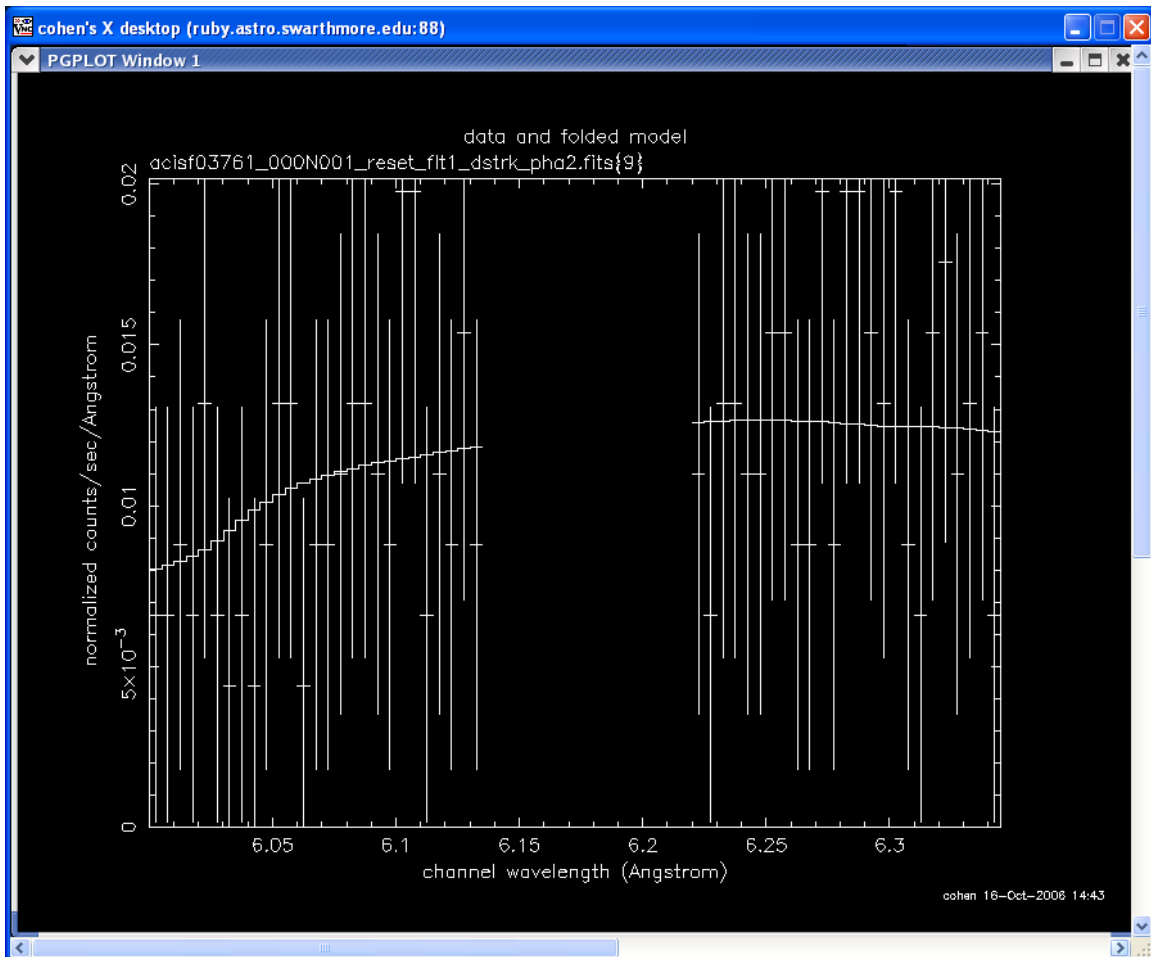Re-fitting the DoAr21 spectrum near the Si XIV line
Using Marc's remade rmfs and garfs
16 Oct 2006

Powerlaw index = 2; norm free
C-stat

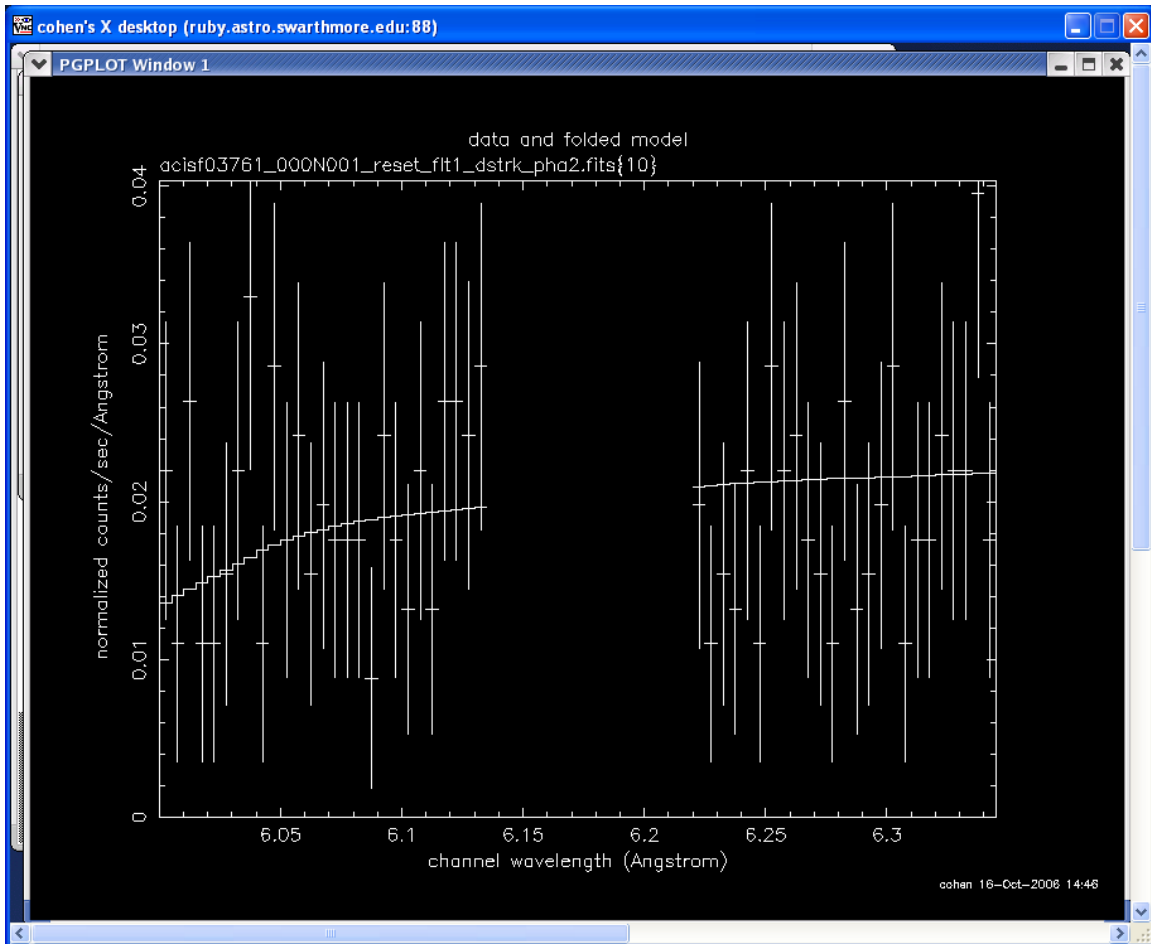On (ignore: 0.0-6.00, 6.14-6.22, 6.35-**) N=52 bins

MEG -1

norm=3.51e-3
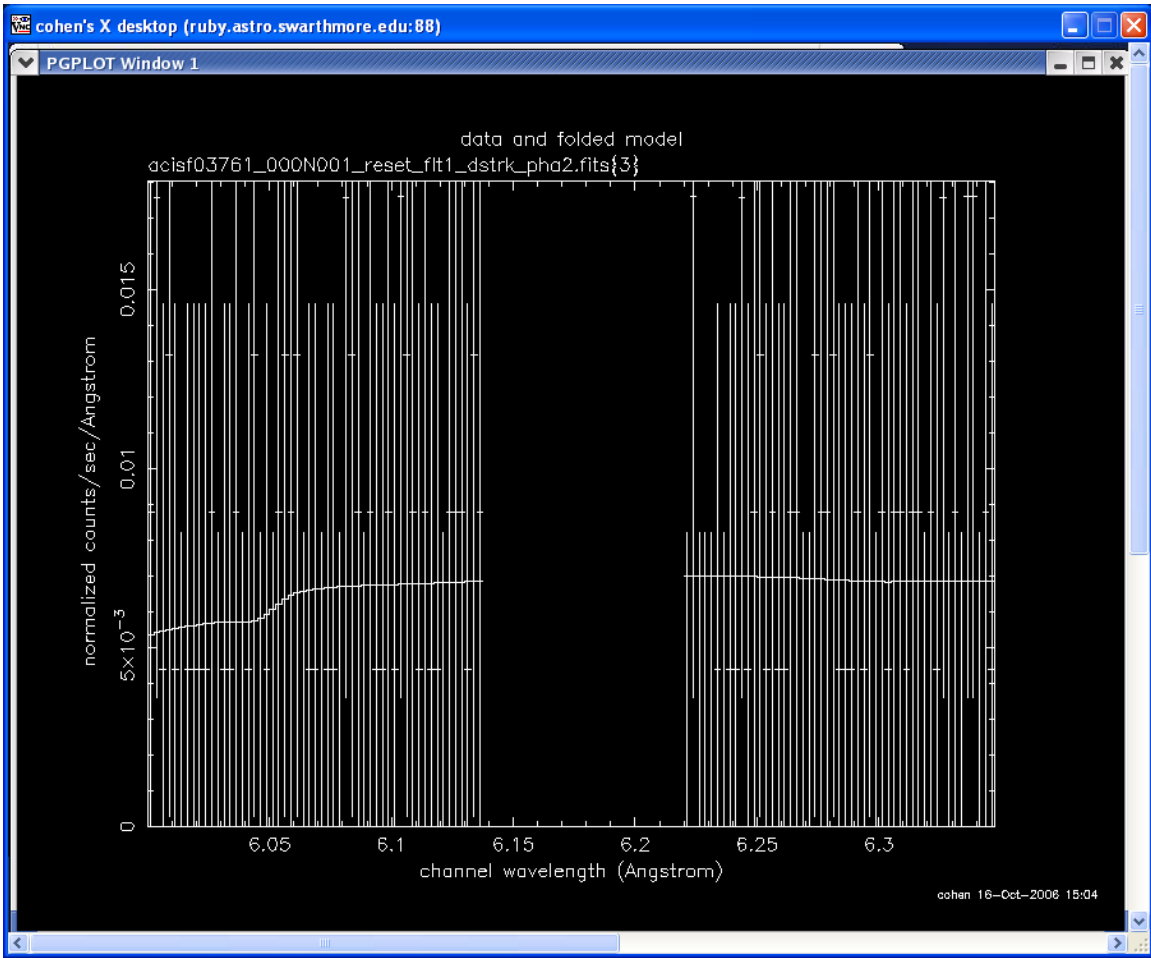Cstat=32.09
goodness=1%

MEG +1

norm=3.92e-3
Cstat=55.22
goodness=50%

N=106 bins over same wavelength range in the HEG

HEG -1

norm=3.39e-3
Cstat=112.59
goodness=23%

HEG +1

norm=3.96e-3
Cstat=99.32
goodness=7%

data and folded model
acisf03761_000N001_reset_flt1_dstrk_pha2.fits{4}

cohen 16-Oct-2006 15:07

These values are now in pretty good seeming agreement. Are they formally consistent with each other?

3.65e-3 : 4.25e-3 is the 68% confidence range (DeltaC=1) for the HEG+1 data
3.13e-3 : 3.66e-3 for HEG-1

3.30e-3 : 3.73e-3 for MEG-1
3.73e-3 : 4.10e-3 for MEG+1

2. FITTING LGAUSS + POW TO THE LINE AND NEARBY CONTINUUM

include 6.12:6.26 (so, less continuum) for the MEG
use the powerlaw continuum fits found above
first, fit one arm at a time

flux-weighted wavelength 6.1822

MEG -1


```
----------------------------------------------------------------------------
Model:  lgauss<1> + powerlaw<2>
Model Fit Model Component  Parameter  Unit     Value
par   par comp
  1    1   1  lgauss    waveleng A        6.18101    +/-  0.766898
  2    2   1  lgauss     sigma   mA       3.31913    +/-   3.74697
  3    3   1  lgauss     norm            2.133308E-05 +/-  0.614124E-05
  4    4   2  powerlaw  PhoIndex          2.00000    frozen
  5    5   2  powerlaw   norm            3.510000E-03 frozen
----------------------------------------------------------------------------
----------------------------------------------------------------------------
 C-statistic =    19.82894    using    27 PHA bins.
 Akaike Information Criterion =     129.9601
 Bayesian Information Criterion =     140.3388
XSPEC>plot
XSPEC>goodness nosim 100
 18.00% of realizations have a fit statistic <     19.83
```
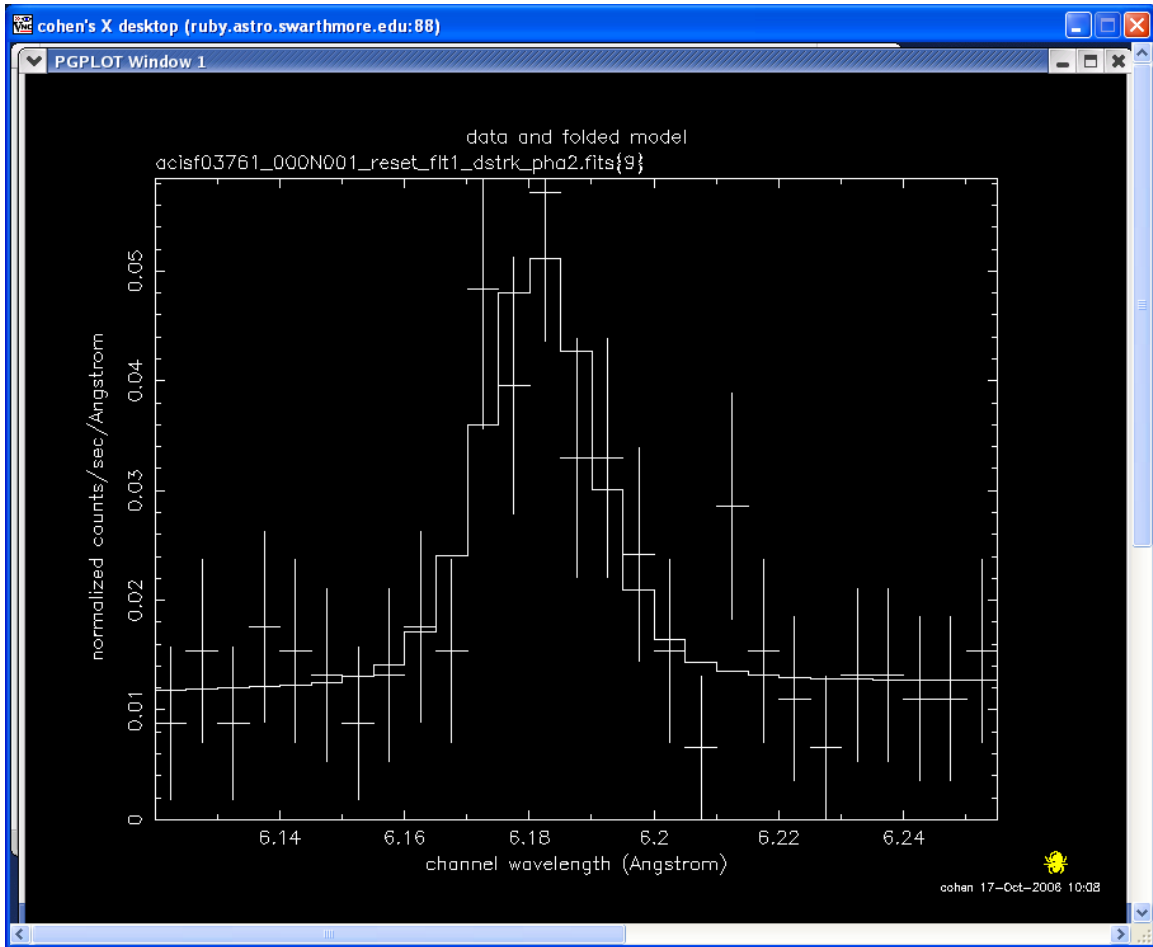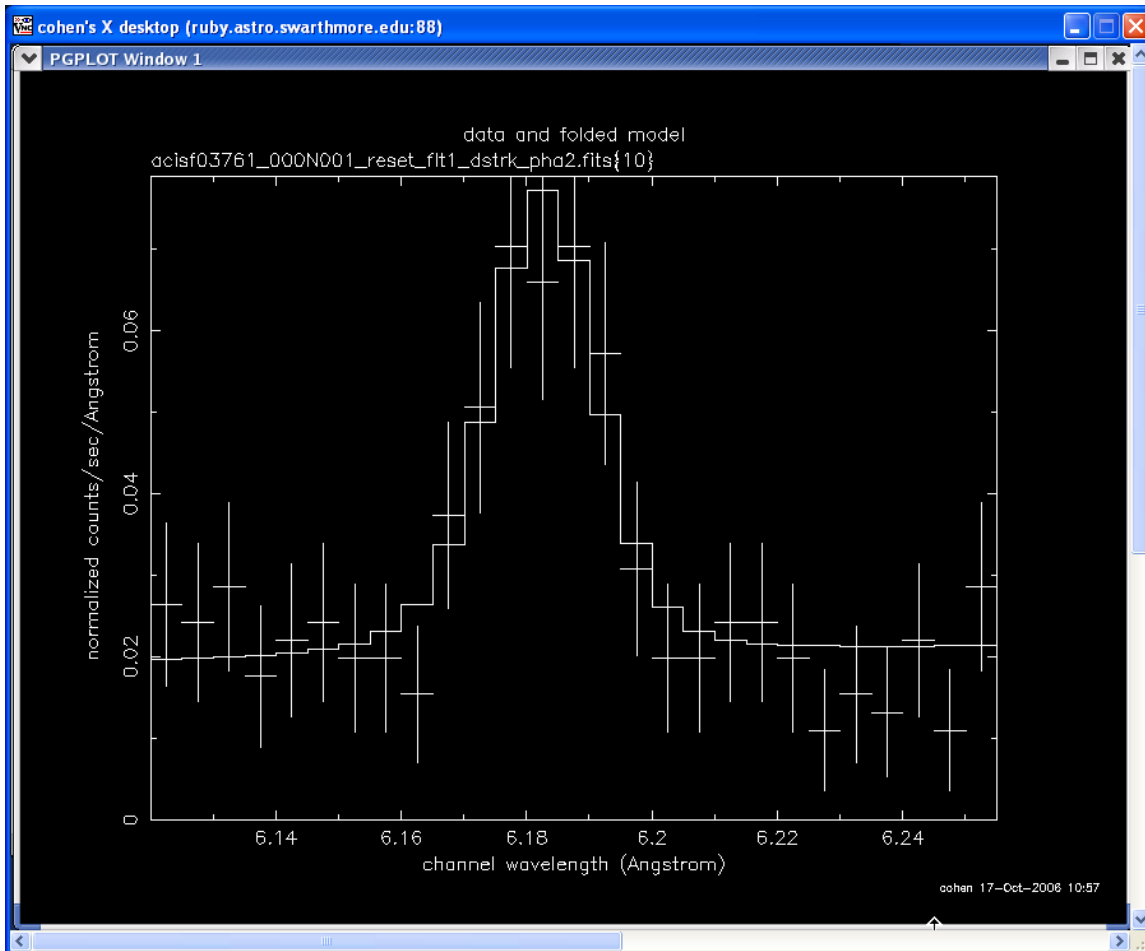
MEG +1

```
--------------------------------------------------------------------------------
Model: lgauss<1> + powerlaw<2>
Model Fit Model Component  Parameter  Unit    Value
par  par comp
 1   1   1  lgauss    waveleng A        6.18300    +/-  0.681443
 2   2   1  lgauss    sigma   mA        2.70485    +/-   3.70431
 3   3   1  lgauss    norm             2.014430E-05 +/- 0.463579E-05
 4   4   2  powerlaw  PhoIndex          2.00000    frozen
 5   5   2  powerlaw  norm             3.920000E-03 frozen
--------------------------------------------------------------------------------

--------------------------------------------------------------------------------
 C-statistic =     17.99811    using    27 PHA bins.
XSPEC>goodness nosim 100
  8.00% of realizations have a fit statistic <      18.00
```

Combined +1/-1 MEG fit:

```
-------------------------------------------------------------------------------
Model:  lgauss<1> + powerlaw<2>
Model Fit Model Component  Parameter  Unit     Value
par    par comp
  1    1   1  lgauss     waveleng A        6.18223    +/-  0.445459
  2    2   1  lgauss     sigma   mA        3.46990    +/-  2.48399
  3    3   1  lgauss     norm              2.101552E-05 +/-  0.442108E-05
  4    4   2  powerlaw   PhoIndex          2.00000    frozen
  5    5   2  powerlaw   norm              3.615801E-03 +/-  0.361336E-03
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
 C-statistic =     38.57593    using    54 PHA bins.
XSPEC>goodness nosim 100
 6.00% of realizations have a fit statistic <     38.58
```
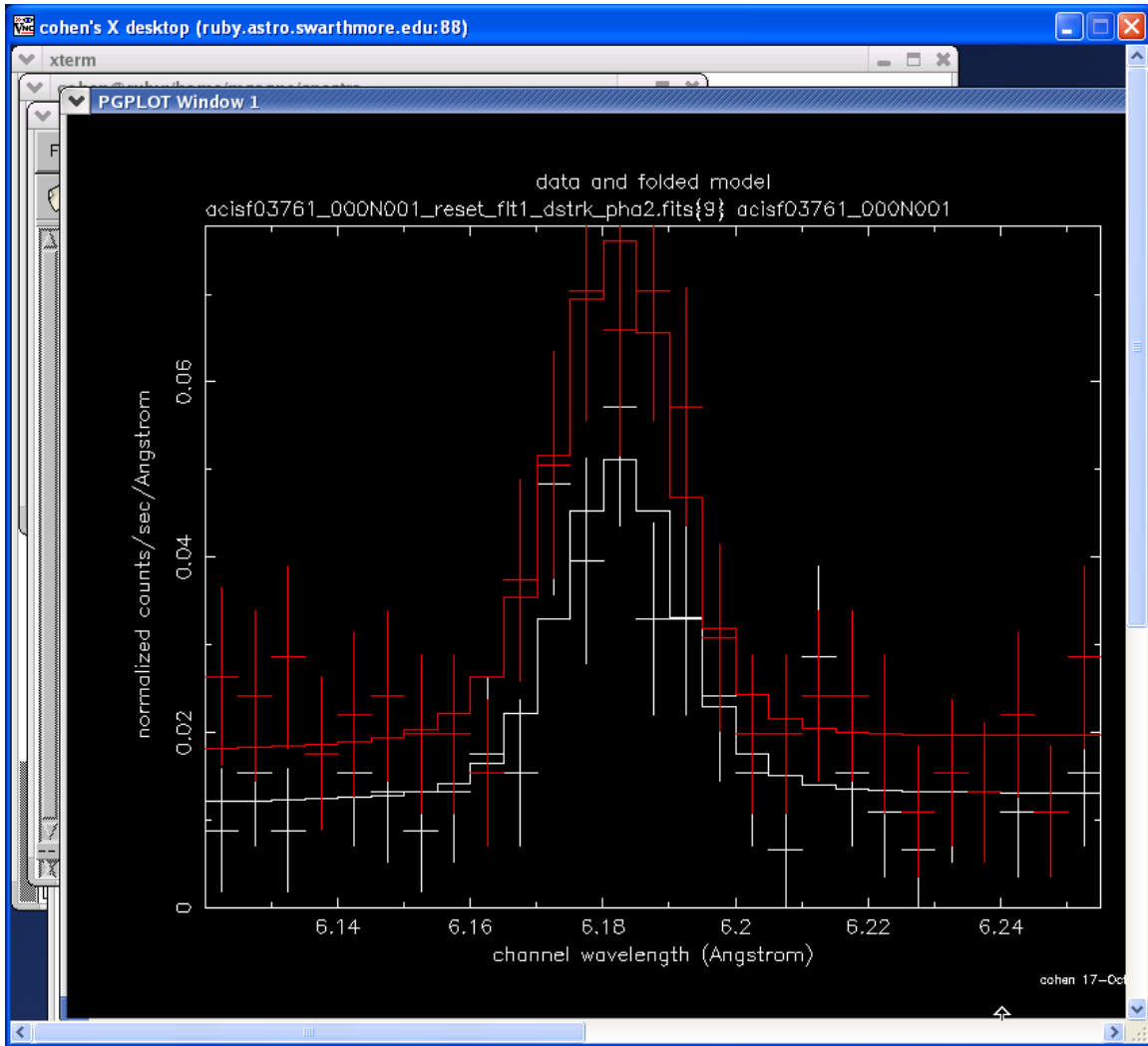
For HEG fit [6.16:6.21] using the power-law continuum fits listed above

HEG -1

```
---------------------------------------------------------------------------
Model:  lgauss<1> + powerlaw<2>
Model Fit Model Component  Parameter  Unit     Value
par   par comp
  1   1   1   lgauss     waveleng A        6.18350     +/-  -1.00000
  2   2   1   lgauss     sigma   mA      4.855193E-02 +/-  -1.00000
  3   3   1   lgauss     norm            1.981350E-05 +/-  0.639536E-05
  4   4   2   powerlaw   PhoIndex         2.00000    frozen
  5   5   2   powerlaw   norm            3.390000E-03 frozen
---------------------------------------------------------------------------
```
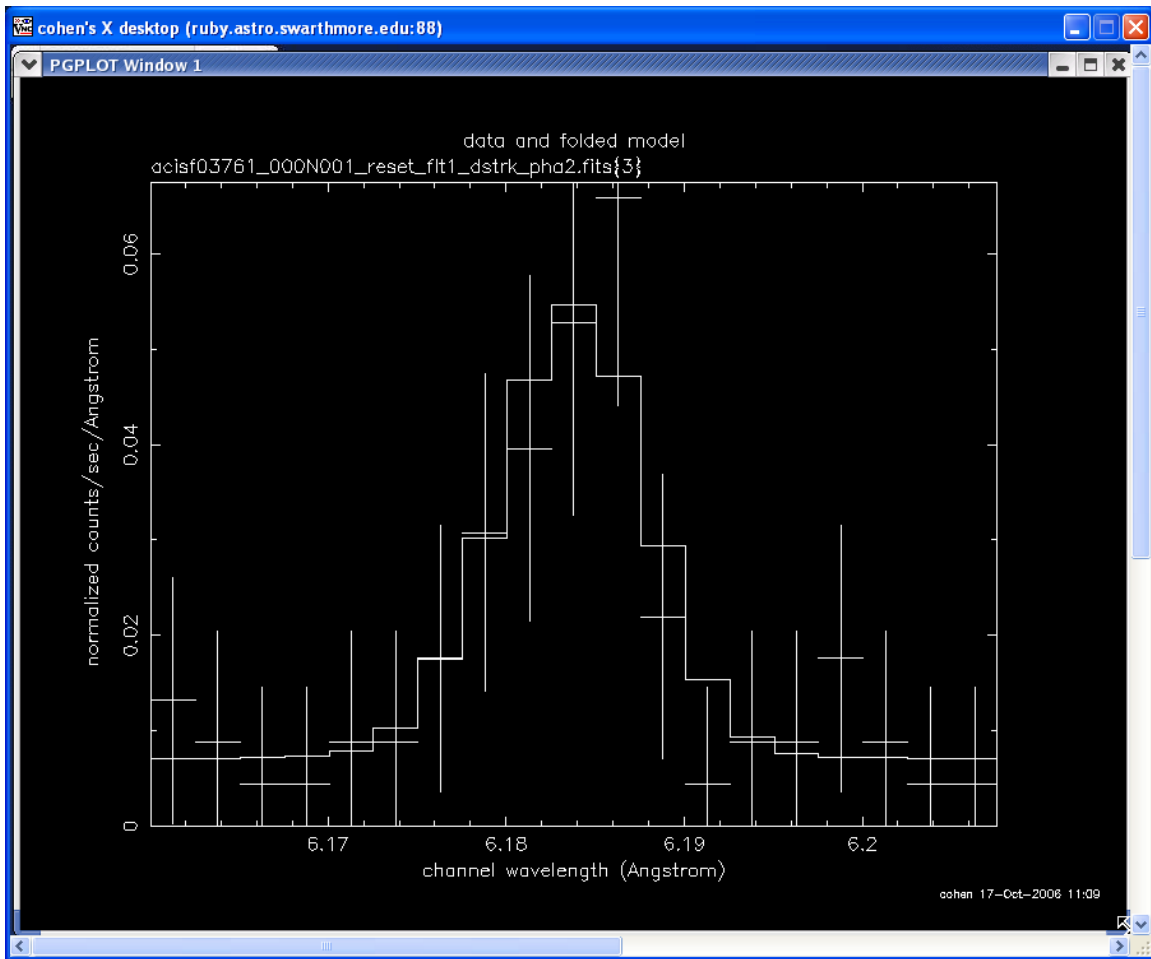

 C-statistic =   9.514089   using   19 PHA bins.
 Akaike Information Criterion =   70.95518
 Bayesian Information Criterion =   77.94739
XSPEC>plot
XSPEC>goodness nosim 100
 0.00% of realizations have a fit statistic <   9.514

HEG +1

 Model: lgauss<1> + powerlaw<2>
 Model Fit Model Component Parameter Unit   Value
 par   par comp
  1   1   1   lgauss   waveleng A   6.18310   +/- 224481.
  2   2   1   lgauss   sigma   mA   4.03149   +/- 1.78121
  3   3   1   lgauss   norm   1.928333E-05 +/- 0.749858E-05
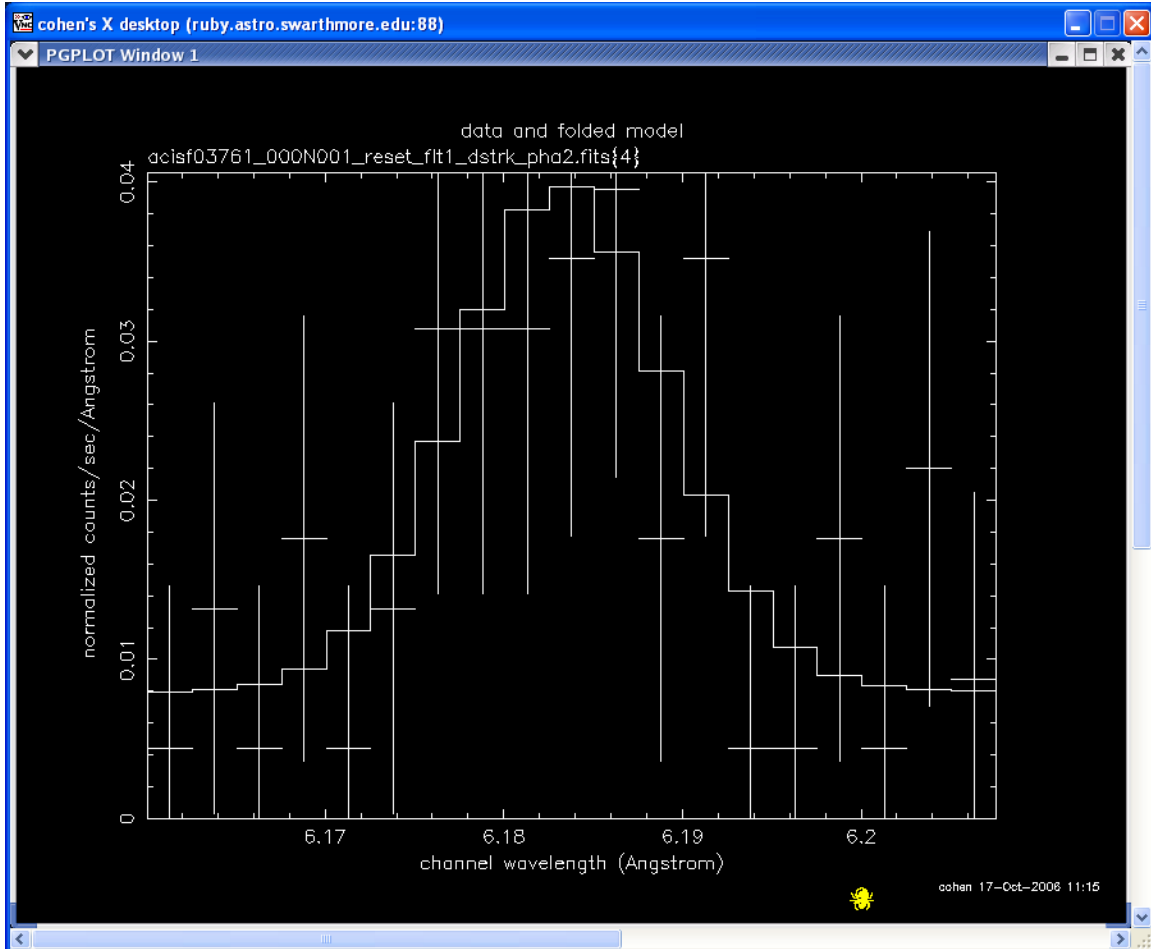 4   4   2   powerlaw   PhoIndex   2.00000   frozen

5   5   2   powerlaw   norm   3.960000E-03 frozen

 C-statistic =   17.41483   using   19 PHA bins.
XSPEC>goodness nosim 100
 38.00% of realizations have a fit statistic <   17.41

combined HEG:

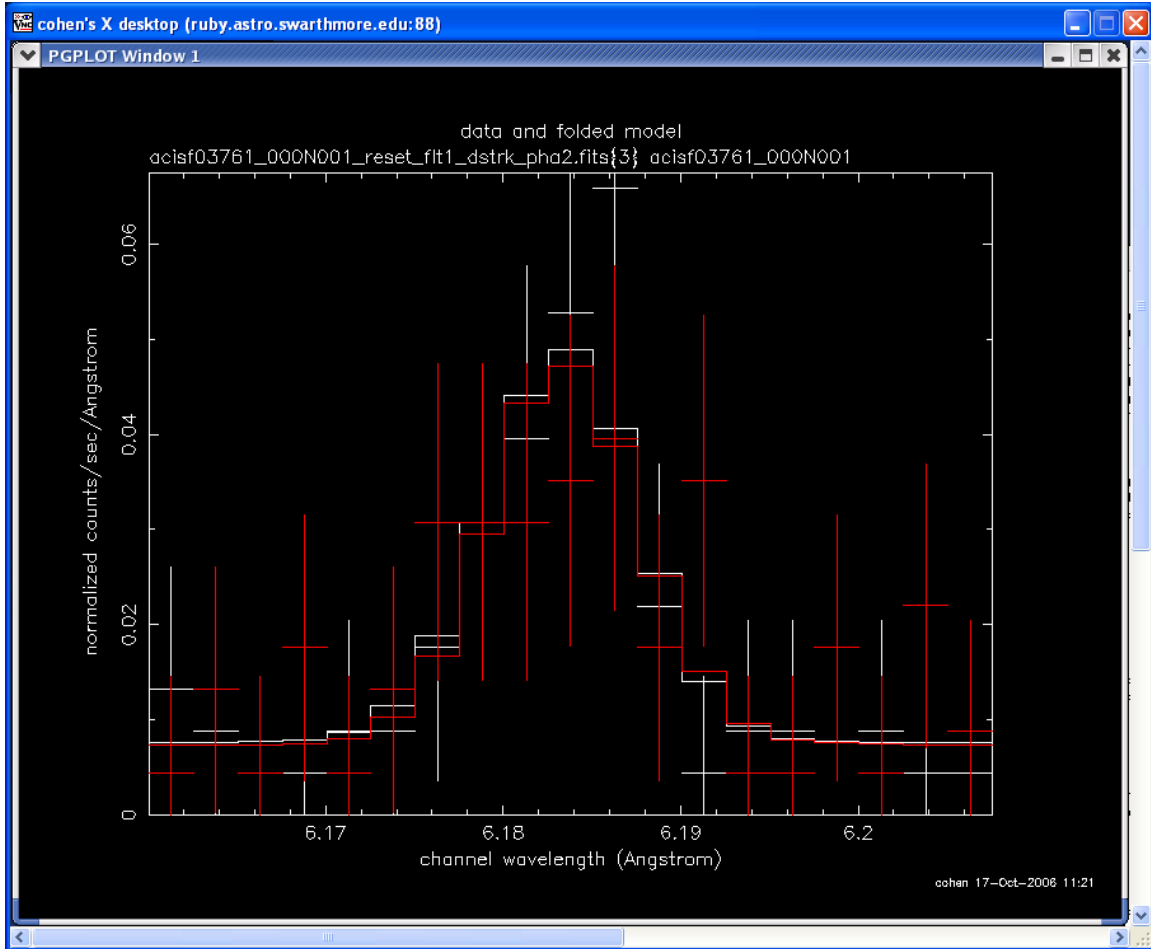 Model: lgauss<1> + powerlaw<2>
 Model Fit Model Component Parameter Unit   Value
 par   par comp
  1   1   1   lgauss   waveleng A   6.18300   +/- -1.00000
  2   2   1   lgauss   sigma   mA   0.534587   +/- 0.521688
  3   3   1   lgauss   norm   1.765386E-05 +/- 0.469634E-05
  4   4   2   powerlaw   PhoIndex   2.00000   frozen
  5   5   2   powerlaw   norm   3.650000E-03 frozen

```
--------------------------------------------------------------------------------
```
 C-statistic =   31.28625   using   38 PHA bins.
XSPEC>goodness nosim 100
 11.00% of realizations have a fit statistic <   31.29

Finally, combined HEG + MEG, both -1 and +1

First, fit a continuum to the combined data:

```
--------------------------------------------------------------------------------
```
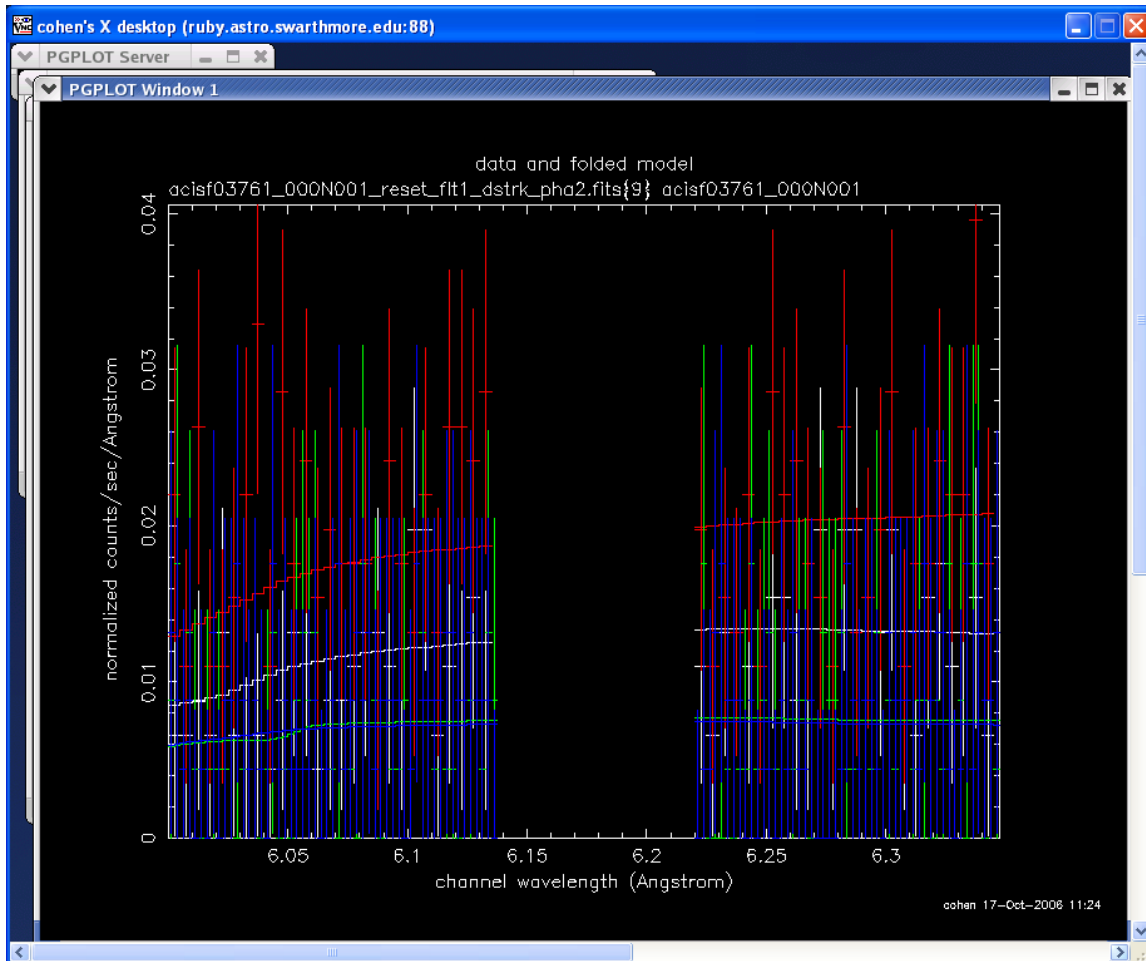 Model: powerlaw<1>
 Model Fit Model Component Parameter Unit   Value
 par   par comp
  1   1   1 powerlaw PhoIndex   2.00000   frozen
  2   2   1 powerlaw norm   3.729019E-03 +/- 0.165993E-03
```
--------------------------------------------------------------------------------
```
```
--------------------------------------------------------------------------------
```
 C-statistic =   303.4495   using   316 PHA bins.

Akaike Information Criterion =   1125.339
Bayesian Information Criterion =   1130.315
XSPEC>plot
XSPEC>goodness nosim 100
  2.00% of realizations have a fit statistic <   303.4

Now fit the line with this continuum level fixed

6.14:6.23

```
 --------------------------------------------------------------------------
 Model:  lgauss<1> + powerlaw<2>
 Model Fit Model Component  Parameter  Unit     Value
 par   par comp
   1   1   1   lgauss     waveleng A        6.18314     +/-  3.92931
   2   2   1   lgauss     sigma   mA        1.95399     +/-  1.22807
   3   3   1   lgauss     norm             1.940000E-05 +/-  0.00000
   4   4   2   powerlaw   PhoIndex          2.00000     frozen
```
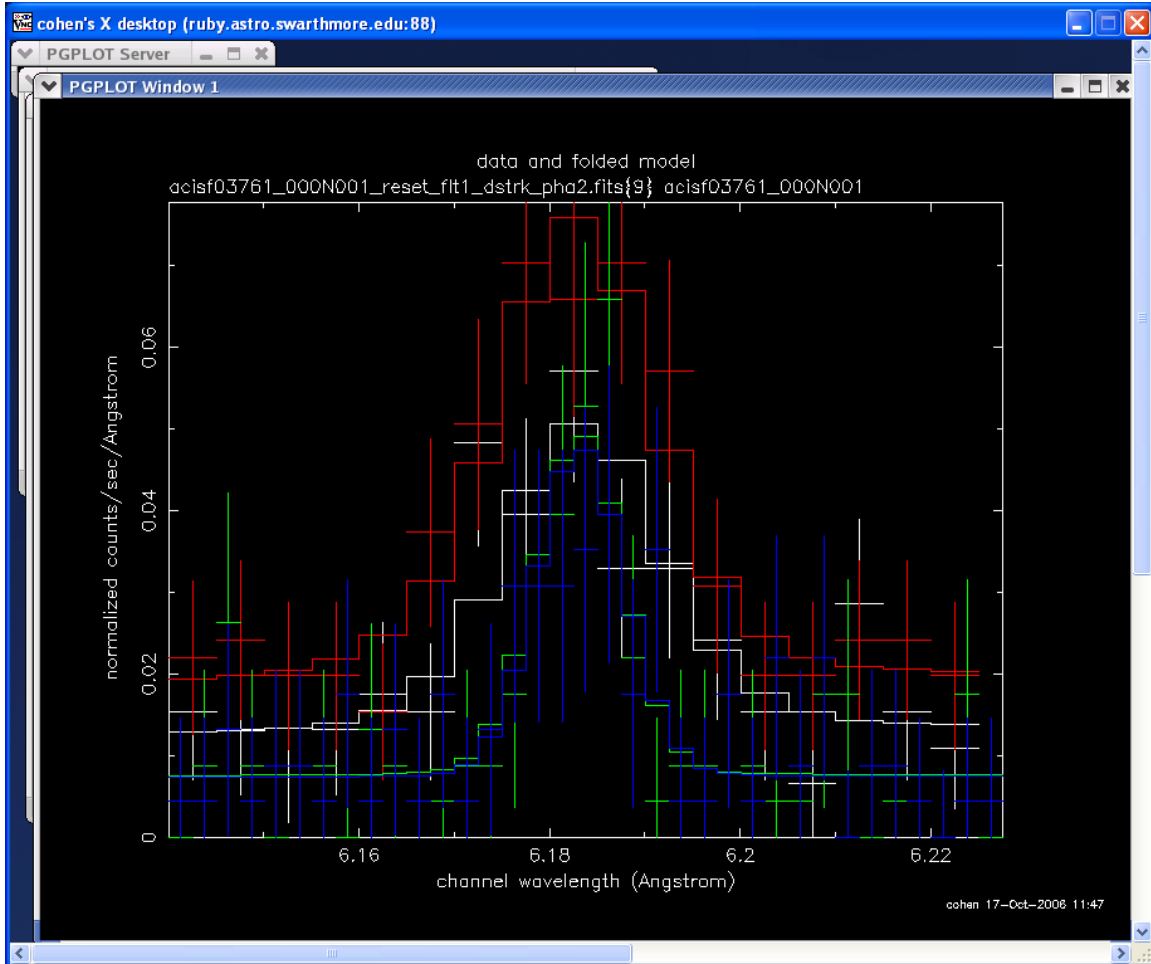
5   5   2   powerlaw   norm   3.730000E-03 frozen

 C-statistic =   105.5544   using   104 PHA bins.
XSPEC>goodness nosim 100
 31.00% of realizations have a fit statistic <   105.6

68% confidence limits:

lambda: 6.18248 – 6.18461
sigma: 0.1 – 3.4 mA
norm: 1.79e-5 : 2.09e-5