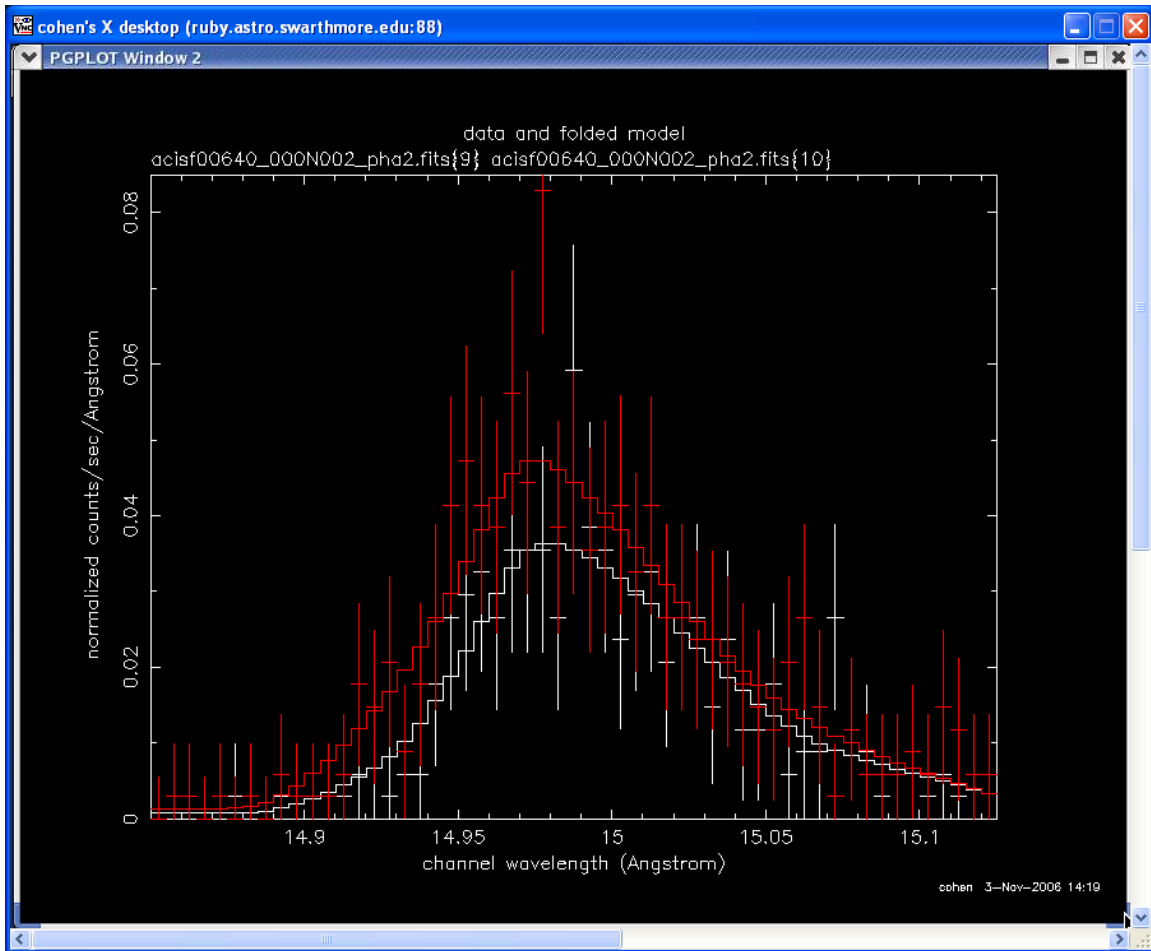


Once again, fitting the 15.014 line in the MEG +/-1 Chandra spectrum of zeta Pup with a windprof model. Using Maurice's 30Aug06 implementation of windprof (not the very latest version).

Best fit on (14.85:15.13 Angstroms) in the MEG.

Here, *no* background is included:

```
-----  
Model: windprof<1> + powerlaw<2>  
Model Fit Model Component Parameter Unit Value  
par par comp  
1 1 1 windprof q 6.659093E-03 +/- 0.159451  
2 2 1 windprof taustar 1.29494 +/- 0.285470  
3 3 1 windprof umax 0.652458 +/- 0.518939E-01  
4 4 1 windprof tauSobSt 0.00000 frozen  
5 5 1 windprof h 0.00000 frozen  
6 6 1 windprof velocity km/s 2485.00 frozen  
7 7 1 windprof beta 1.00000 frozen  
8 8 1 windprof betaSob 0.00000 frozen  
9 9 1 windprof waveleng A 15.0140 frozen  
10 10 1 windprof shift mA 0.00000 frozen  
11 11 1 windprof thick 0.00000 frozen  
12 12 1 windprof pType 0.00000 frozen  
13 13 1 windprof verbose 0.00000 frozen  
14 14 1 windprof norm 5.303220E-04 +/- 0.534968E-04  
15 15 2 powerlaw PhoIndex 2.00000 frozen  
16 16 2 powerlaw norm 1.690475E-03 +/- 0.140769E-02  
-----  
C-statistic = 82.18877 using 110 PHA bins.
```



OK, Second, let's do the same model and fit but to the data with the background:

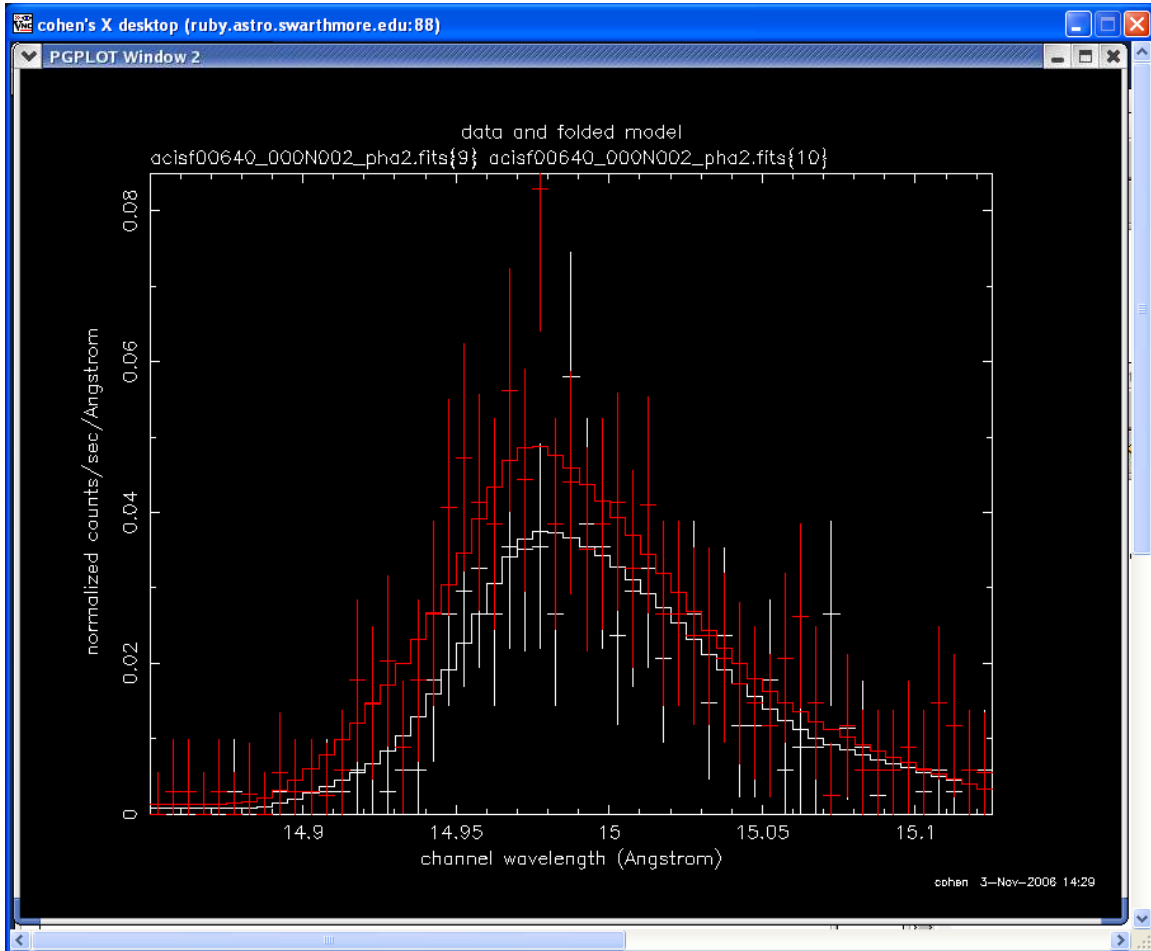
```

-----
Model: windprof<1> + powerlaw<2>
Model Fit Model Component Parameter Unit Value
par par comp
1 1 1 windprof q 1.441660E-02 +/- 0.158527
2 2 1 windprof taustar 1.29241 +/- 0.281120
3 3 1 windprof umax 0.648206 +/- 0.515143E-01
4 4 1 windprof tauSobSt 0.00000 frozen
5 5 1 windprof h 0.00000 frozen
6 6 1 windprof velocity km/s 2485.00 frozen
7 7 1 windprof beta 1.00000 frozen
8 8 1 windprof betaSob 0.00000 frozen
9 9 1 windprof waveleng A 15.0140 frozen
10 10 1 windprof shift mA 0.00000 frozen
11 11 1 windprof thick 0.00000 frozen
12 12 1 windprof pType 0.00000 frozen
13 13 1 windprof verbose 0.00000 frozen
14 14 1 windprof norm 5.245492E-04 +/- 0.536592E-04
15 15 2 powerlaw PhoIndex 2.00000 frozen
16 16 2 powerlaw norm 1.614721E-03 +/- 0.140813E-02

```


C-statistic = 81.31116 using 110 PHA bins.

Hmmm... Maurice had found a higher Cstat (but, like here, essentially no difference in the best fit model parameters)



Is xspec treating this *any* differently? The messages to the screen indicate that the background file *is* being read in:

```
!XSPEC> data 1 acisf00640_000N002 pha2.fits{9};  
Net count rate (cts/s) for file 1 0.1417 +/- 3.0994E-03  
1 data set is in use
```

```
!XSPEC> data 2 acisf00640_000N002 pha2.fits{10};  
Net count rate (cts/s) for file 2 0.1163 +/- 2.9990E-03  
2 data sets are in use
```

```
!XSPEC> back 1 acisf00640_000N002 pha2.fits_bkg{9};
```

```
!XSPEC> tclunknown back 1 acisf00640_000N002 pha2.fits_bkg{9}
```

```
!XSPEC>      ::namespace current

!XSPEC>      backgrnd 1 acisf00640_000N002_pha2.fits_bkg{9}
Net count rate (cts/s) for file  1 0.1402  +/- 3.0999E-03( 99.0% total)
  using background file...      acisf00640_000N002_pha2.fits_bkg{9}

!XSPEC> back 2 acisf00640_000N002_pha2.fits_bkg{10};

!XSPEC> telunknown back 2 acisf00640_000N002_pha2.fits_bkg{10}

!XSPEC>      ::namespace current

!XSPEC>      backgrnd 2 acisf00640_000N002_pha2.fits_bkg{10}
Net count rate (cts/s) for file  2 0.1153  +/- 2.9993E-03( 99.1% total)
  using background file...      acisf00640_000N002_pha2.fits_bkg{10}
```

*Fix a model with “round” parameter values and compare it to both the background-subtracted data and the unsubtracted data:

i) with the background subtraction:

```
-----
Model: windprof<1> + powerlaw<2>
Model Fit Model Component Parameter Unit Value
par par comp
 1 1 1 windprof q          0.00000 +/- 0.00000
 2 2 1 windprof taustar    1.00000 +/- 0.00000
 3 3 1 windprof umax       0.600000 +/- 0.00000
 4 4 1 windprof tauSobSt   0.00000 frozen
 5 5 1 windprof h          0.00000 frozen
 6 6 1 windprof velocity km/s 2485.00 frozen
 7 7 1 windprof beta       1.00000 frozen
 8 8 1 windprof betaSob    0.00000 frozen
 9 9 1 windprof waveleng A  15.0140 frozen
10 10 1 windprof shift mA   0.00000 frozen
11 11 1 windprof thick     0.00000 frozen
12 12 1 windprof pType     0.00000 frozen
13 13 1 windprof verbose   0.00000 frozen
14 14 1 windprof norm      5.000000E-04 +/- 0.00000
15 15 2 powerlaw PhoIndex  2.00000 frozen
16 16 2 powerlaw norm      2.000000E-03 +/- 0.00000
-----
```

C-statistic = 85.96943 using 110 PHA bins.

ii) with no background:

```
-----
Model: windprof<1> + powerlaw<2>
Model Fit Model Component Parameter Unit Value
par par comp
 1 1 1 windprof q          0.00000 frozen
 2 2 1 windprof taustar    1.00000 frozen
 3 3 1 windprof umax       0.600000 frozen
 4 4 1 windprof tauSobSt   0.00000 frozen
 5 5 1 windprof h          0.00000 frozen
 6 6 1 windprof velocity km/s 2485.00 frozen
-----
```

7	7	1	windprof	beta	1.00000	frozen
8	8	1	windprof	betaSob	0.00000	frozen
9	9	1	windprof	waveleng A	15.0140	frozen
10	10	1	windprof	shift mA	0.00000	frozen
11	11	1	windprof	thick	0.00000	frozen
12	12	1	windprof	pType	0.00000	frozen
13	13	1	windprof	verbose	0.00000	frozen
14	14	1	windprof	norm	5.000000E-04 +/-	0.00000
15	15	2	powerlaw	PhoIndex	2.00000	+/- 0.00000
16	16	2	powerlaw	norm	2.000000E-03 +/-	0.00000

C-statistic = 87.09071 using 110 PHA bins.

OK; the models are identical, but the C statistics are different (just a little), so the data must actually be a bit different with the background subtraction. (But is xspec simply subtracting the background?)

*writing out ascii files from iplot (to compare the bkg and no bkg *data*; the models in the two files are identical).

OK, the data columns differ slightly (for some wavelength bins); the uncertainty column differs a bit too. My spot check indicates that the data column values are slightly lower (though often equivalent) in the background subtracted case.

See:

<http://astro.swarthmore.edu/~cohen/projects/porosity/bkgsub.dat>

<http://astro.swarthmore.edu/~cohen/projects/porosity/nobkg.dat>

So, now my working hypothesis is that xspec simply subtracts the background, even when using the C statistic. I don't think that this is good.

Question:

Why did Maurice get significantly higher C statistic values when we were fitting these models in his office in late August?

Bigger question:

Is it better to use the background or not? Maybe we should do it both ways and show that we get the same results (more or less); though this won't be good enough for the XMM data.