

Narrow energy-shifted features in XMM-Newton spectra of AGNs

Juan Roa Llamazares

Tutor : Anna Lia Longinotti

24/07/2006

Narrow energy-shifted features in
XMM-Newton spectra of AGNs

1. Introduction

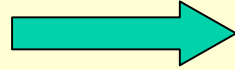
2. Procedure

3. Some results

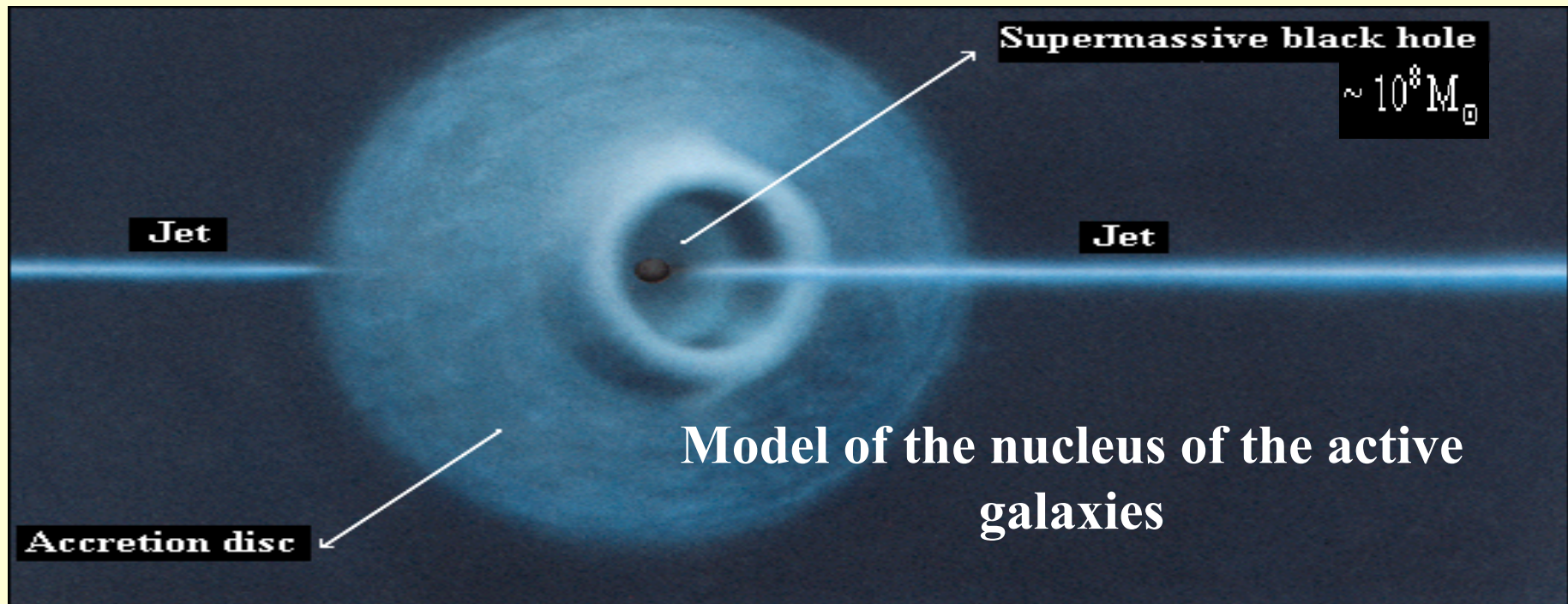
4. Future directions

1. Introduction

**X-ray spectra
(0.1-100 keV)
of AGNs**



The center of a galaxy that is emitting exceptionally large amounts of energy



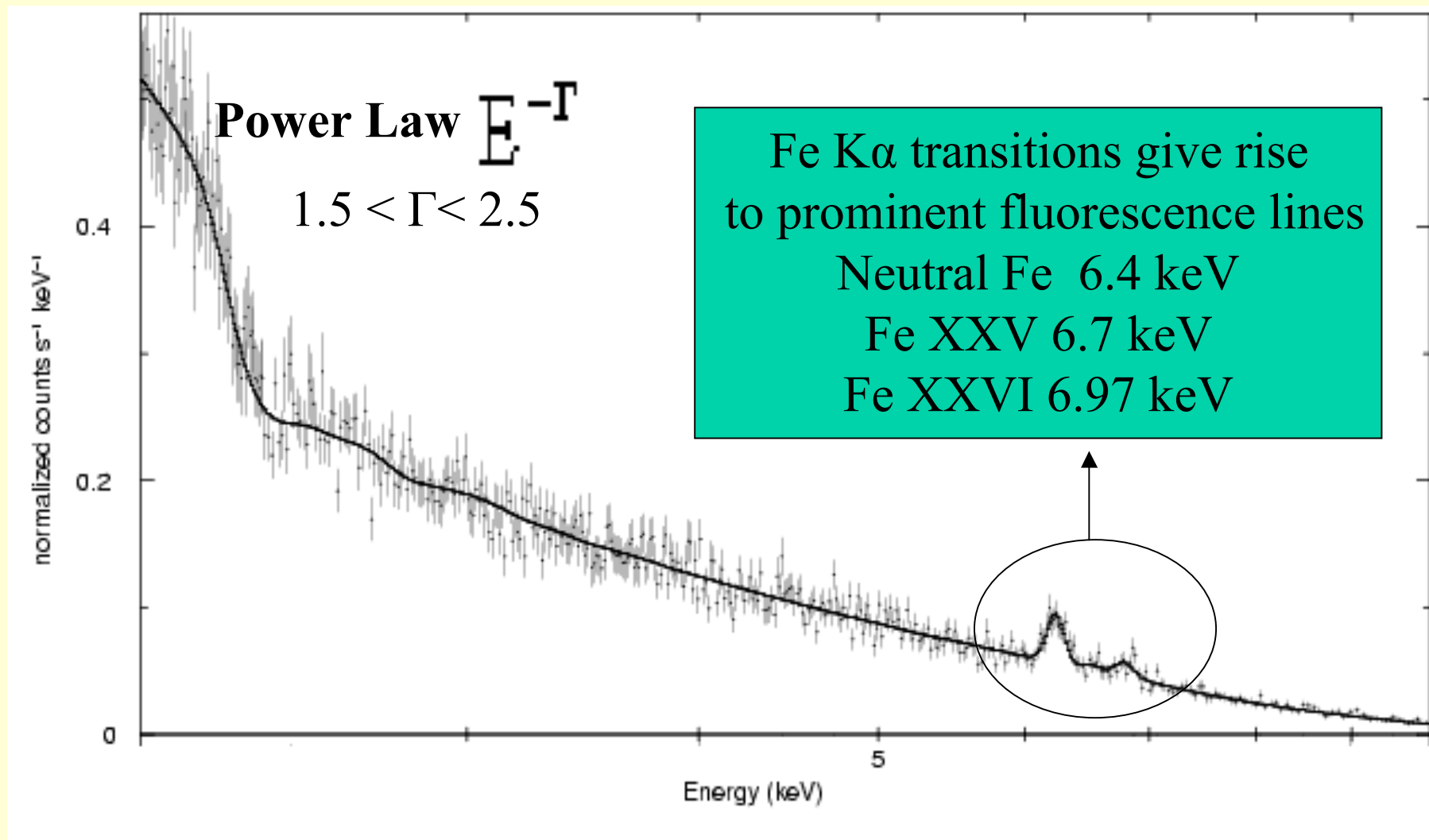
EPIC camera of the XMM-Newton (0.3-10 keV)

24/07/2006

Narrow energy-shifted features in
XMM-Newton spectra of AGNs

1. Introduction

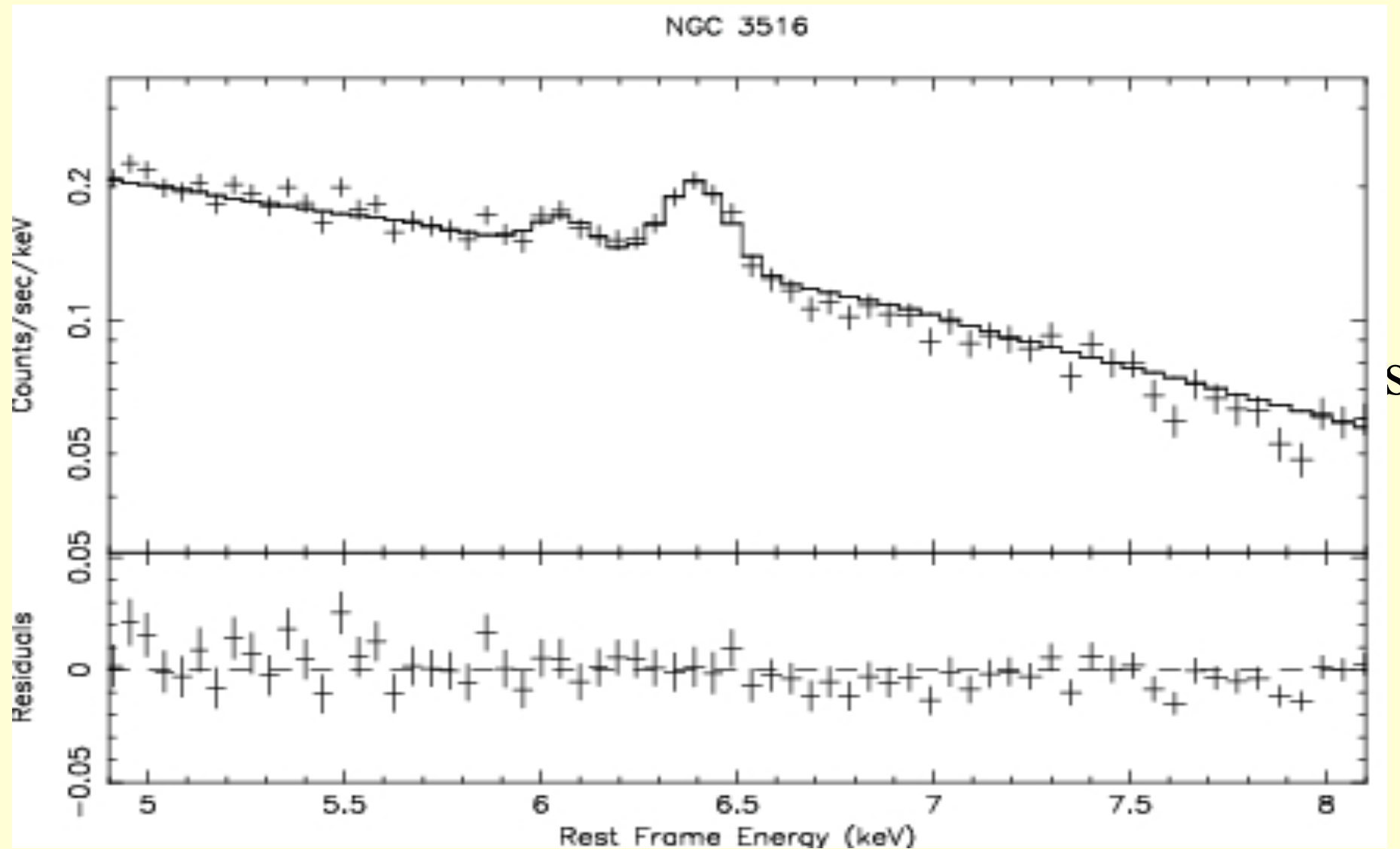
Hard X-ray spectrum of MKN590 (2-10 keV)



24/07/2006

Narrow energy-shifted features in
XMM-Newton spectra of AGNs

1. Introduction



24/07/2006

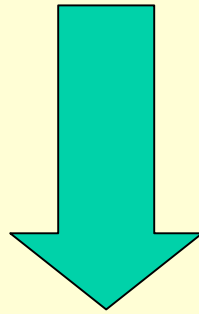
Narrow energy-shifted features in
XMM-Newton spectra of AGNs

1. Introduction

- Some characteristics of the lines
 - Probably transient nature
 - Low significance
 - Signature of BH and gravity
 - Found in individual objects by individual authors
 - NGC3516 (Turner 02, Iwasawa 04)
 - NGC7314 (Yaqoob 2003)
 - Mrk841 (Petrucci 02, Longinotti 04)

1. Introduction

Why are narrow energy-shifted features important?



Because they can provide information about the innermost region in AGNs

1. Introduction

Test the occurrence and significance of narrow energy-shifted features in a large sample of AGNs

- Create a script using
 - tcl
 - tcsh
 - fortran

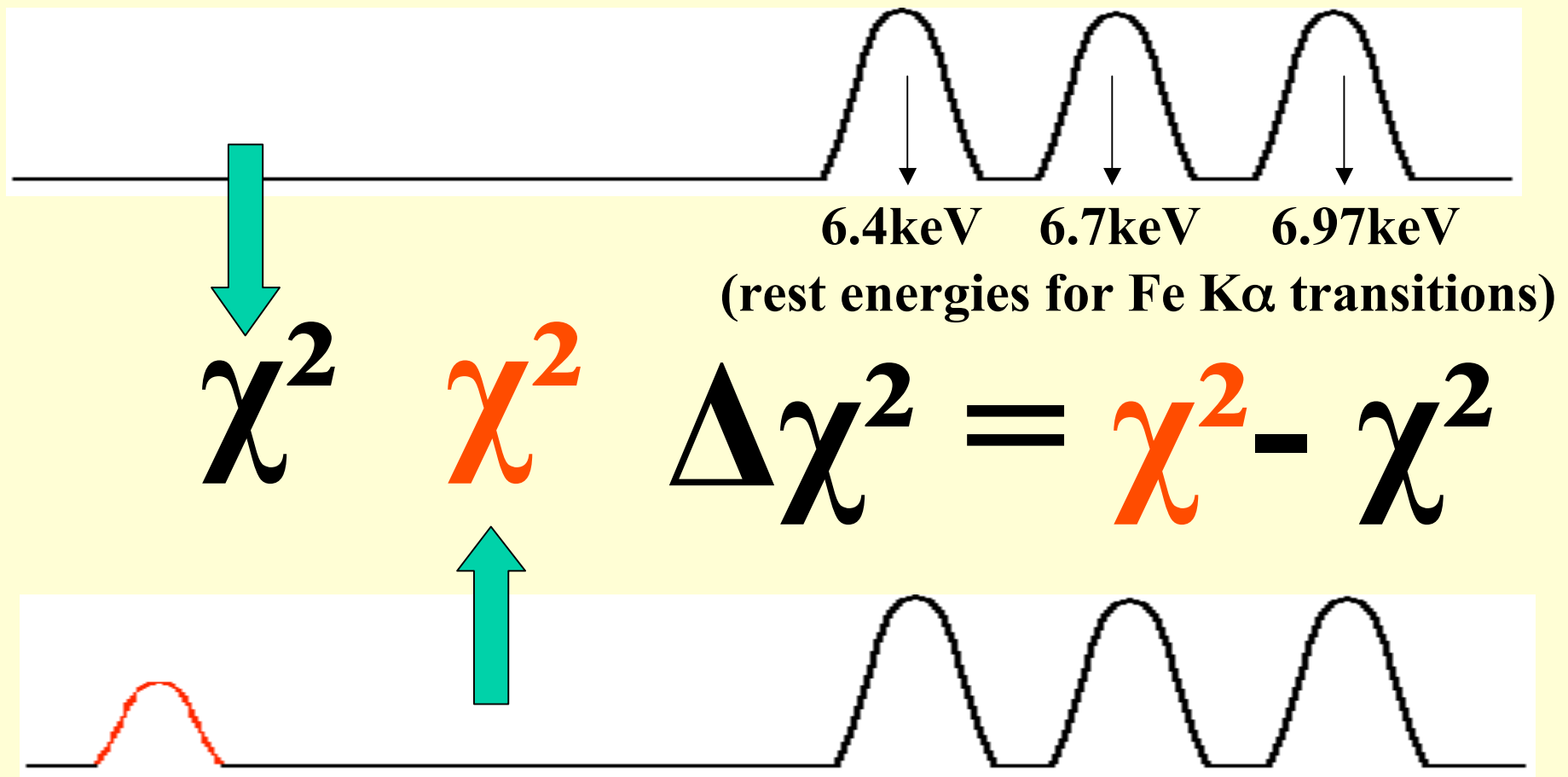
Sample taken from XMM archive
124 spectra
85 sources

- Xspec (X Ray Spectral fitting Package)

2. Procedure

Each 2-10 keV spectrum fitted by a baseline model

Baseline model: Power Law + 3 fixed Fe gaussian lines



Add a gaussian line: Baseline model + **new line ($\sigma = 1$ eV)**

24/07/2006

Narrow energy-shifted features in
XMM-Newton spectra of AGNs

2. Procedure

$\Delta\chi^2 < -9.21$  Threshold of significance 99%

$4 < E < 9$ keV excluding the range between 6.4 and 7 keV



Best fit model: Baseline model + N gaussian lines ($\sigma = 1$ eV)

2. Procedure

Check the significance for each N line
test through Monte Carlo simulations (10^4 realizations).

$$y = f(x) + u(x)$$

model

random term

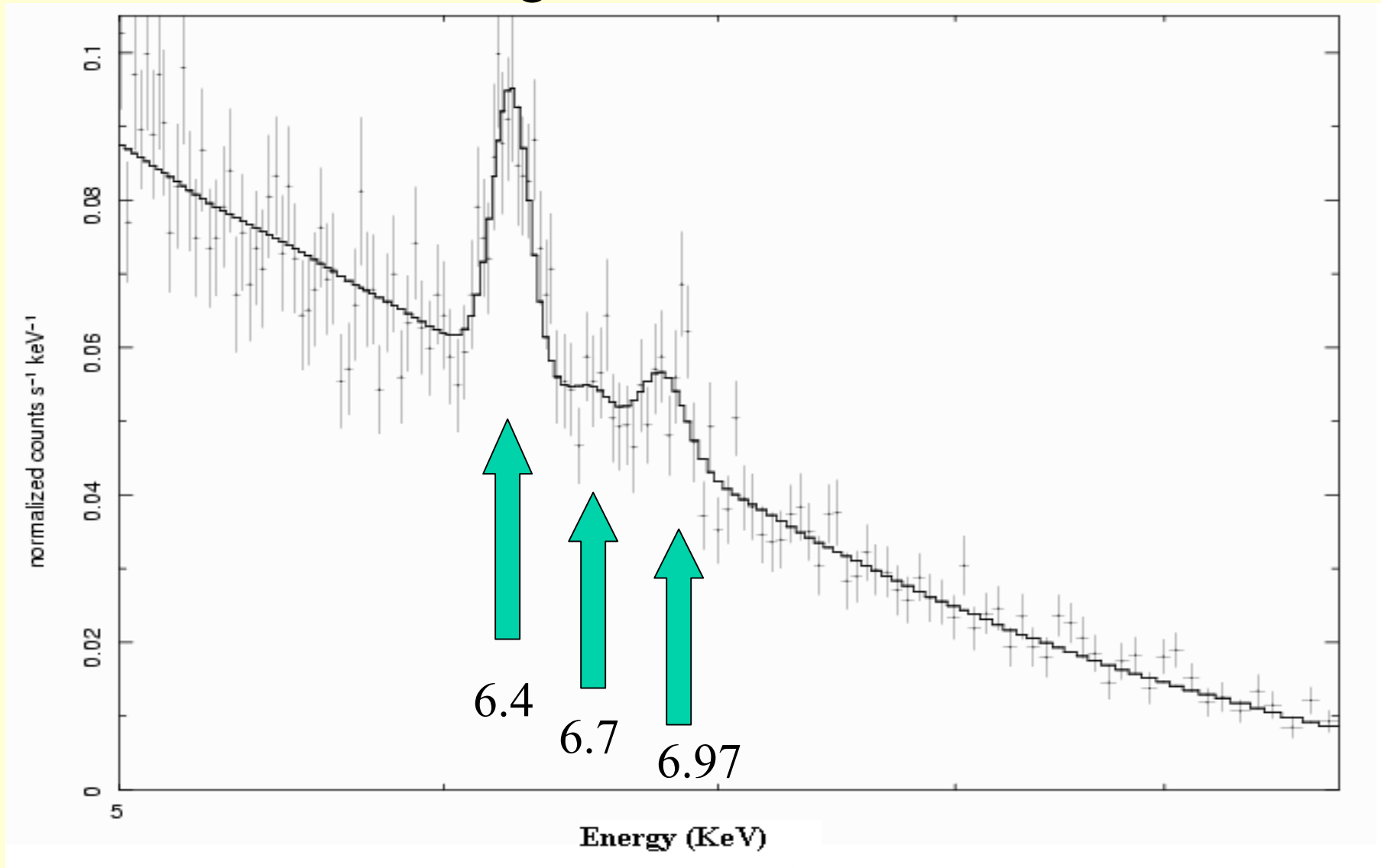
best fit model excluding
the line to be tested

Poisson Noise

We are going to check if the line is significant or
is caused by Poisson noise

3. Some results

- MRK 590: No significant lines

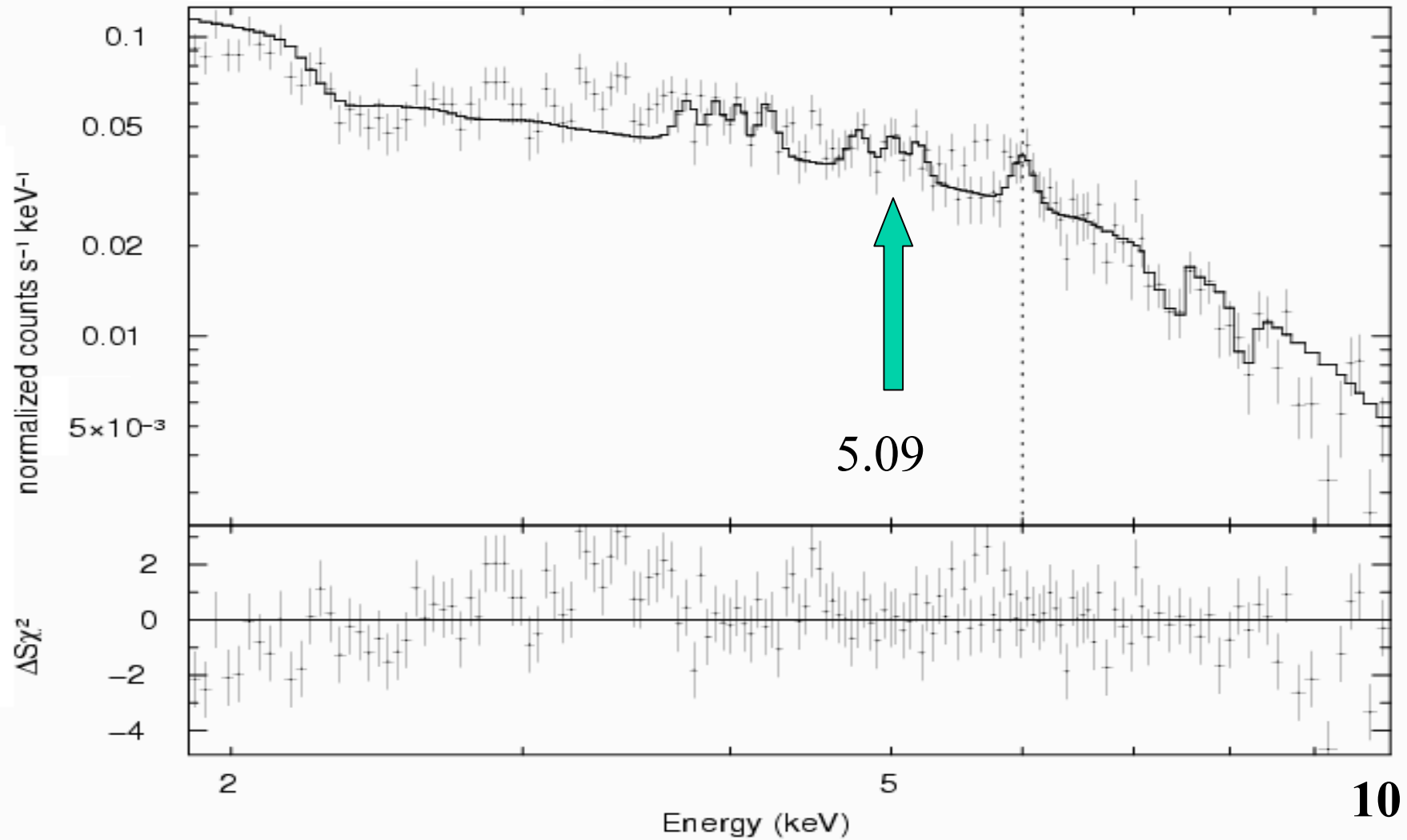


24/07/2006

Narrow energy-shifted features in
XMM-Newton spectra of AGNs

3. Some results

- MKN 304: Significant line at 5.09 keV



24/07/2006

Narrow energy-shifted features in
XMM-Newton spectra of AGNs

4. Future directions

- **Improve the script**
- **Put the results in an efficient way:**
 - **Create a data base**
 - **Create a friendly interface**
- **Test varying the baseline model**