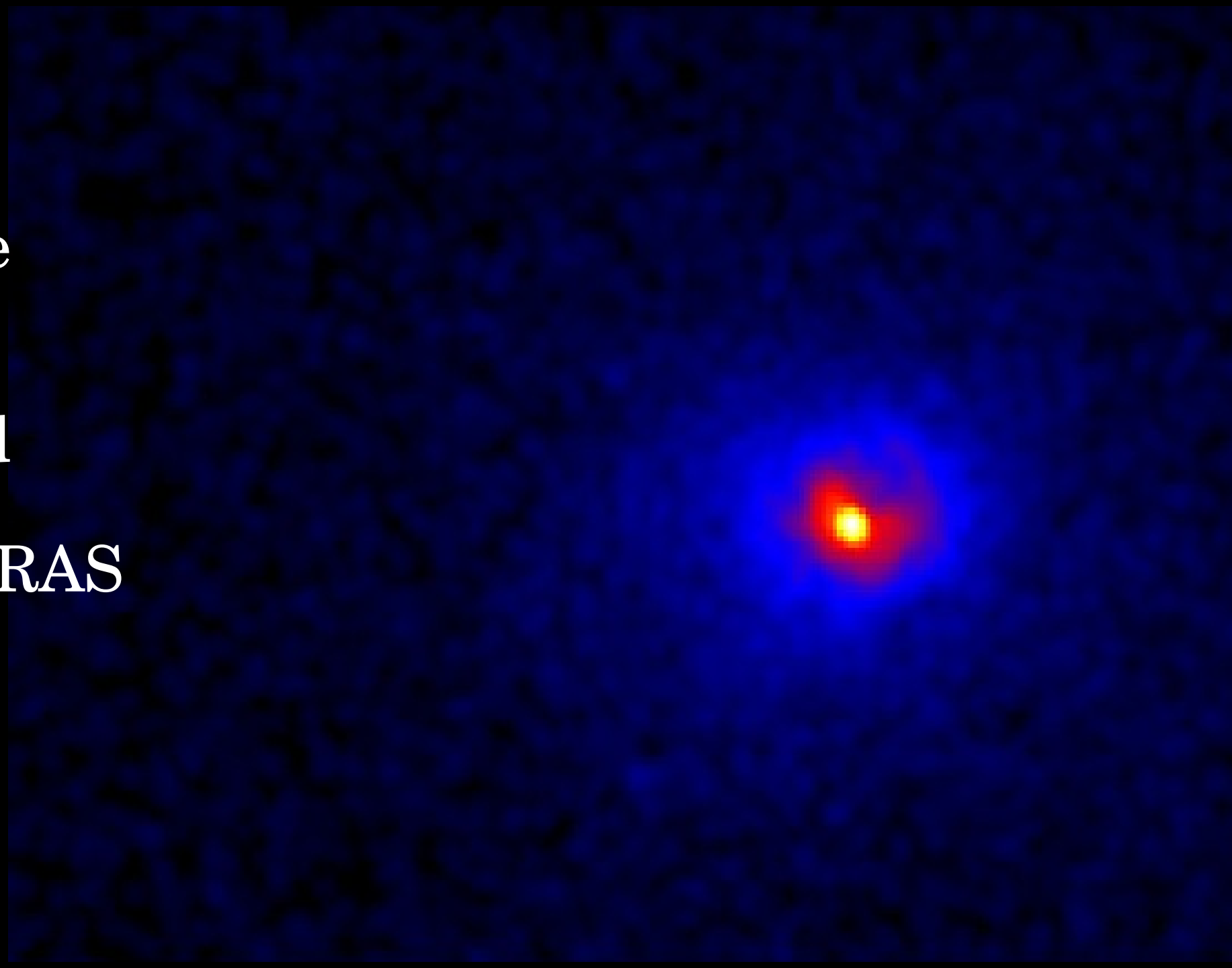
A look into the Transmissive, Reflective, Geometric and Relativistic properties of IRAS



Don Niko R. Godilano

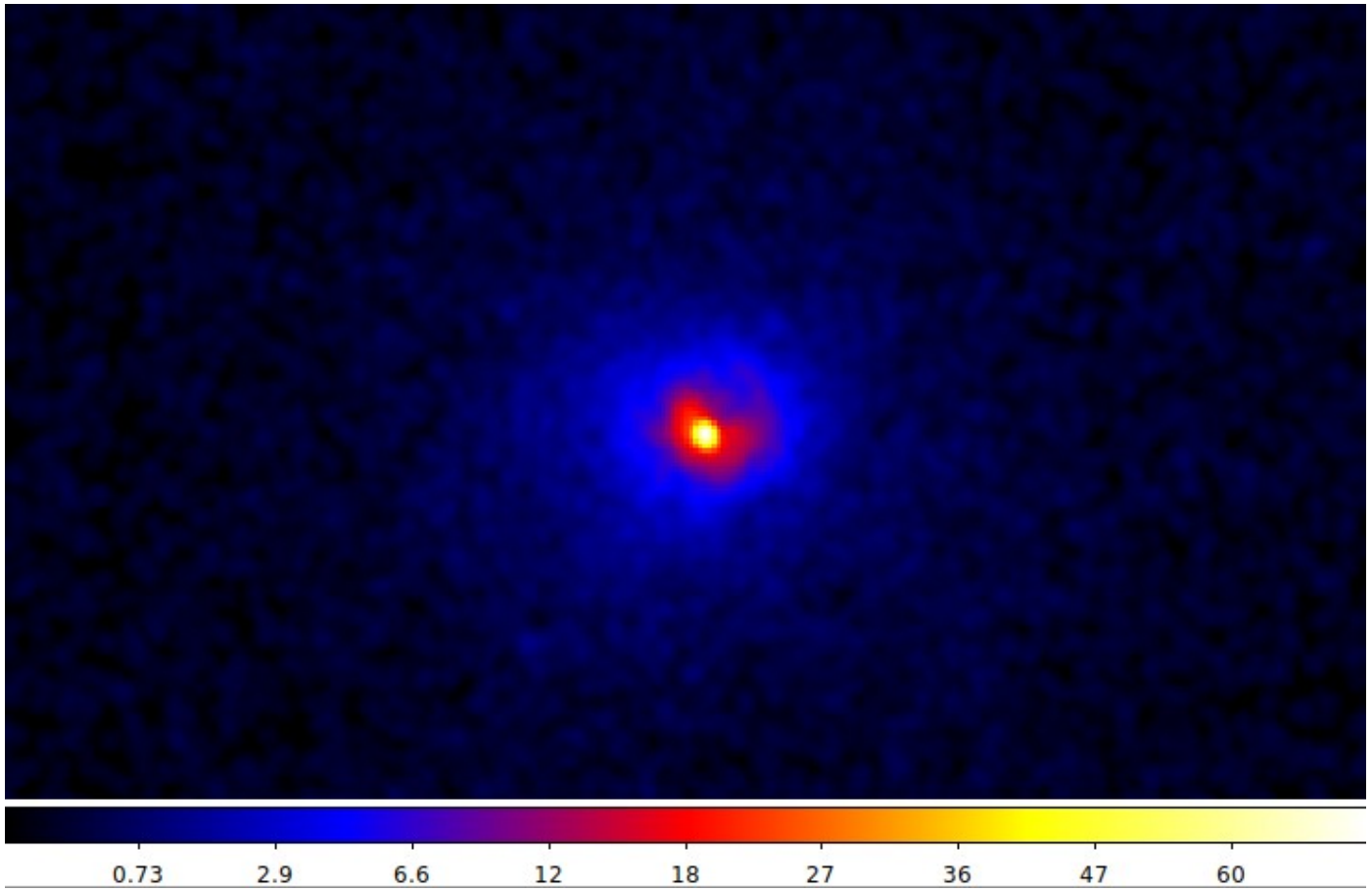
Carla Alejandra Garcia

Akshay Kumar

Methodology

The Tools

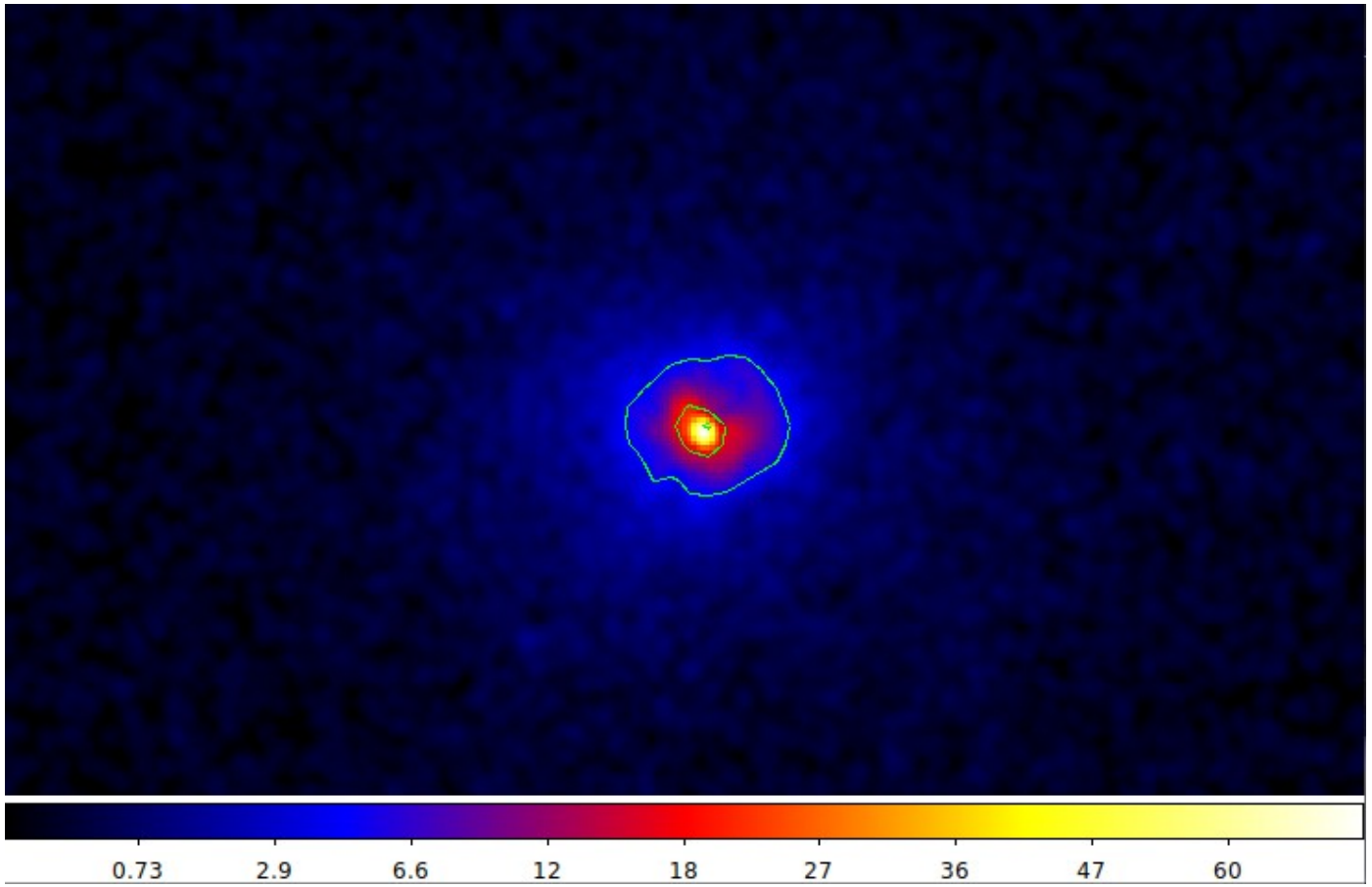
Chandra Interactive Analysis Observation (CIAO) v. 4.12	For data processing and integrating to other image processing software
SaoImageDS9 v. 8.1	For viewing and extracting of source and background region
HEASOFT Software v. 6.26.1	Bundle of software (containing HEASARC) for reprocessing, re-extracting, rebinning and correcting the source and background to produce spectrum files
Xspec v. 11.3.2	For analyzing the spectrum and applying models



The Source

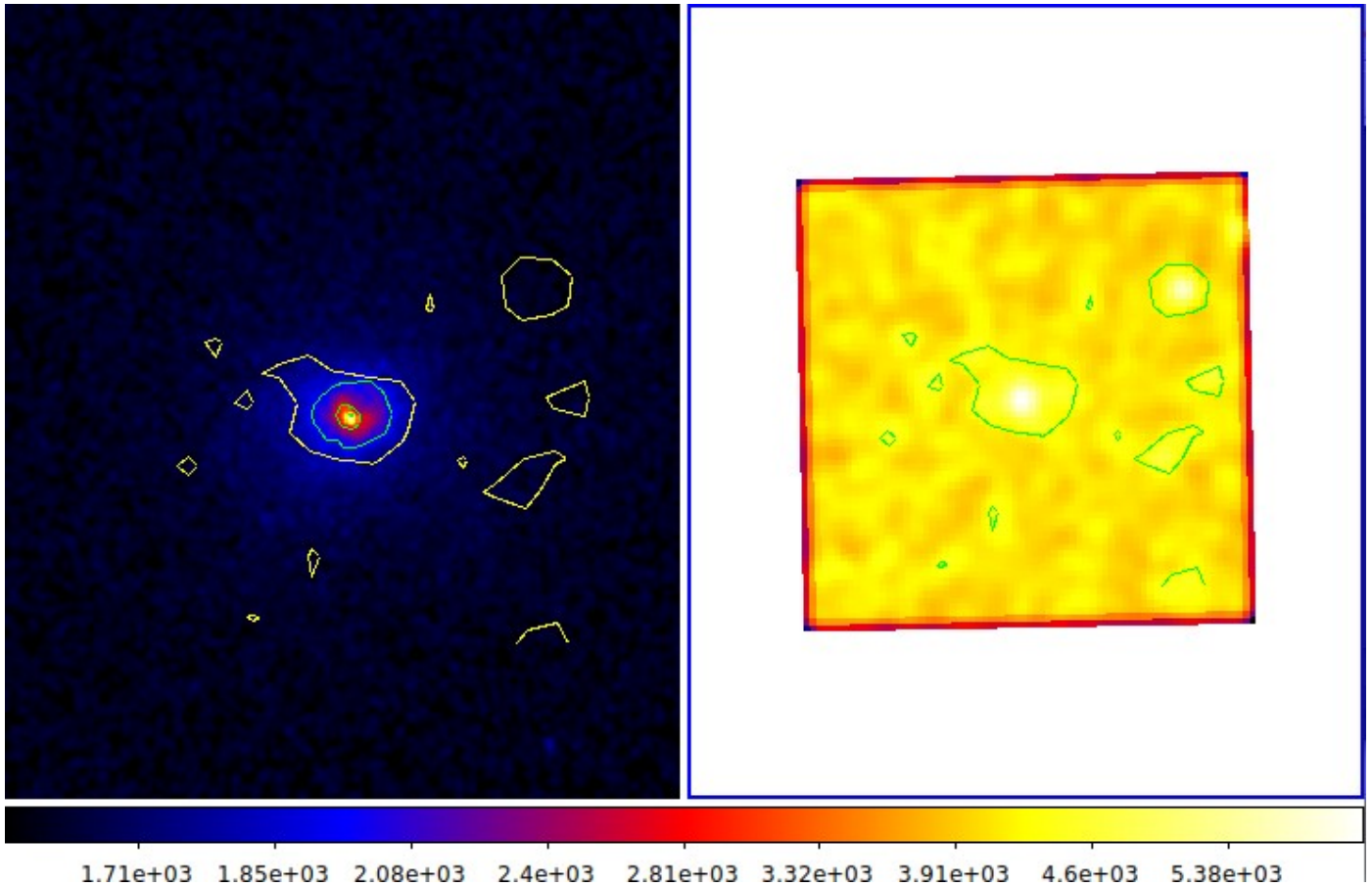
The Source

- Target Name: IRAS 09104+4109
- Object Type: QSO-Sy2
- Mission: Chandra X-ray Observatory
- Instrument Type: ACIS-I (Advanced CCD Imaging Spectrometer)
- Coordinates: 09h13m45.489s, +40d56m28.22s / 138.439538, 40.941174
- Radial Velocity / Redshift: 132780 km/s / 0.4422
- Hubble Distance: 1958.41 Mpc
- Diameter: 12.87” / 122.05 kpc
- Exposure Time: 76.16 ks
- Release Date: 2010-01-07 15:29:42



The Source

Double-peak iron line



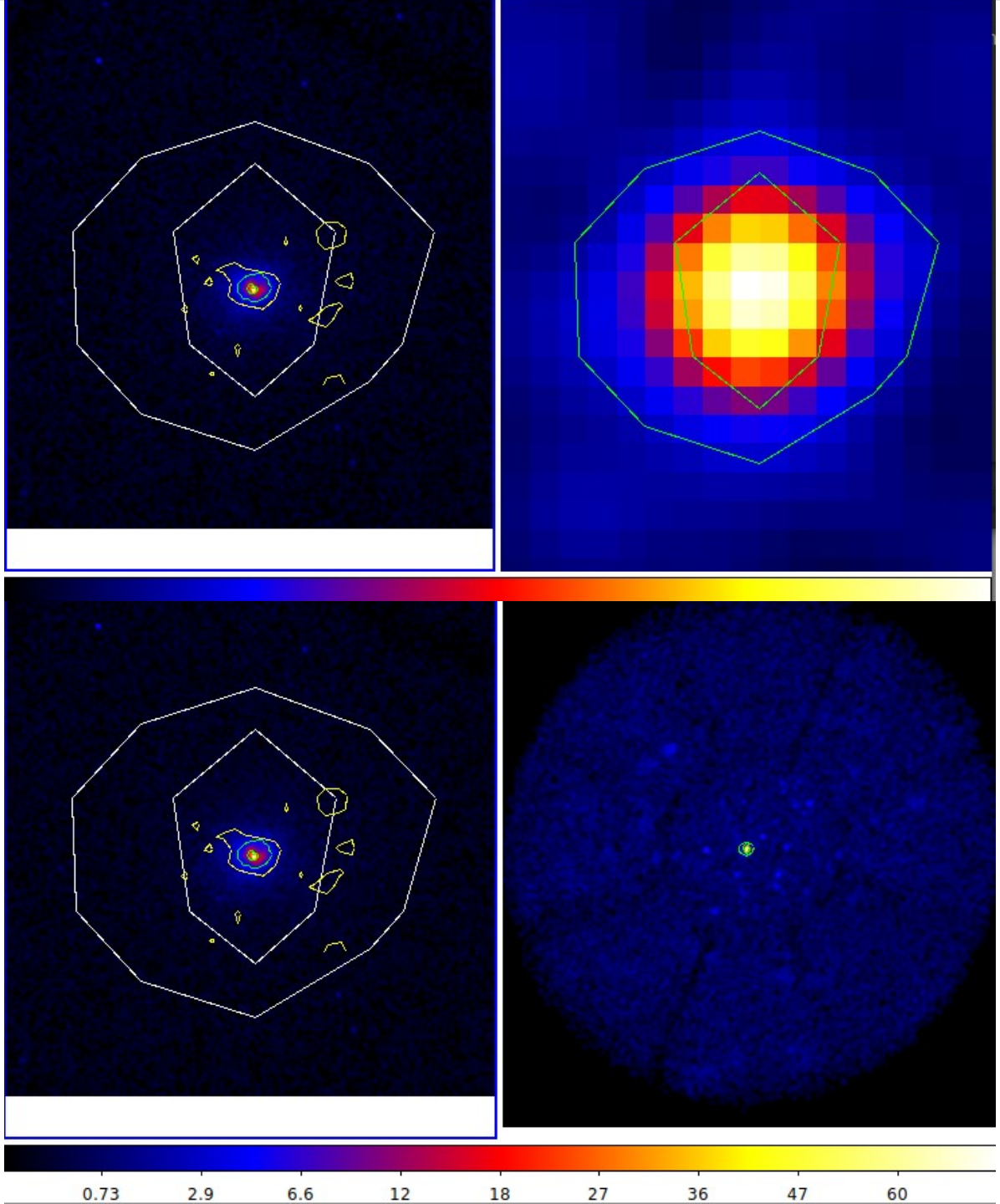
The Source

--Optical Spectra

--103aE Band

--Palomar48-inchSchmidt

--Emission lines from galaxy clusters



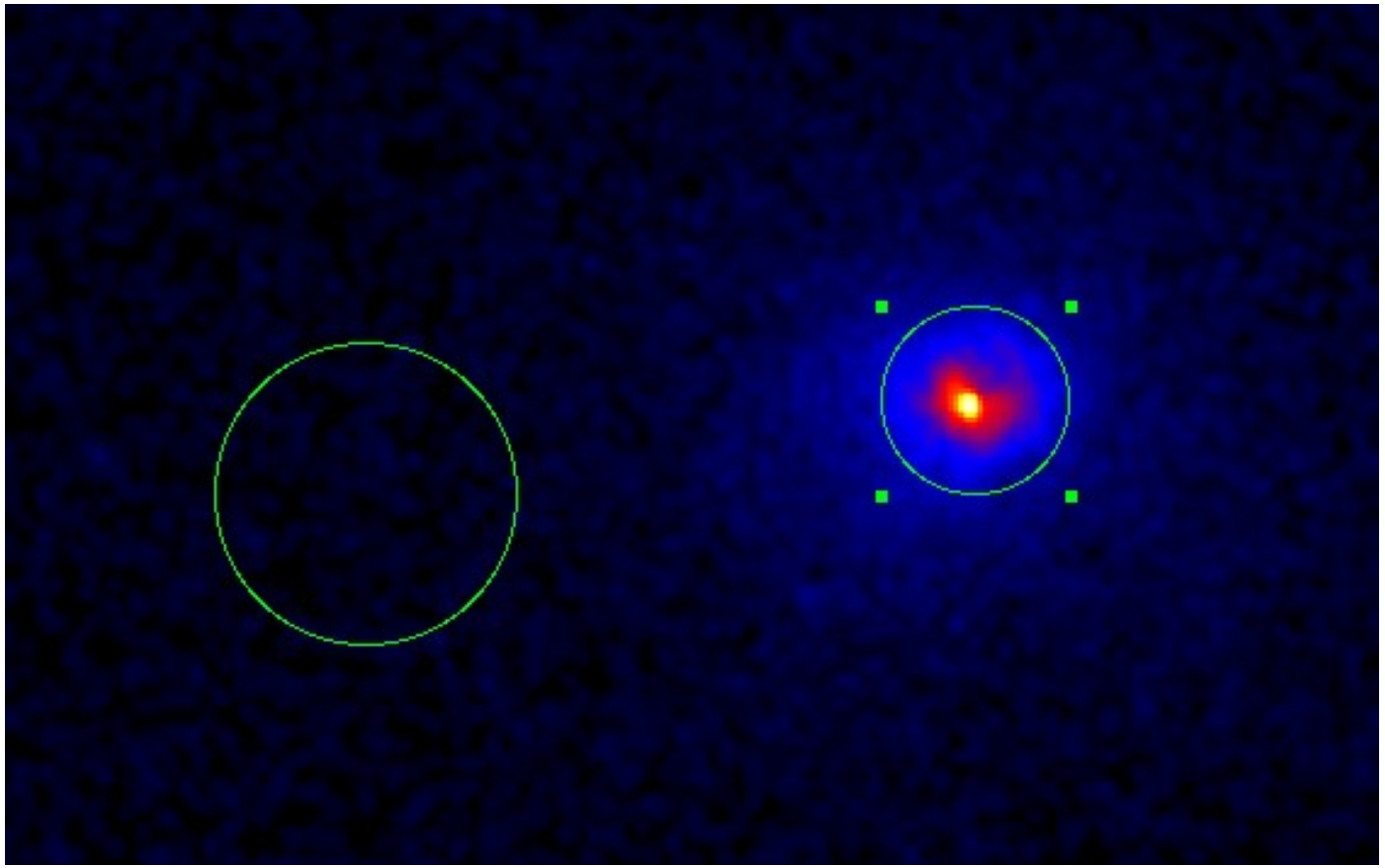
The Source

--Entire X-ray source of galaxy cluster

--0.1-2.4keV Band

--ROSAT

-- Emission lines from galaxy clusters

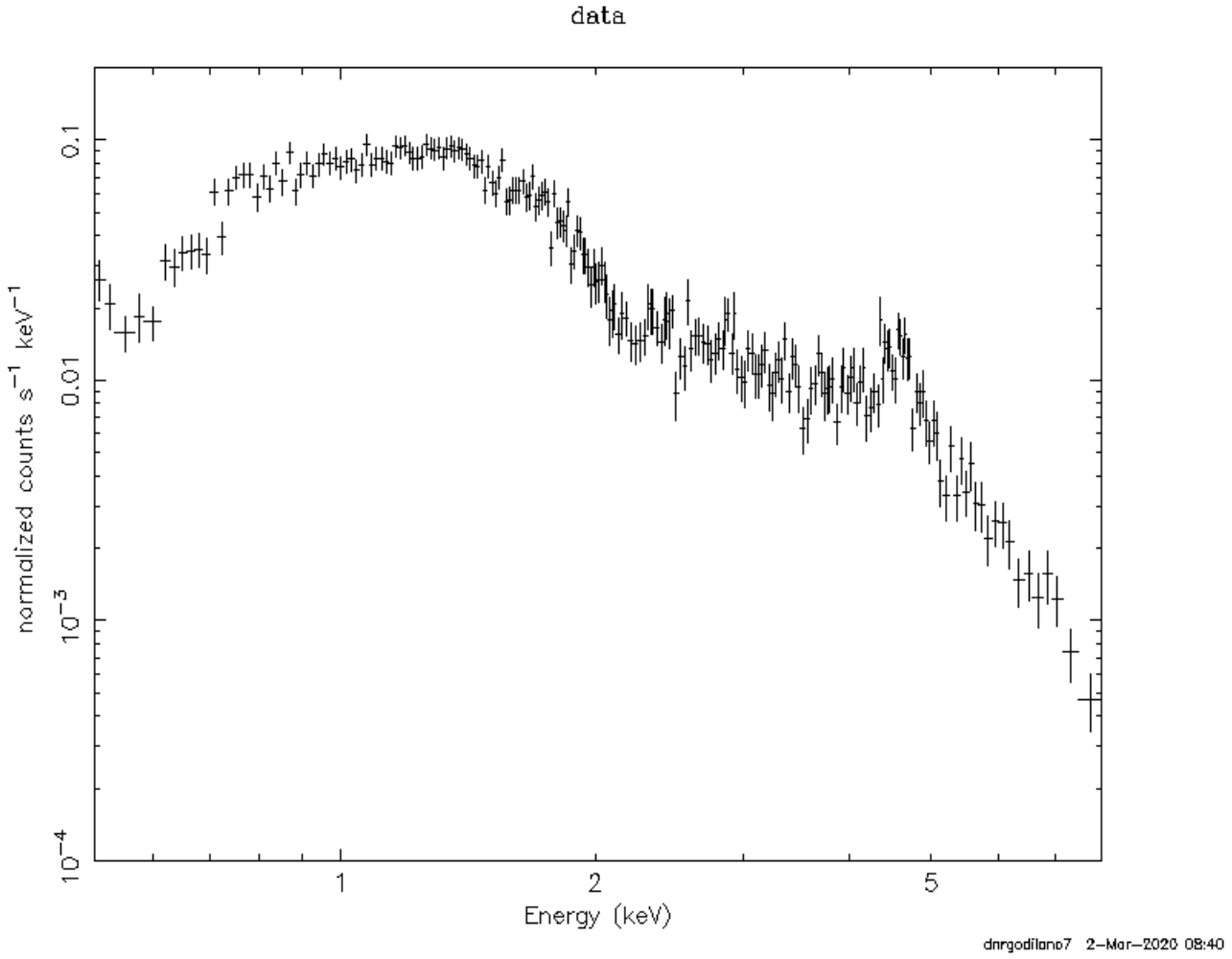


Region Extraction

--11arcsec source

--17 arcsec background

--consider the core, accretion disk, outermost

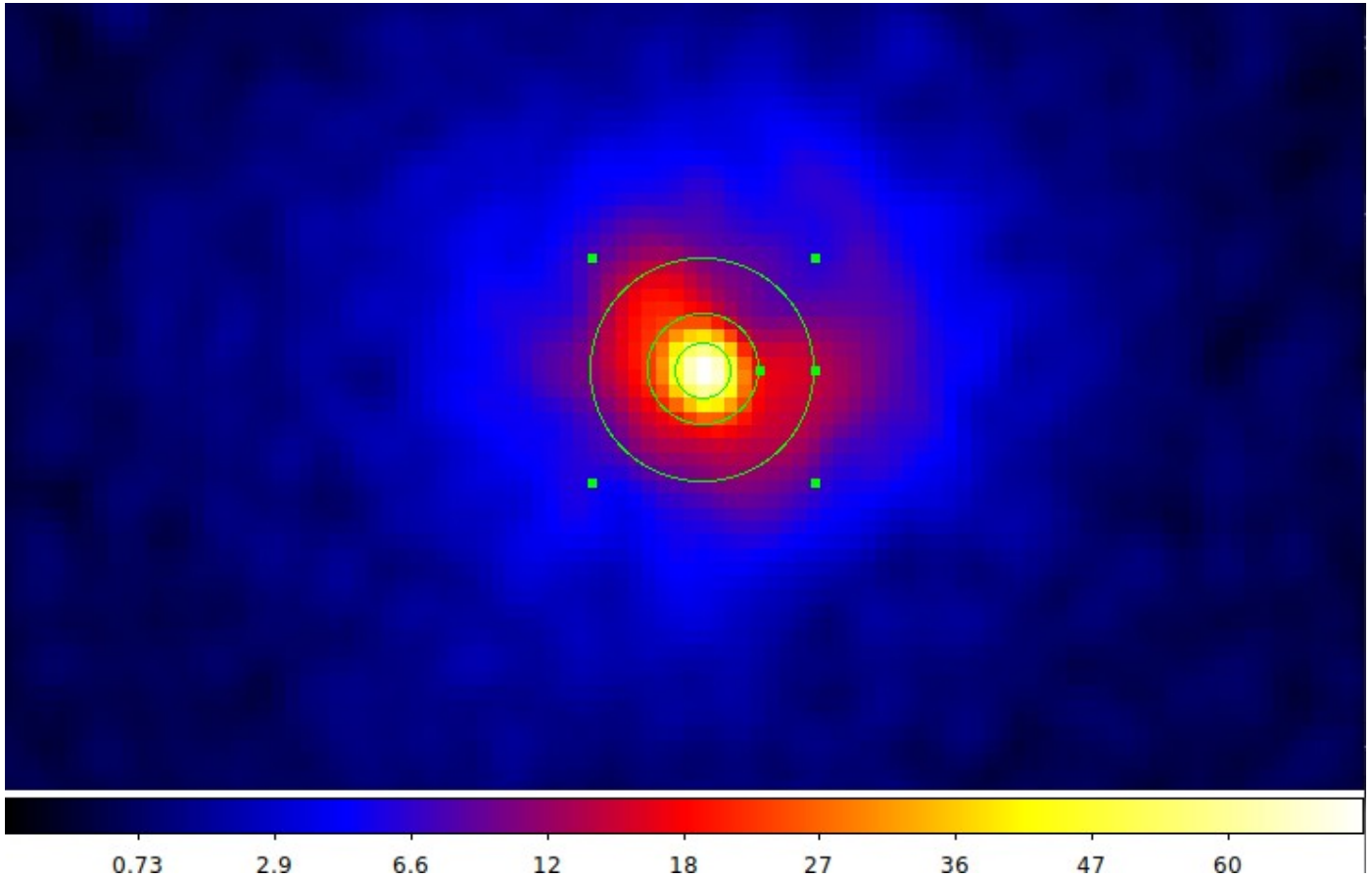


Region Extraction

--11arcsec source

--17 arcsec background

--consider the core, accretion disk, outermost

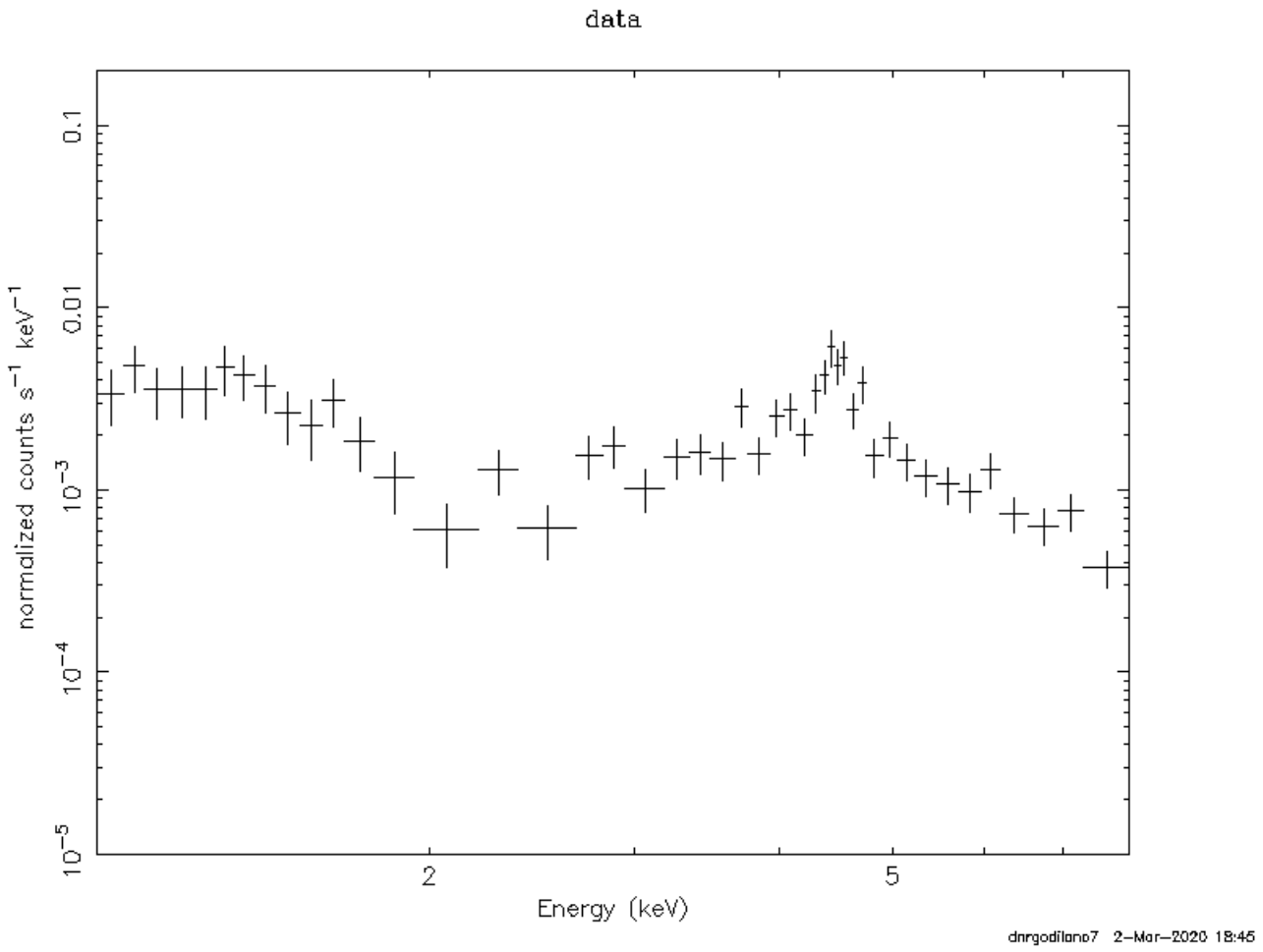


Region Extraction

--1arcsec source

--2-4 arcsec annulus background

--isolate the core and subtract the brightness surrounding region



Extraction Regions

--1arcsec source

--2-4 arcsec annulus background

--isolate the core and subtract the brightness surrounding region

Results and Discussions

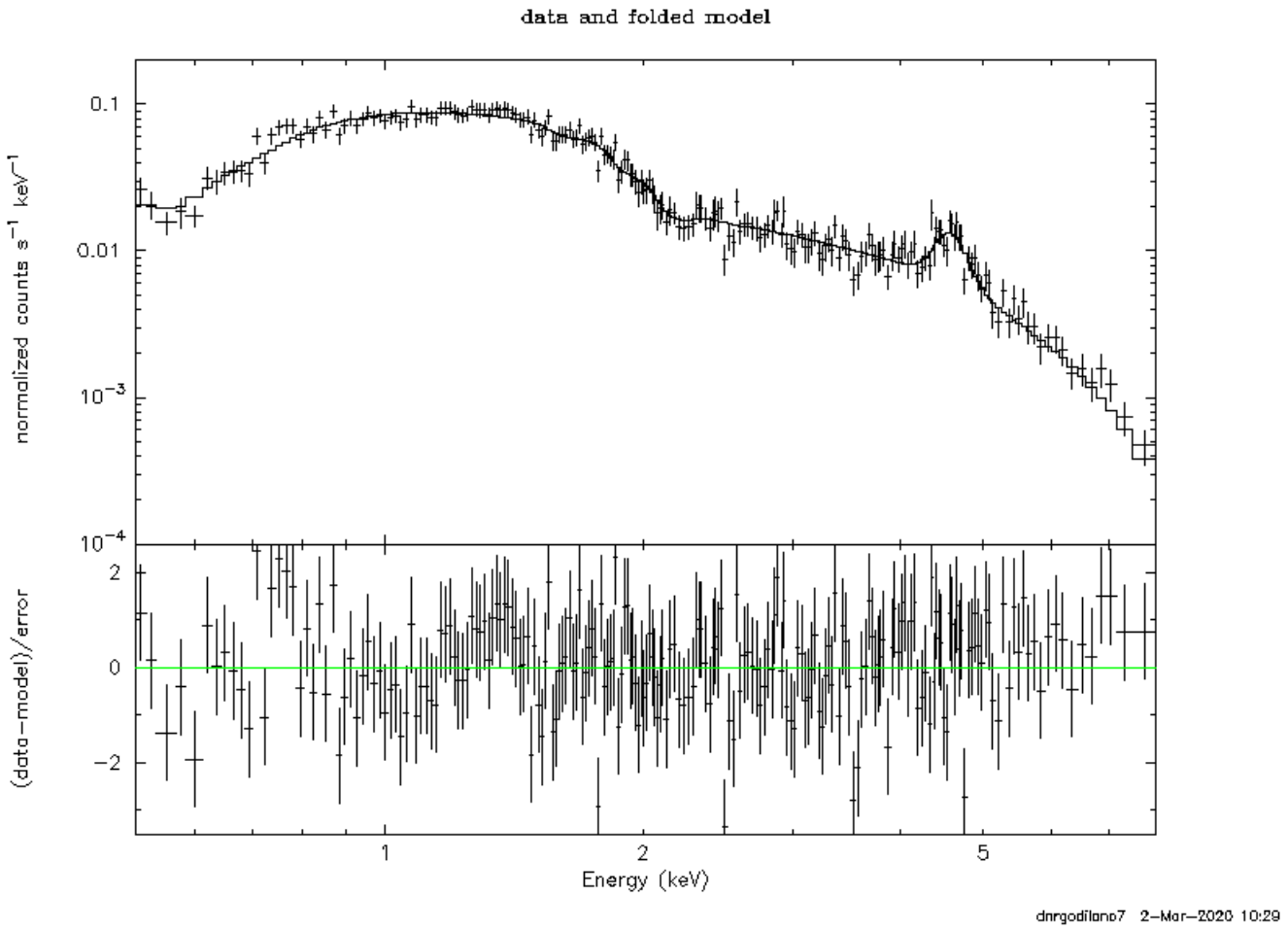
General Case

- Reasons and Motivation
- tbabs(powerlaw+zgauss)
- Transmission and reflection dominated model provide good fit to quasar emission

Nh	Gamma	E-alpha	EW	Red-X2	x2dof
6.60 x 10^20 +/-	1.964	6.58	230	1.0232	233/218

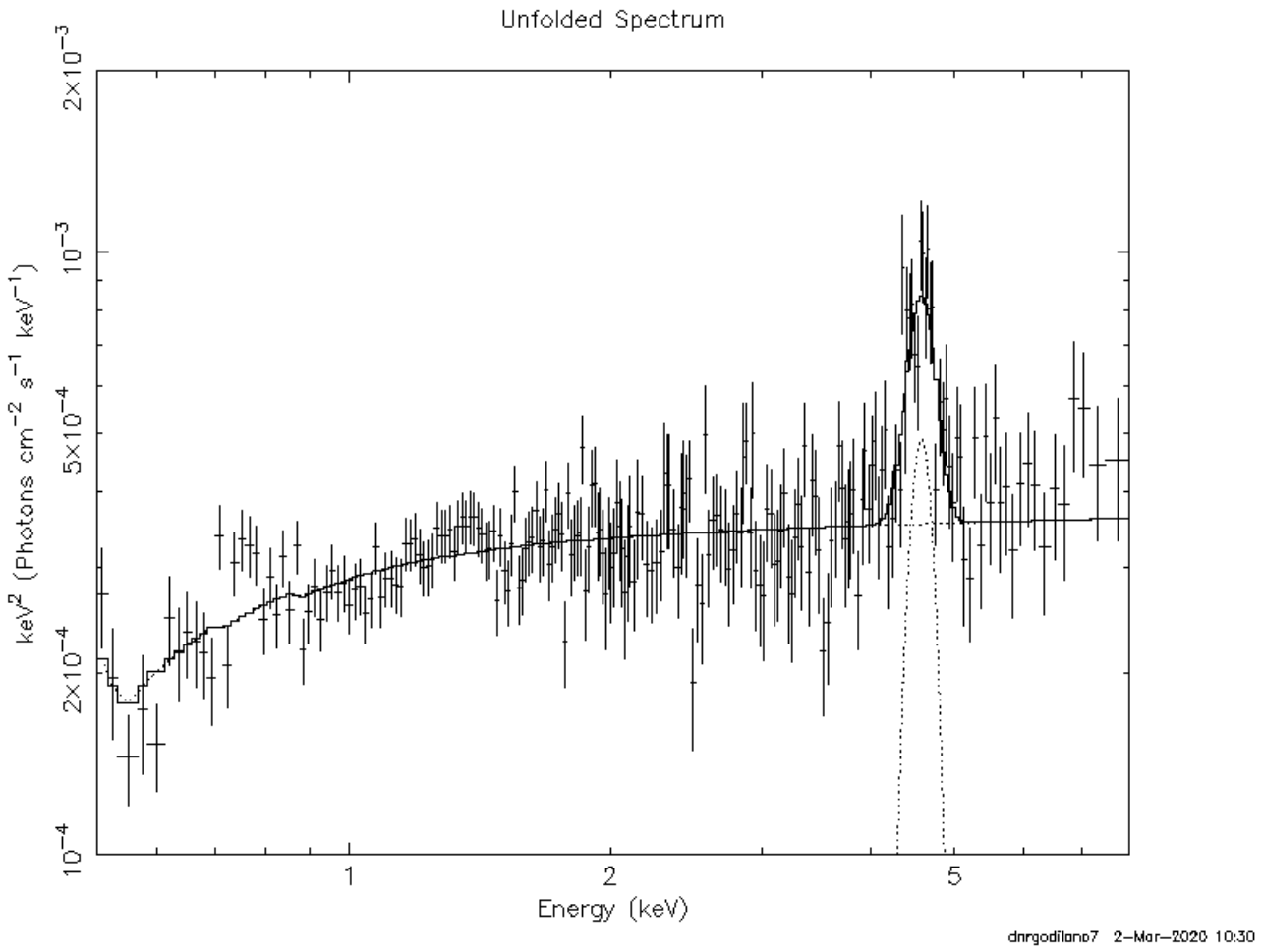
General Case

tables



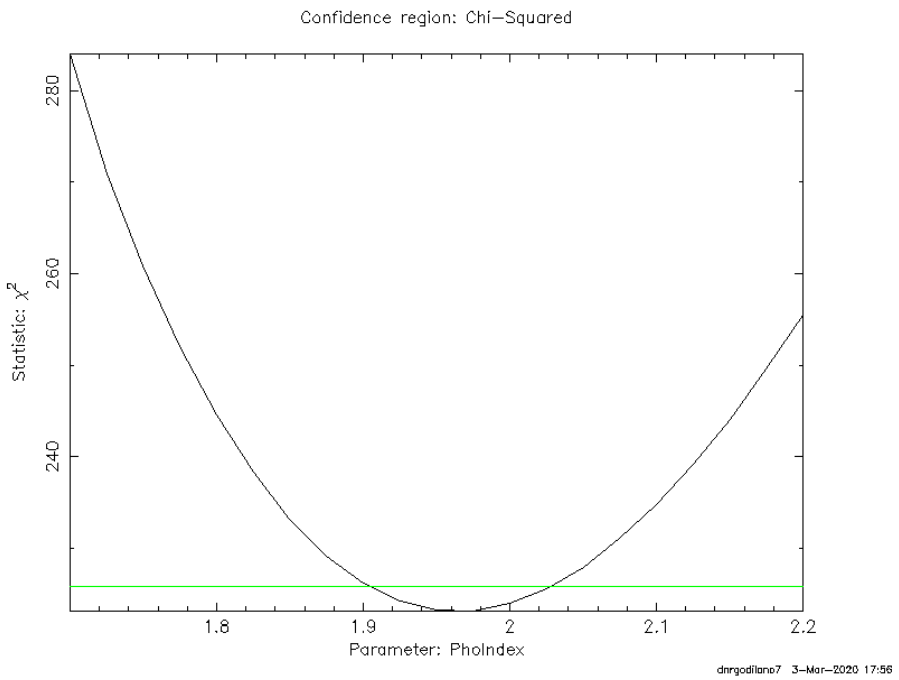
General Case

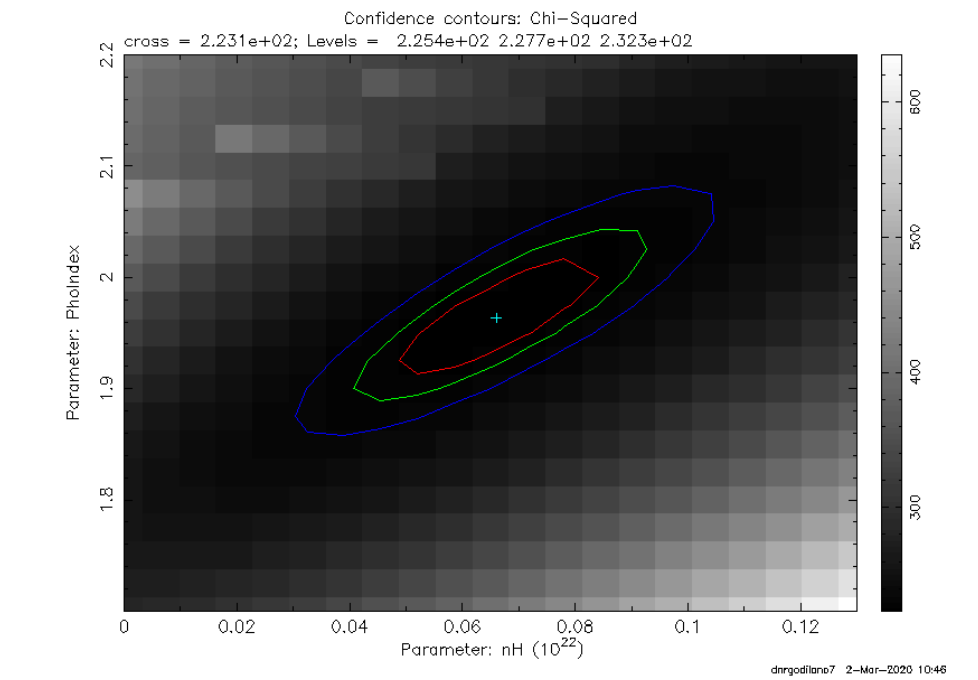
Plot ldata



General case

eeuf





General case

Plot contours

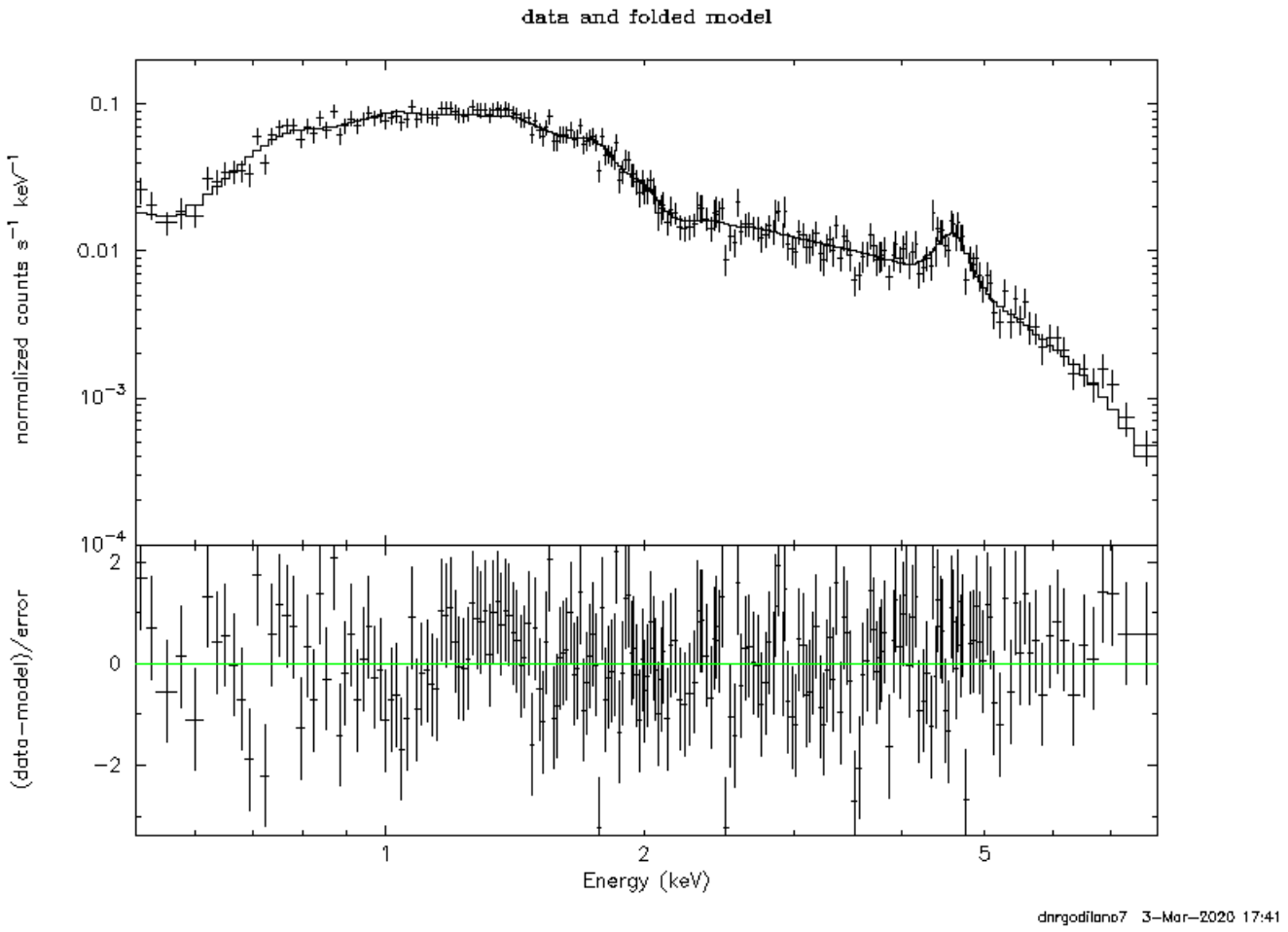
Transmission

- Reasons and Motivation
- tbabs(powerlaw+mekal+zgauss)

Nh	Gamma	kT (keV)	E-alpha (keV)	EW (eV)	Red-X2	X2/dof
6.53 x 10^20 +/- 2.02	1.81 +/- 0.08	1.91 +/- 0.67	6.57 +/- 0.04	246 +/- 49.4	0.96	208/216

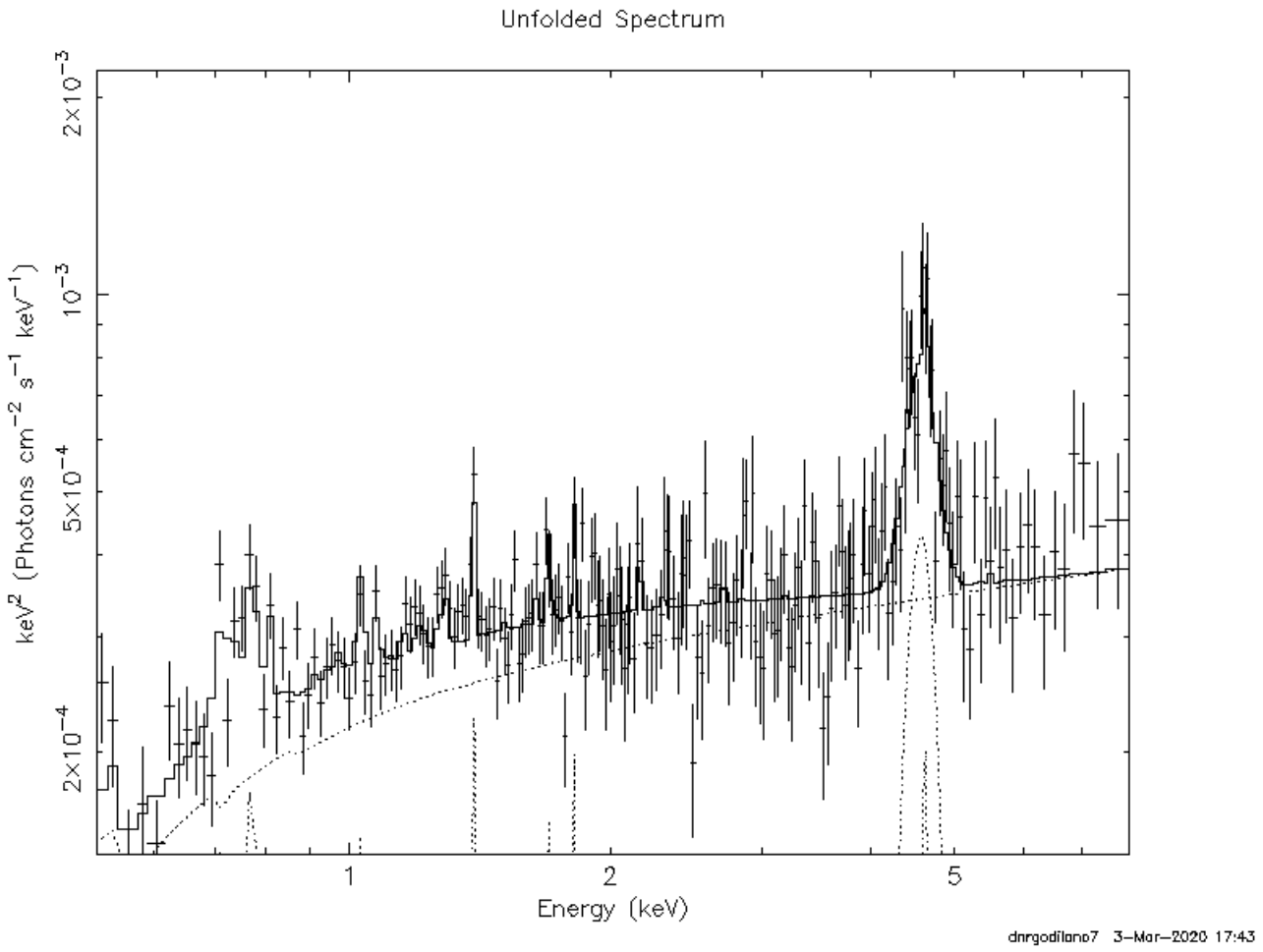
Transmission for entire source

table



Transmission for entire source

eeuf



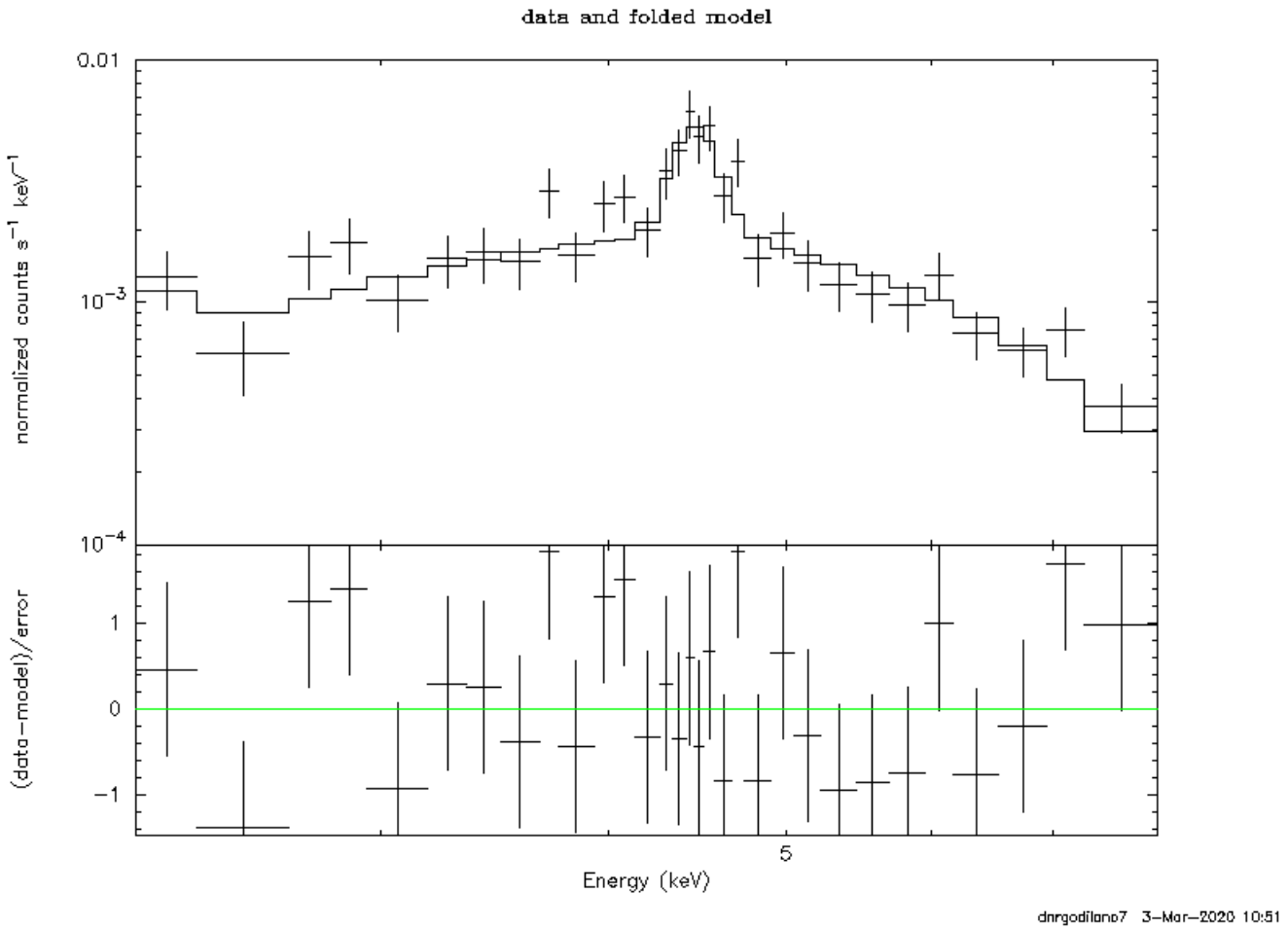
Transmission for entire source

eeuf

Nh	Gamma	kT (keV)	E-alpha (keV)	EW (eV)	Red-X2	X2/dof
4.48 x 10^22 +/- 4.46	0.43 +/- 0.67	0.18 +/- 1.33	6.42 +/- 0.03	118 +/- 49.2	1.26	29/23

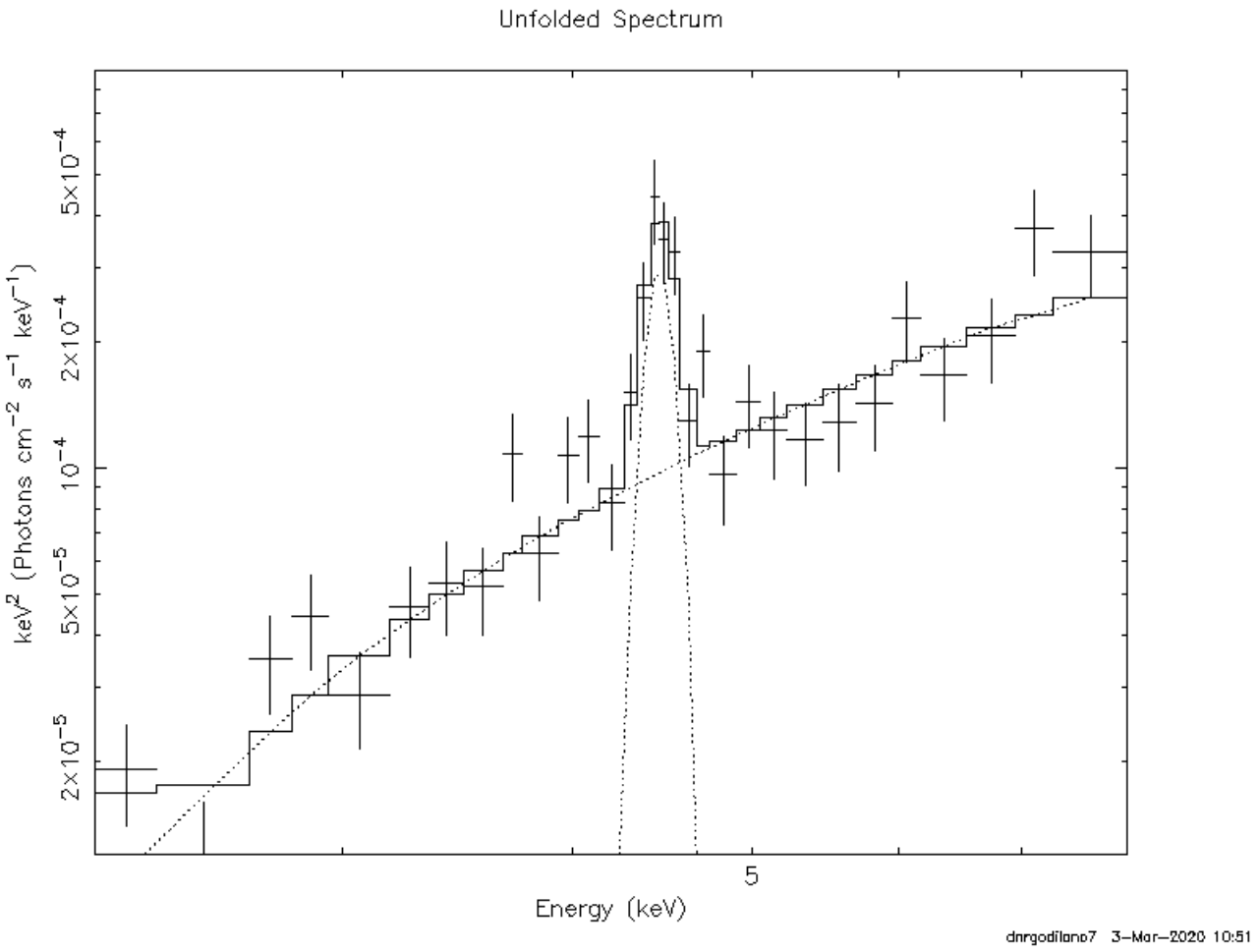
Transmission for center

table



Transmissio n for center

table



Transmissio n for center

table

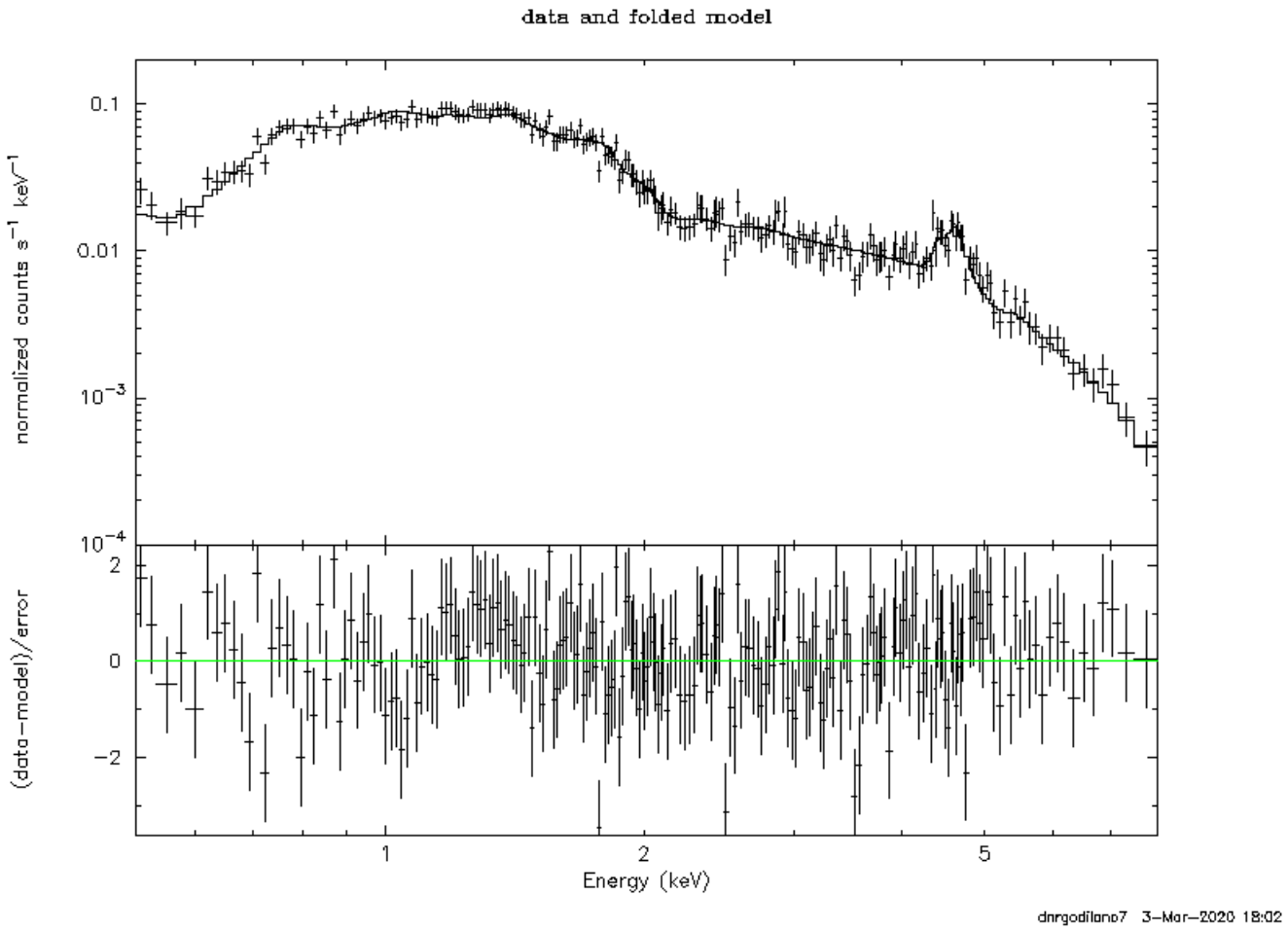
Reflection

- Reasons and Motivation
- tbabs(pexrav+mekal+zgauss)

Nh	Gamma	Cos(theta)	kT (keV)	E-alpha (keV)	EW (eV)	Red-X2	X2/dof
3.99 x 10^20 +/- 2.11	1.72 +/- 0.33	0.90 (f)	3.23 +/- 0.35	6.37 +/- 0.81	0.16 +/- 65.0	0.98	208/214

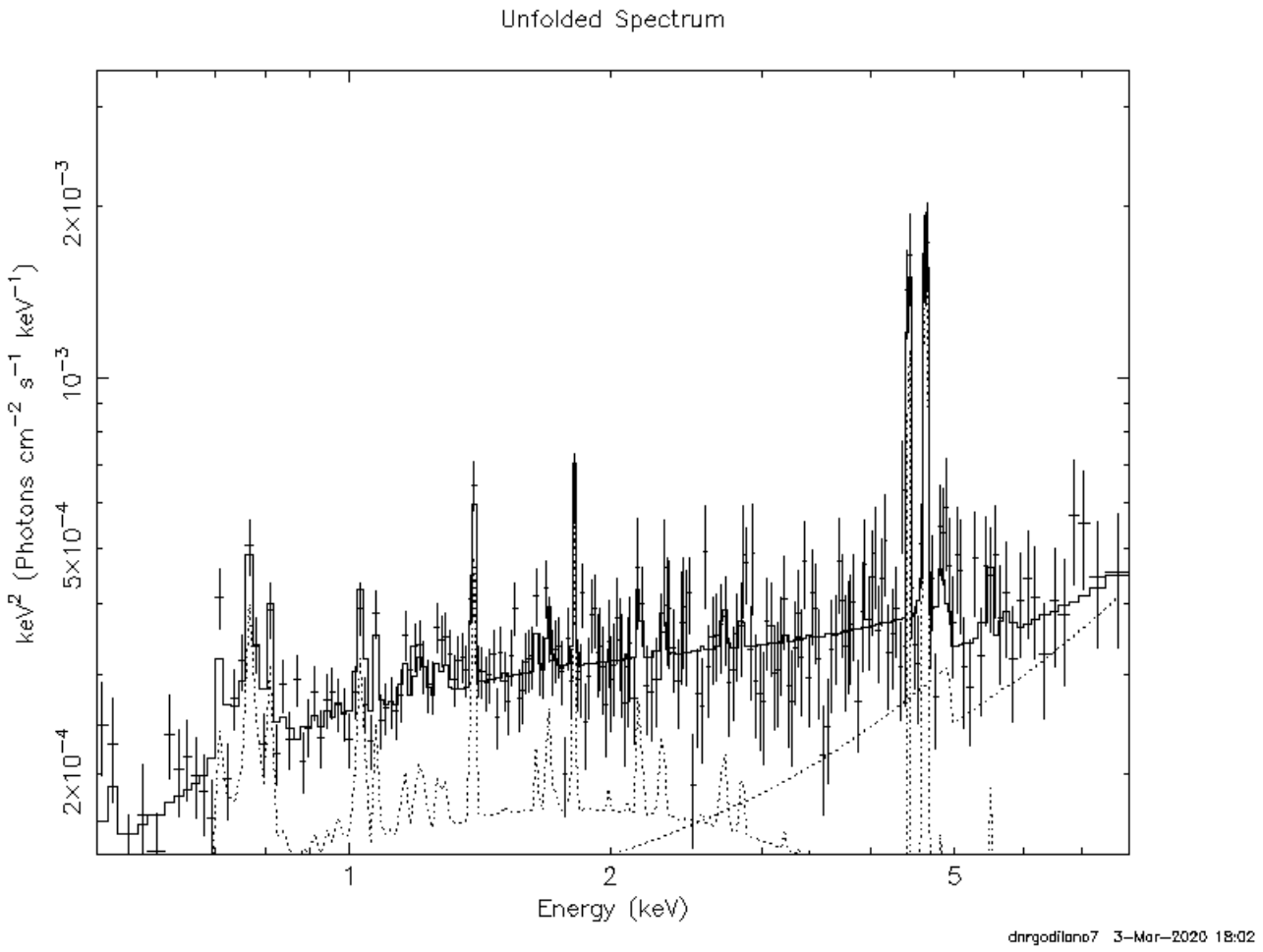
Reflection for entire source

eeuf



Reflection for entire source

eeuf



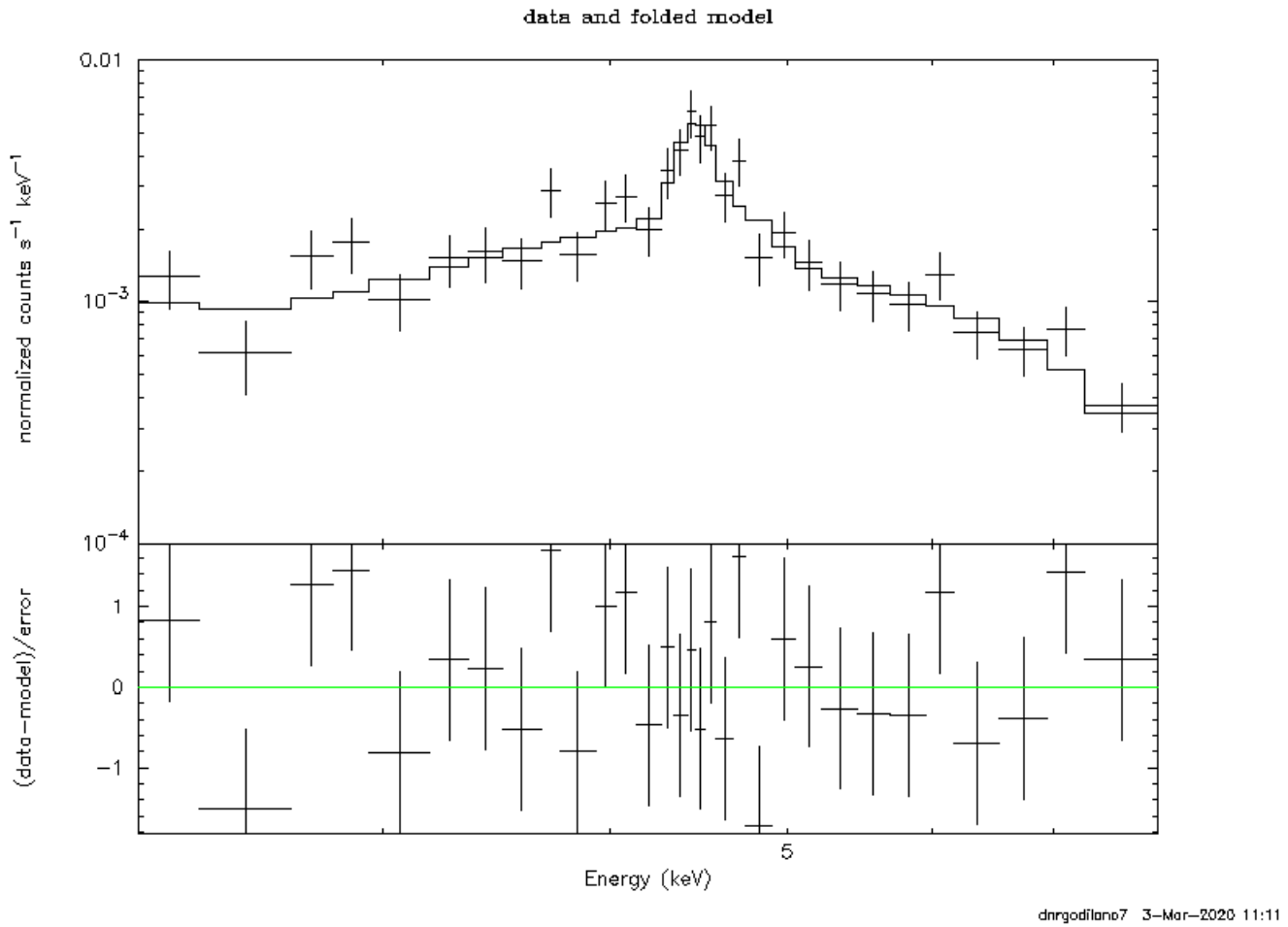
Reflection for entire source

eeuf

Nh	Gamma	Cos(theta)	kT (keV)	E-alpha (keV)	EW (eV)	Red-X2	X2/dof
3.97 x 10^22 +/- 24.50	1.21 +/- 10.44	0.90 (f)	0.23 +/- 1.03	6.41 +/- 0.03	73.38 +/- 72.07	1.252	26/21

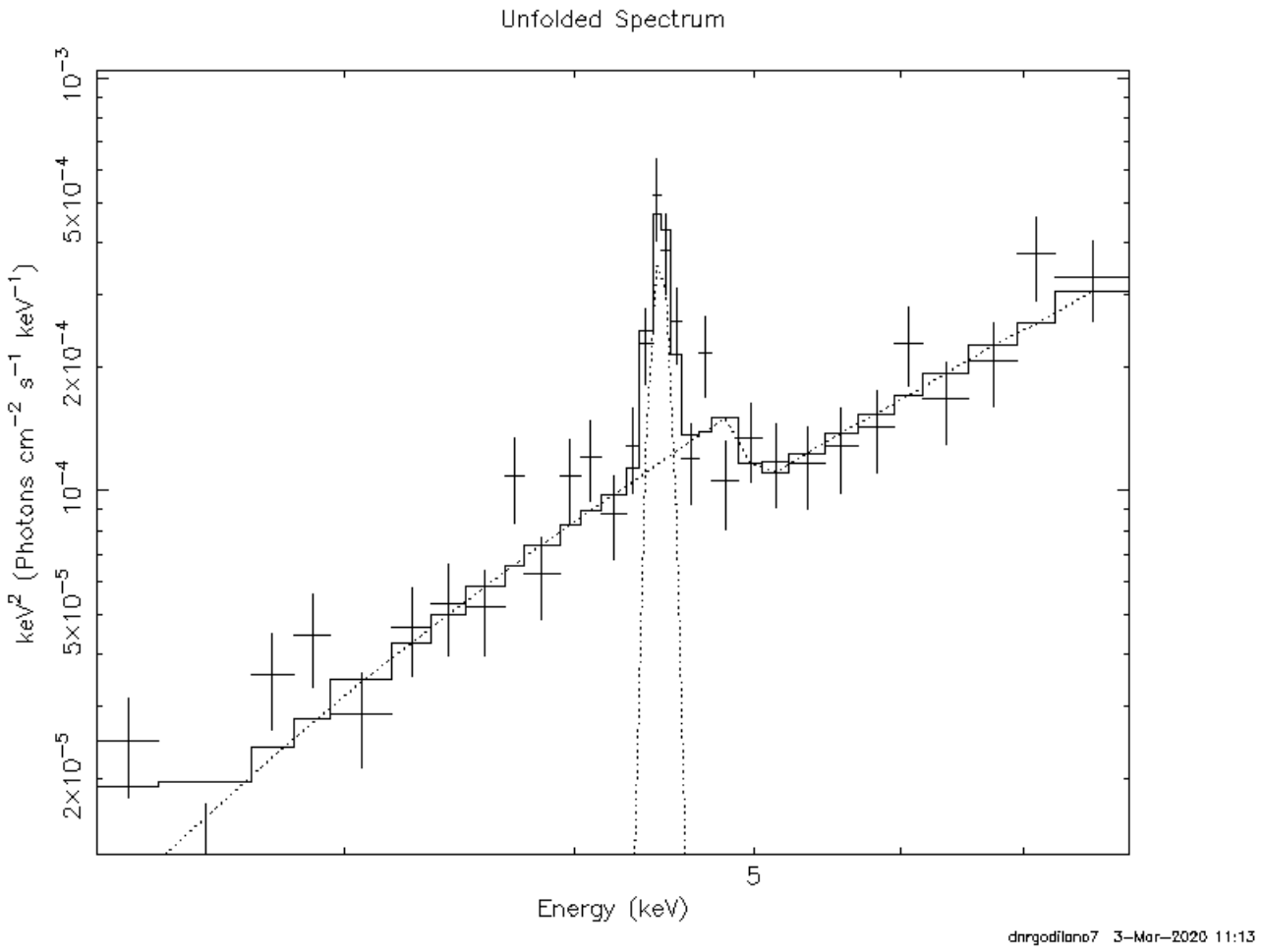
Reflection for center

eeuf



Reflection for center

Plot ldata



Reflection for center

eeuf

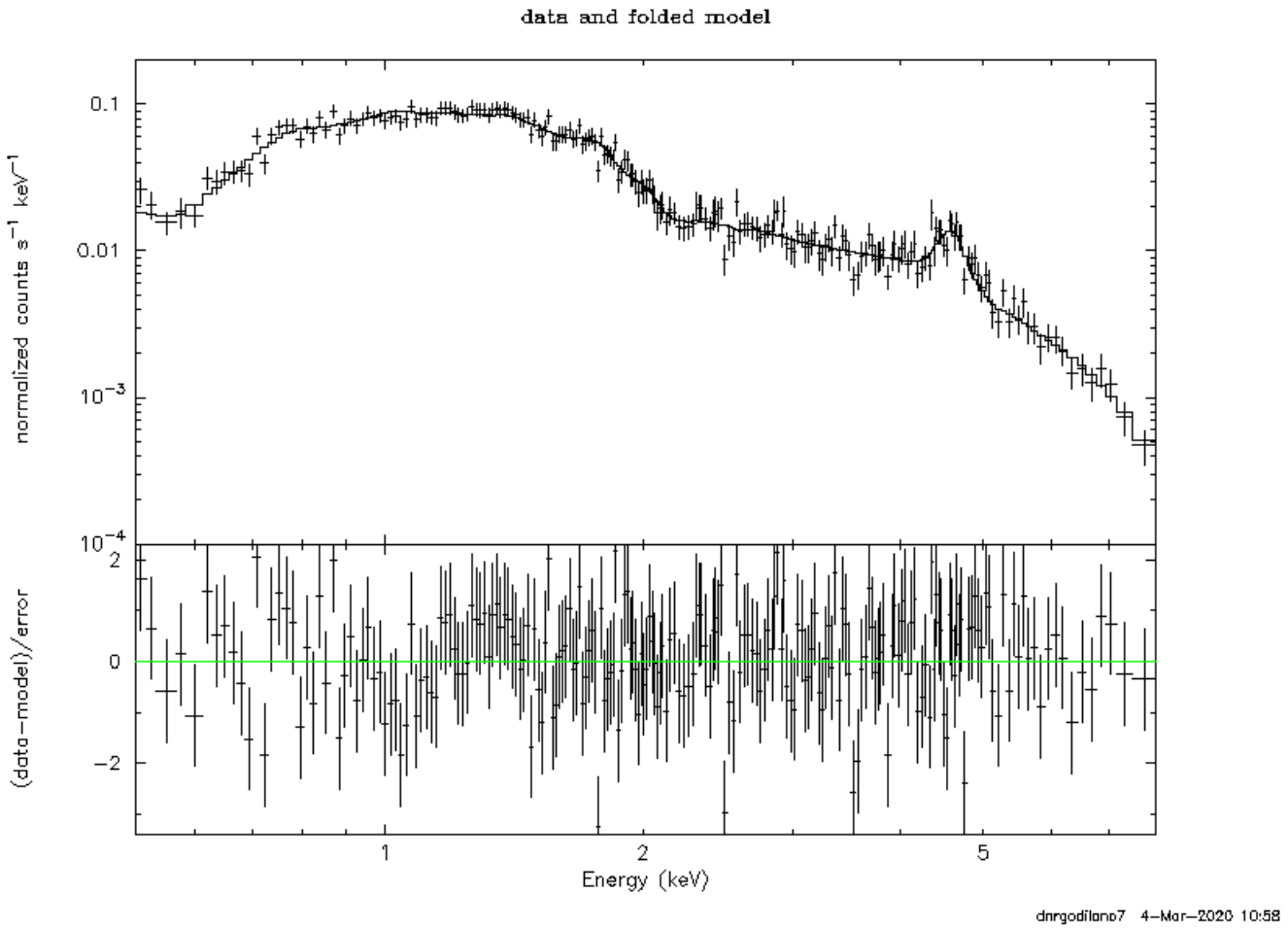
MyTorus

- Reasons and Motivation
- tbabs(powerlaw+mekal+zgauss) +Mytorus_emission

Nh	Gamma	Incl Angle	kT (keV)	E-alpha (keV)	EW (eV)	Red-X2	X2/dof
7.96 x 10^20 +/- 2.17	1.82 +/- 1.65	70deg (f)	2.60 +/- 0.74	6.53 +/- 0.03	205.01 +/- 72.8	0.95	201/213

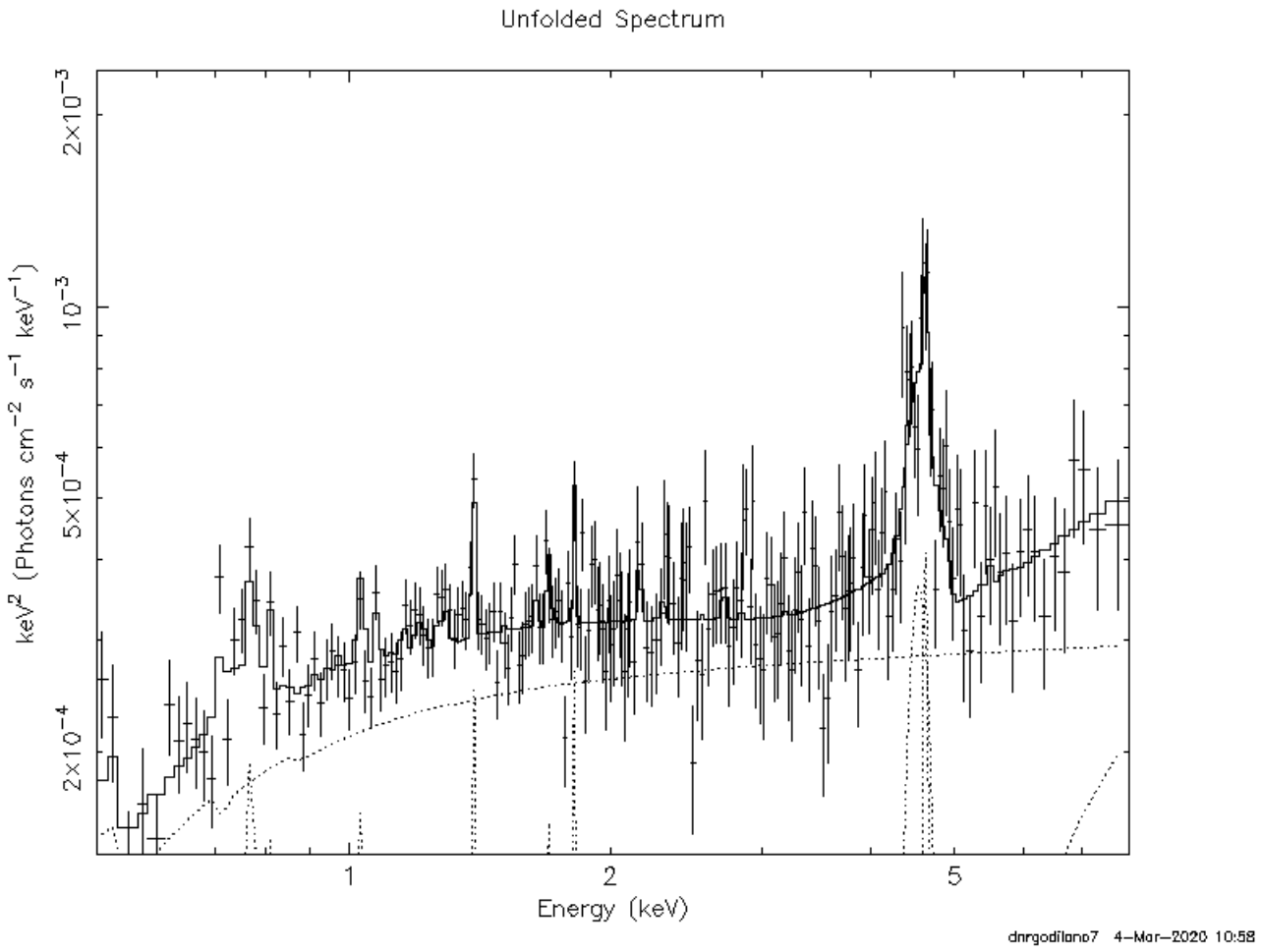
MyTorus

eeuf



Mytorus entire

eeuf



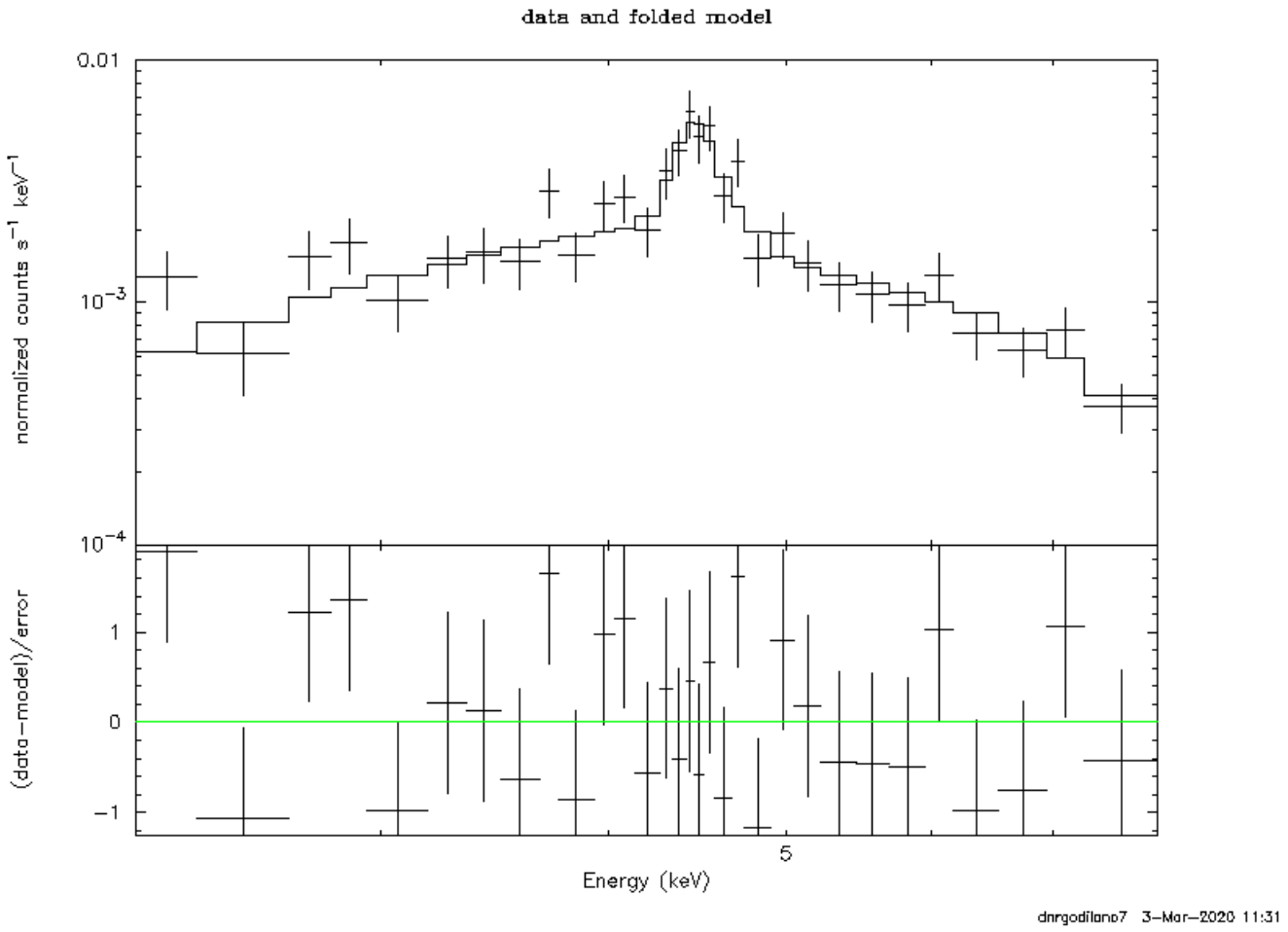
Mytorys entire

eeuf

Nh	Gamma	Incl Angle	kT (keV)	E-alpha (keV)	EW (eV)	Red-X2	X2/dof
4.02 x 10^22 +/- 26.73	1.65 +/- 11.14	90deg (f)	0.17 +/- 2.19	6.41 +/- 0.04	84.45 +/- 71.11	1.35	27/20

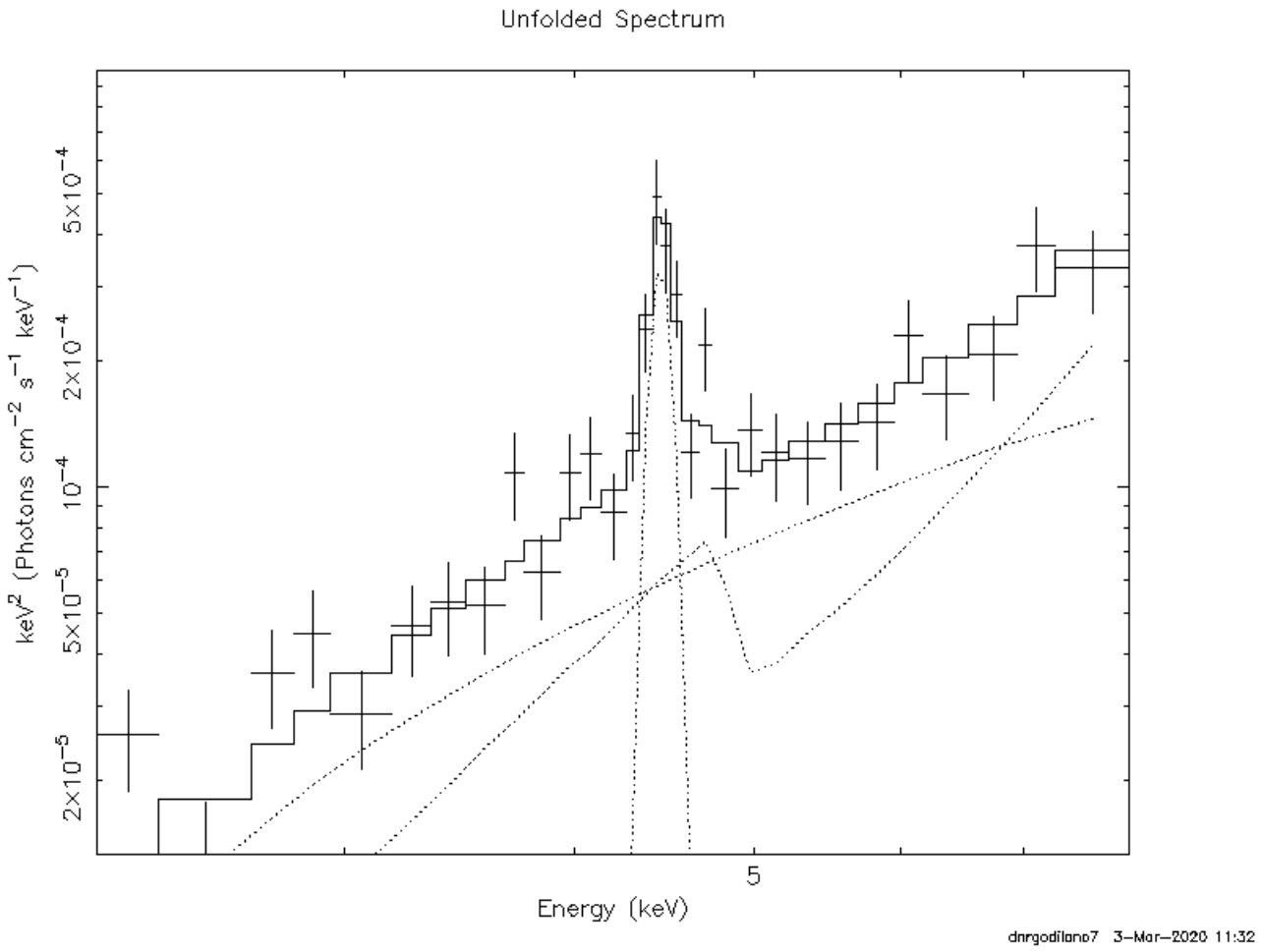
MyTorus center

eeuf



Mytorus for center

eeuf

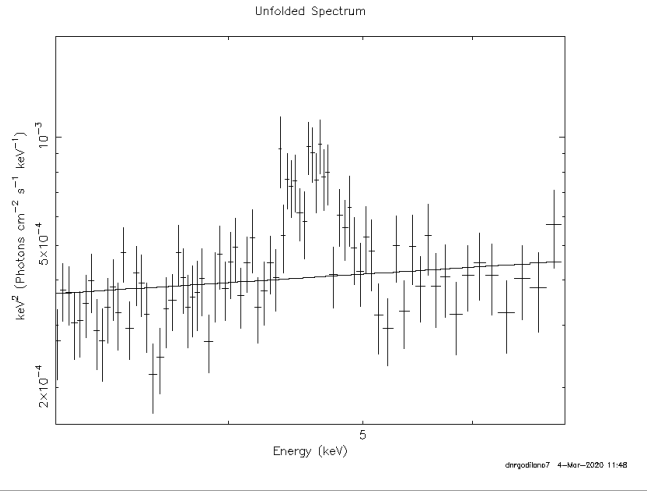


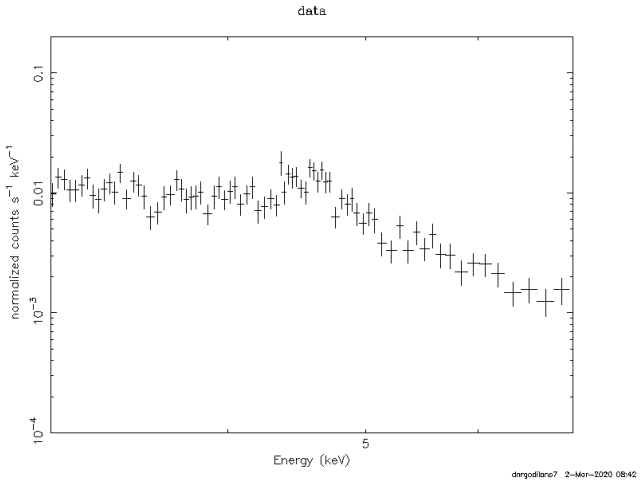
Mytorus for entire

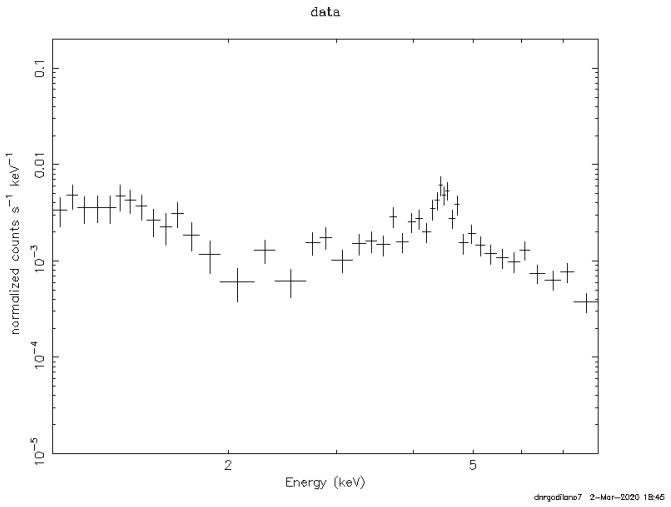
eeuf

Relativistic Reflection

- Reasons and Motivation
- Put models used







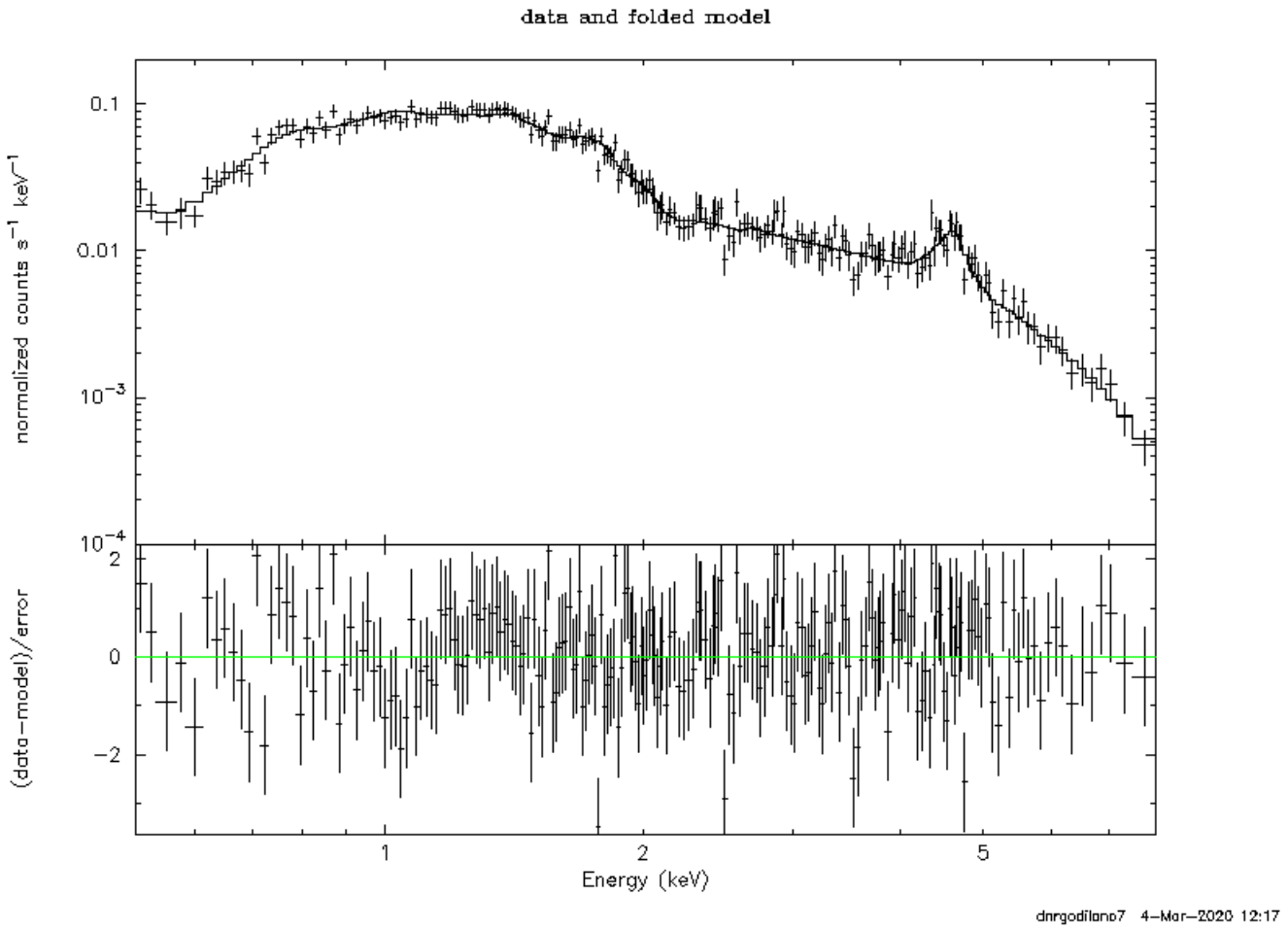
Relativistic Reflection

Reasons and Motivation

Relativistic Reflection

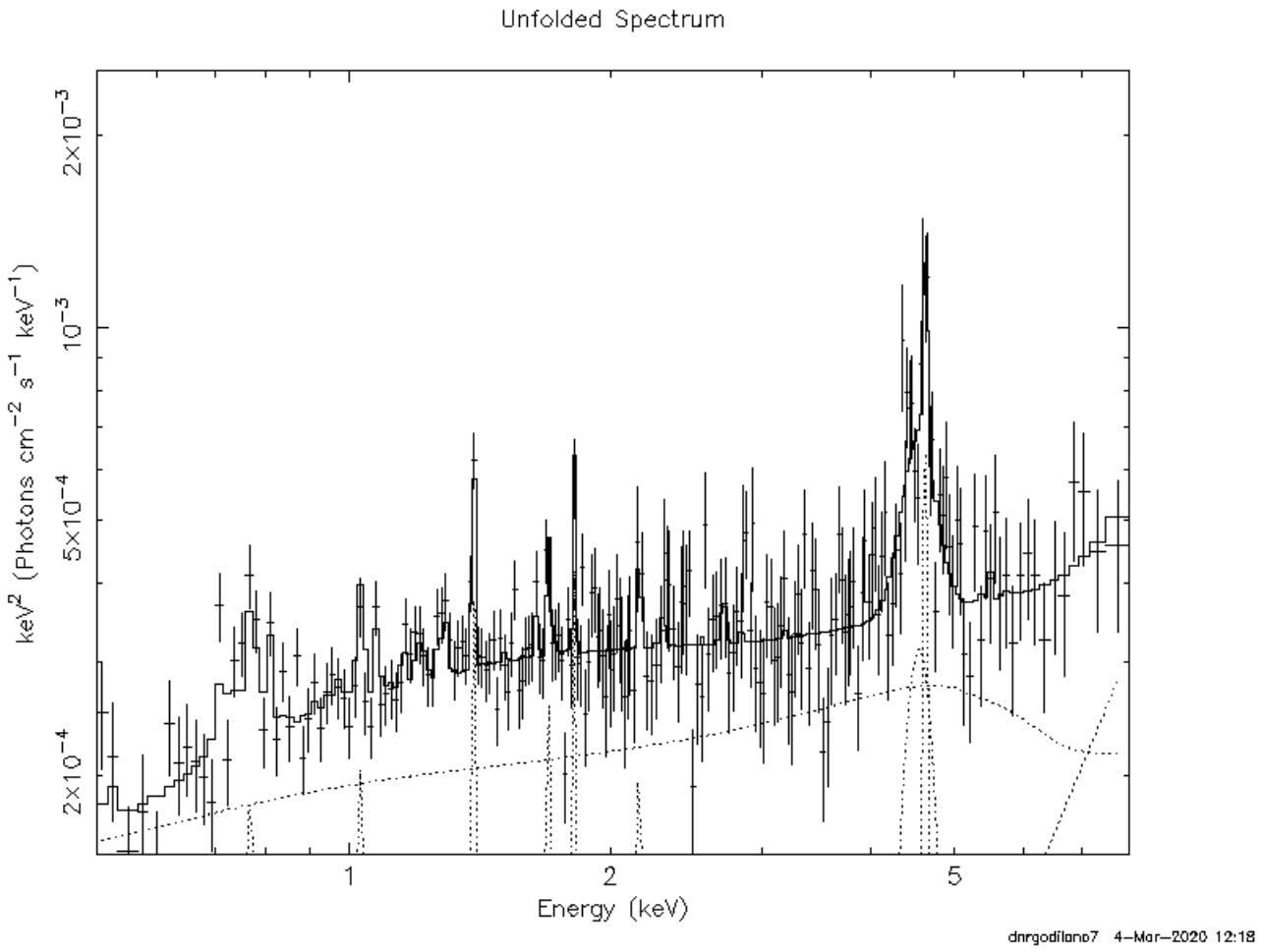
- Reasons and Motivation

Nh	Gamma	Incl Angle	a (spin)	kT (keV)	E-alpha (keV)	EW (eV)	Red-X2	X2/dof
2.06 x 10^21 +/- 1.11	1.67 +/- 2.13	89deg (f)	0.0 (f)	2.22 +/- 0.39	6.53 +/- 0.06	305.40 +/- 74.55	0.96	203/211
2.07 x 10^21 +/- 1.43	1.48 +/- 3.62	28.43 +/- 144.14	0.0 (f)	2.20 +/- 0.43	6.54 +/- 0.06	276.3 +/- 81.5	0.97	202/210
2.02 x 10^21 +/- 1.27	1.43 +/- 2.83	23.98 +/- 231.04	-0.994 +/- 26.65	2.20 +/- 0.45	6.53 +/- 0.07	264.2 +/- 75.8	0.97	202/209



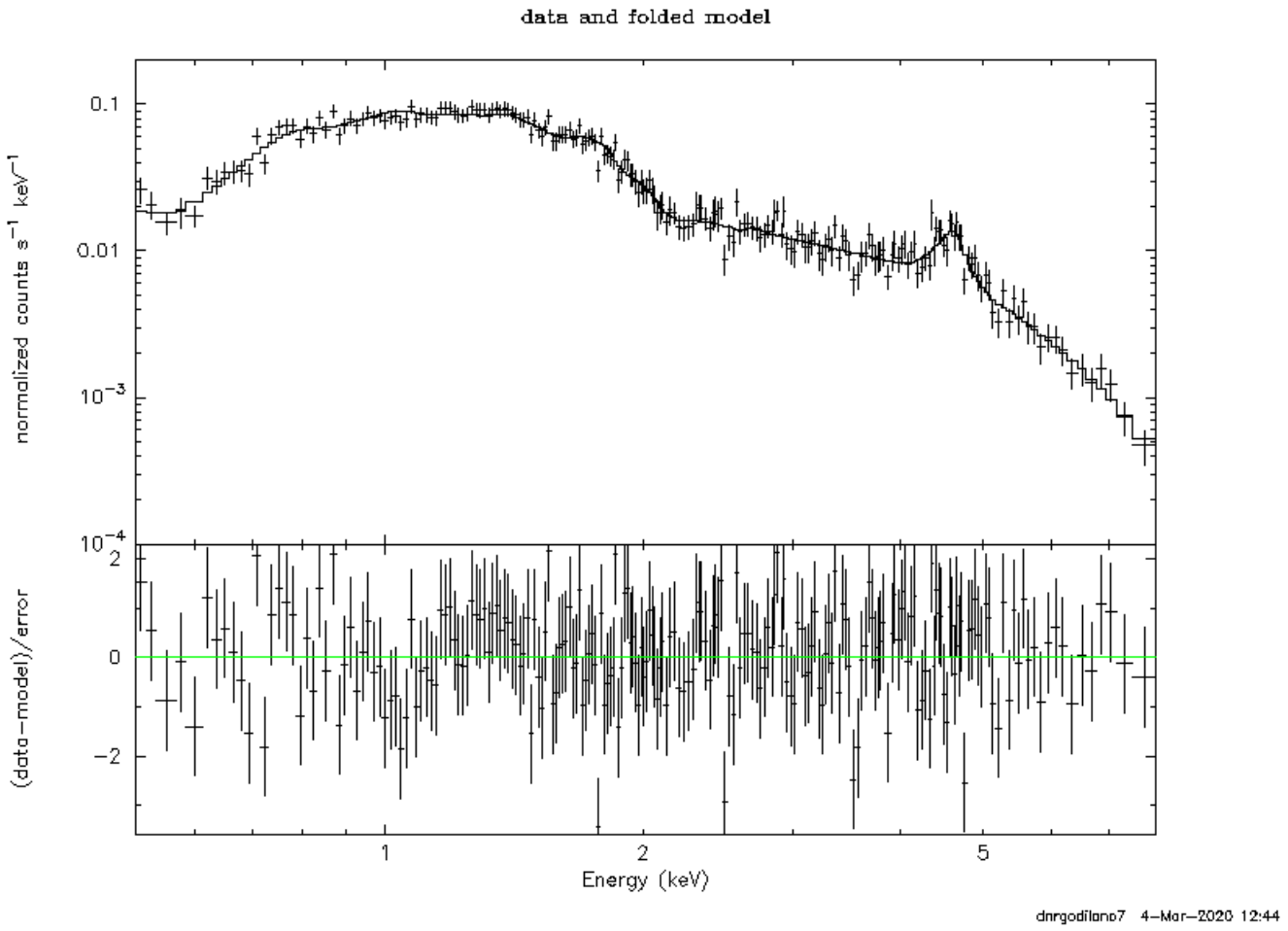
GR-swthaw for entire

eeuf



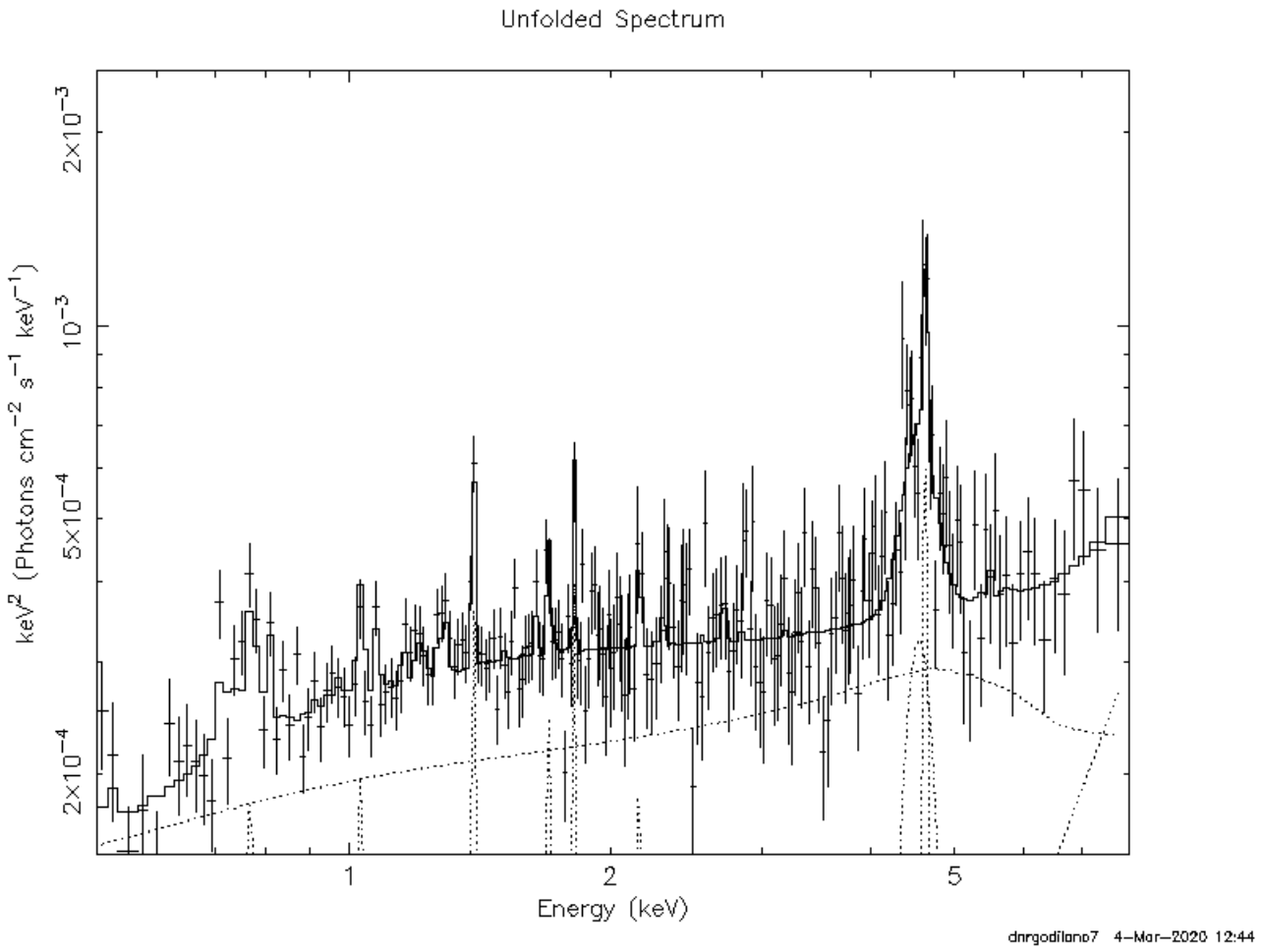
GR-swthaw for entire

eeuf



GR-kerrthaw for entire

eeuf



GR-kerrthaw for entire

eeuf