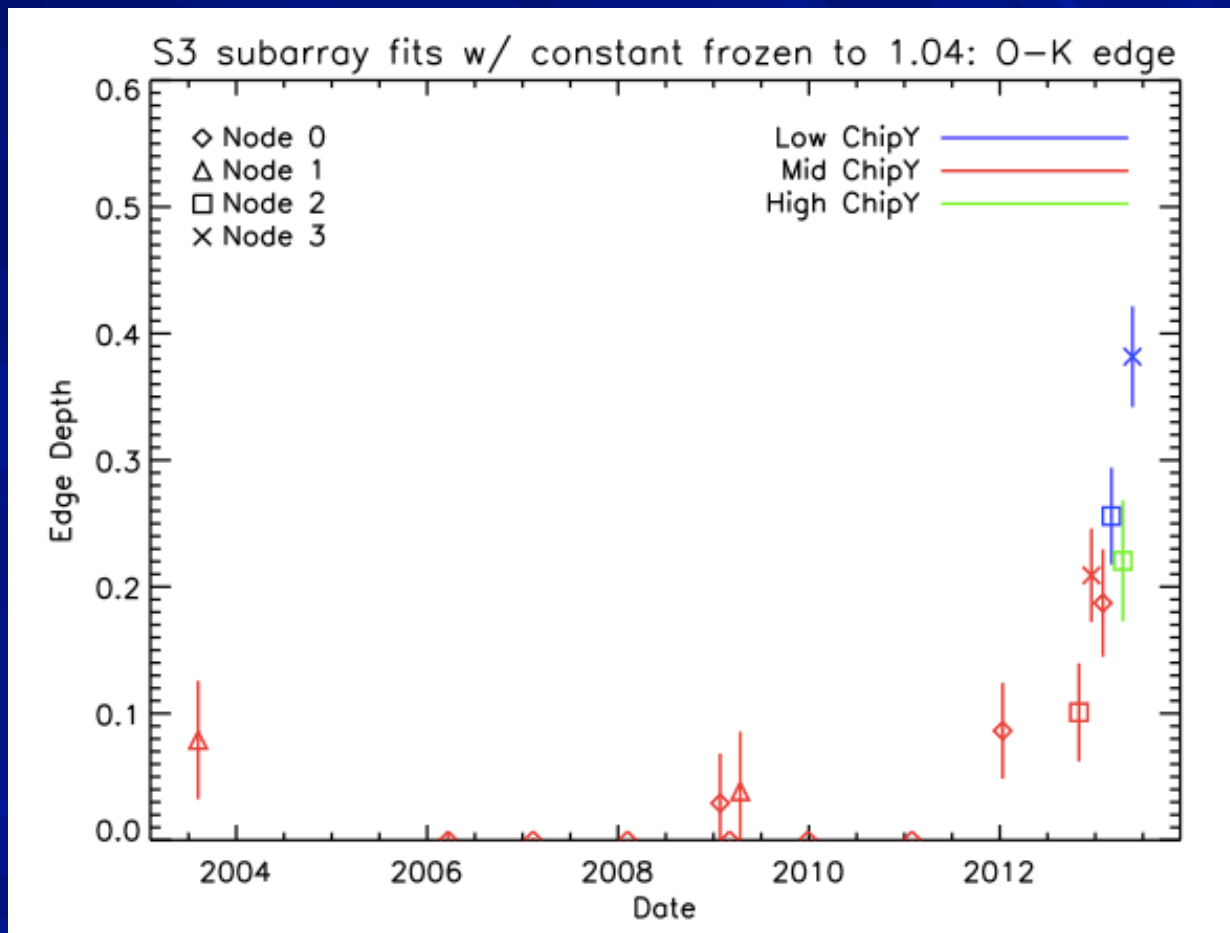
# E0102-72 spectral fits



# E0102-72 Spectral Fits

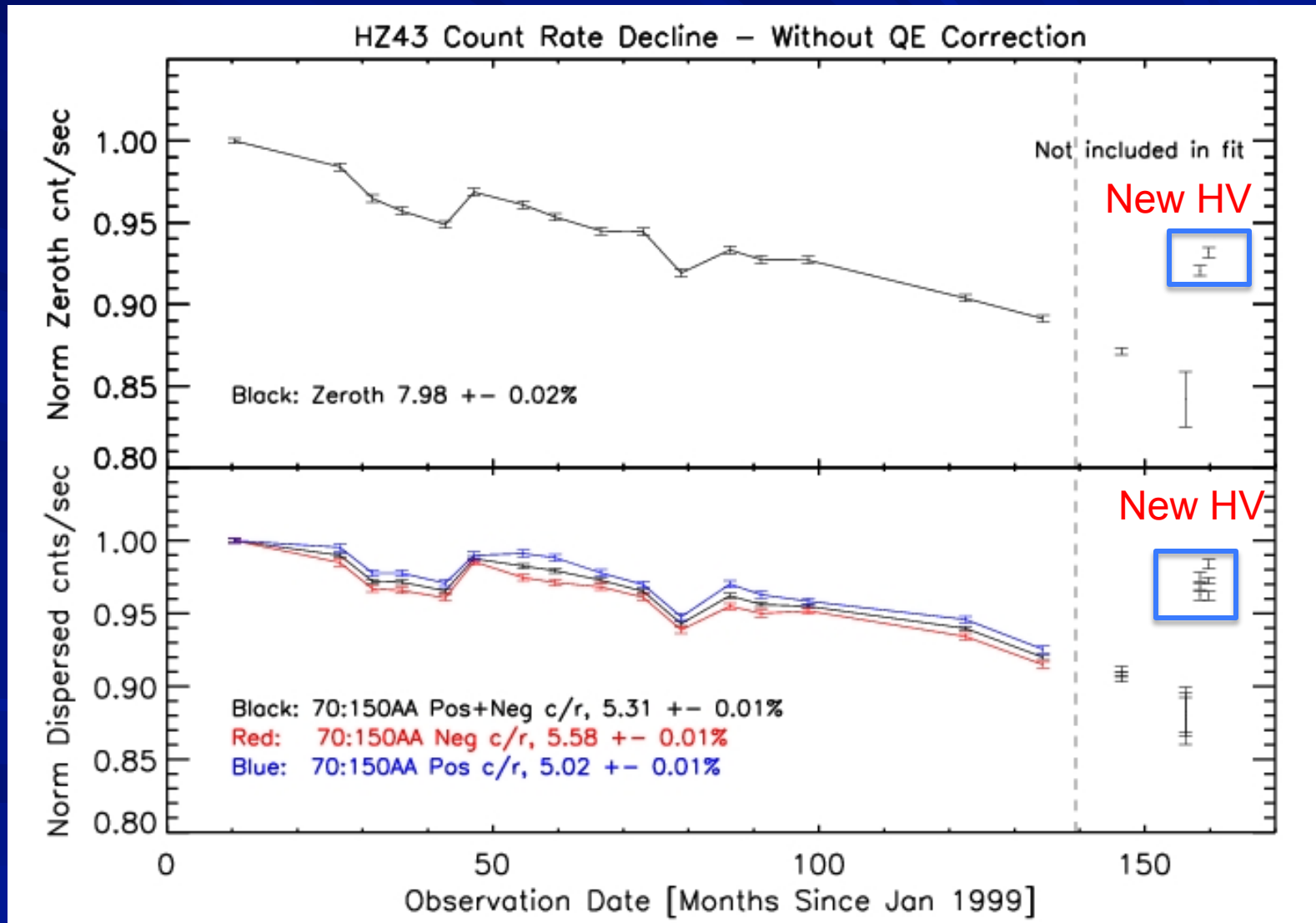


# O-K edge depth derived from E0102-72 spectral analysis



# Adjustment to the HRC-S HV

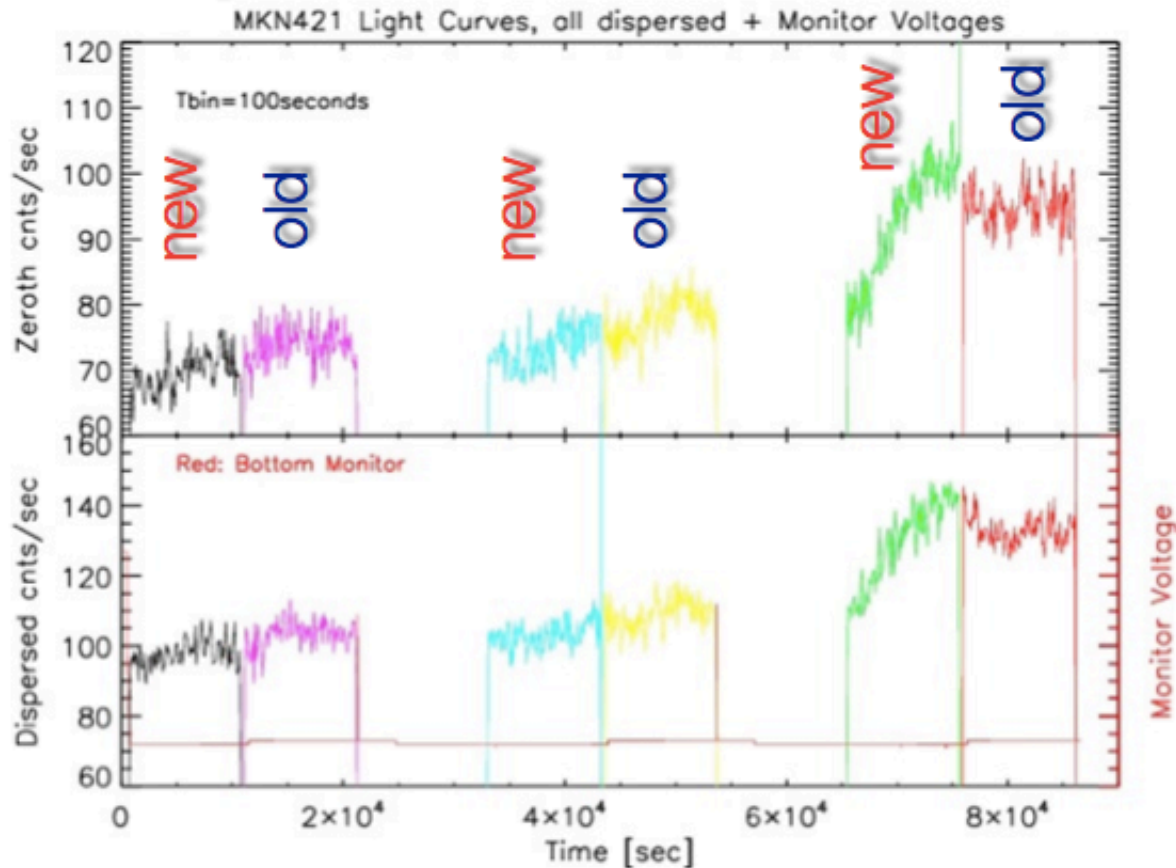
LETG/HRC-S observations of HZ43 over the course of the mission



# LETG/HRC-S observations of Mkn 421 with old and new HV settings

2012 July 3

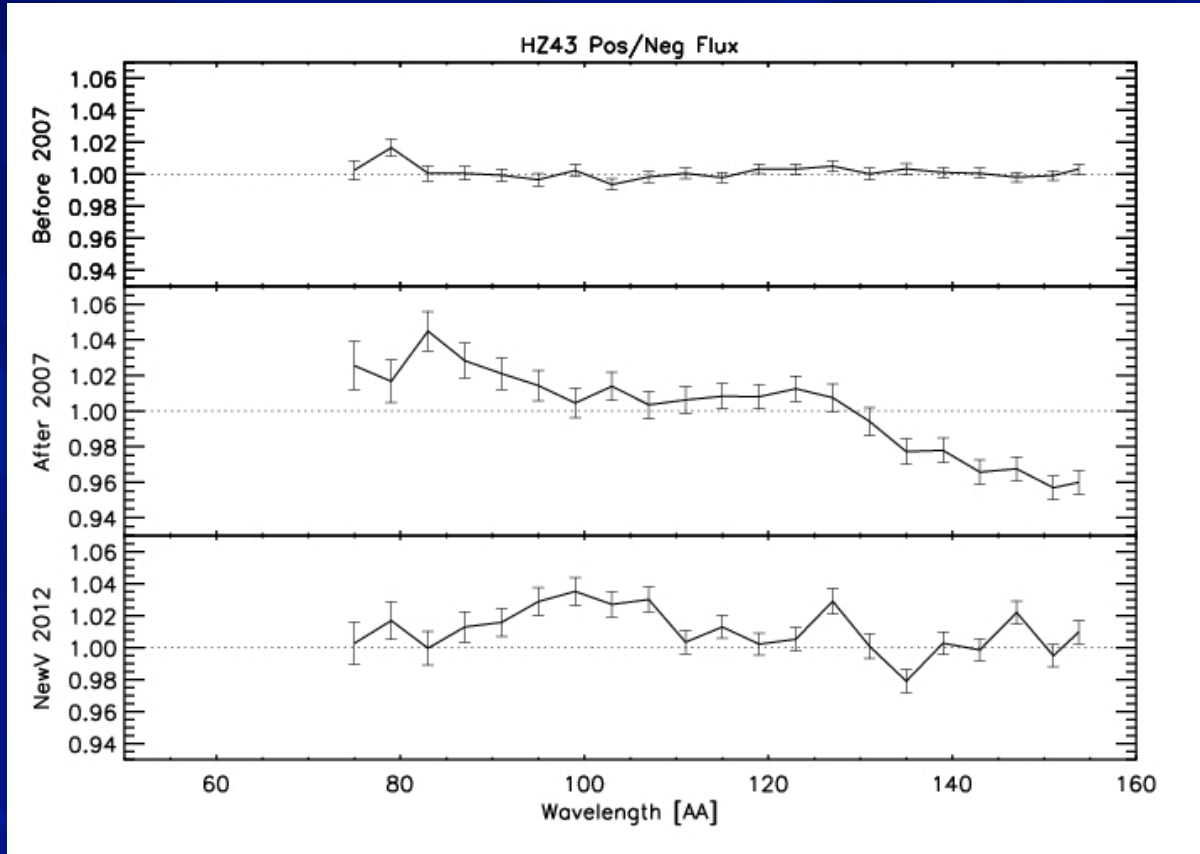
Mkn 421



Mkn 421 did not cooperate



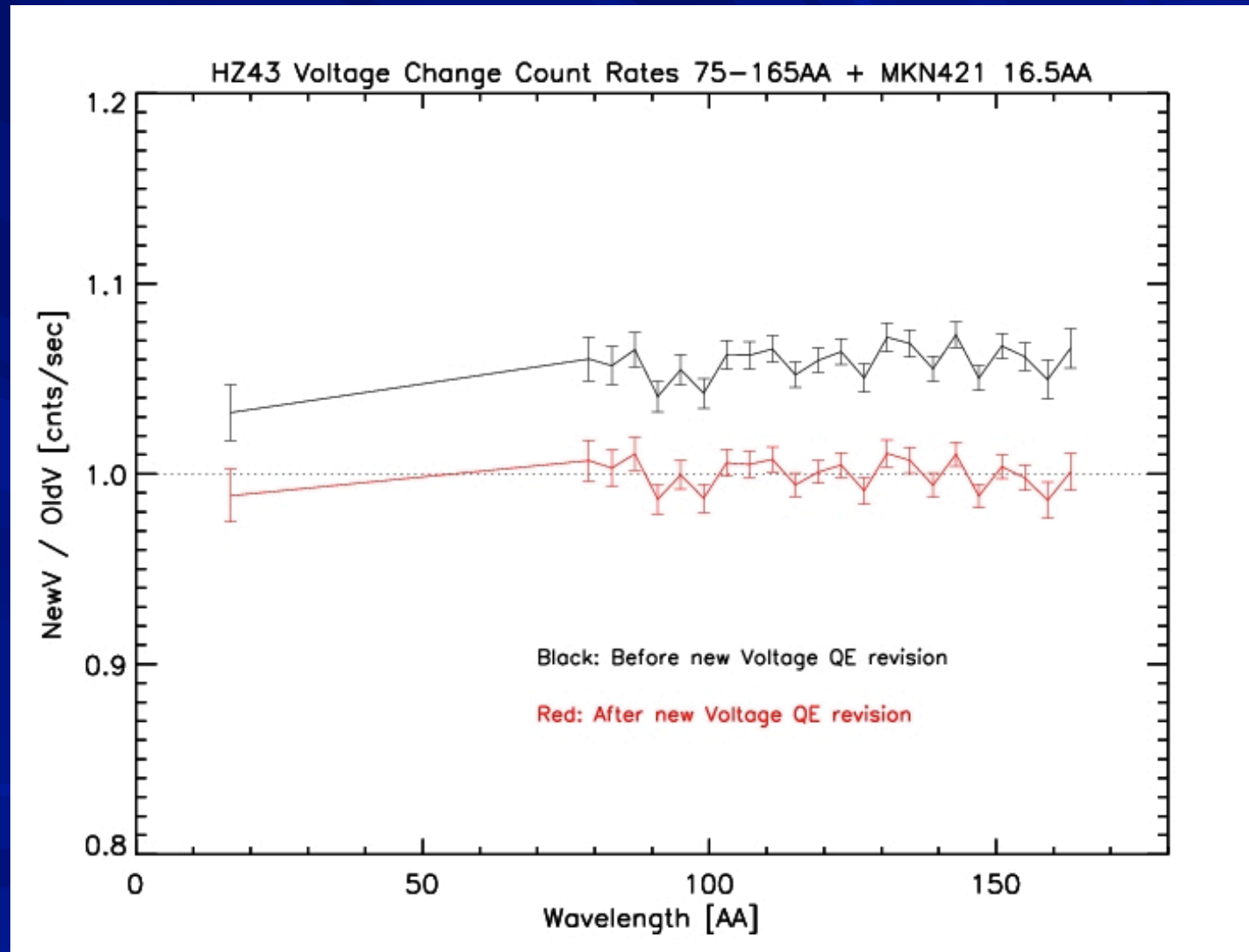
# Adjustment to the HRC-S HV



# Summary of Present Calibration Activities

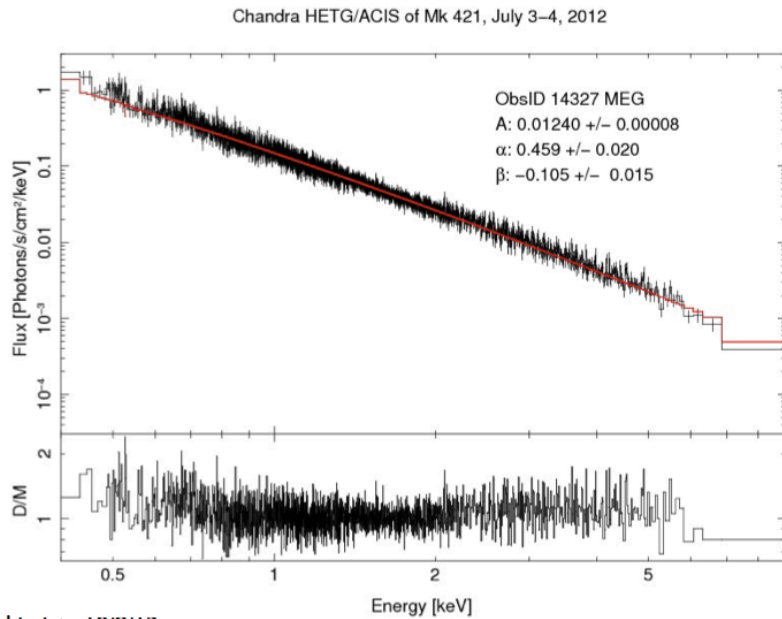
- Update ACIS contamination model
- Revise S1 (and possibly S3) gain at low energies.
- Develop a script for analyzing ACIS CC mode data
- Better characterize the ACIS background spectrum
- Re-calibrate the LETG/HRC-S LSF with the new de-gap map
- Better characterize the arcsecond scale structure in the HRC PSF
- Modify SAOTrace to reproduce the observed Her X-1 PSF/wings

# Adjustment to the HRC-S HV



# July 2012 observations of Mkn 421

## HETG/ACIS-S



TGS Update 10/9/12

## LETG/ACIS-S

