A study of gamma-ray selected AGN with INTEGRAL

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INTRODUCTION

- High luminosity AGN (Quasars and Blazars) almost ignored by INTEGRAL.
- Most of them are at the limit of INTEGRAL sensitivity.
- Aim: Measure their spectra to use the results for an INTEGRAL proposal.

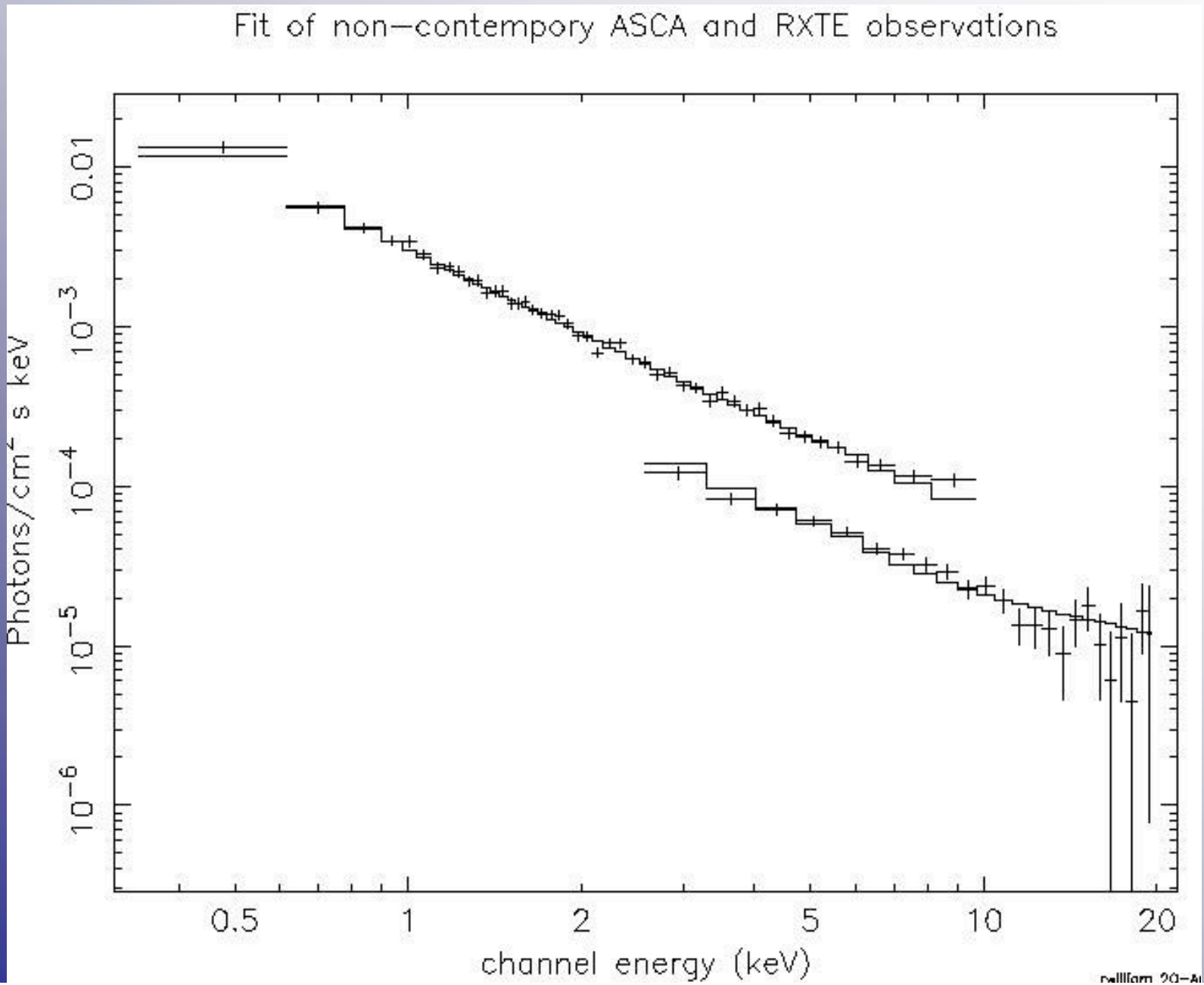
Two projects

- PG 1416-129:
  - Highest luminosity Radio Quiet Quasar listed in the 1st INTEGRAL AGN Catalogue.
- MeV Selected Blazars:
  - Study of the small number of blazars emitting in the 1-30 MeV band.
  - Listed in the 1st COMPTEL Source Catalogue.

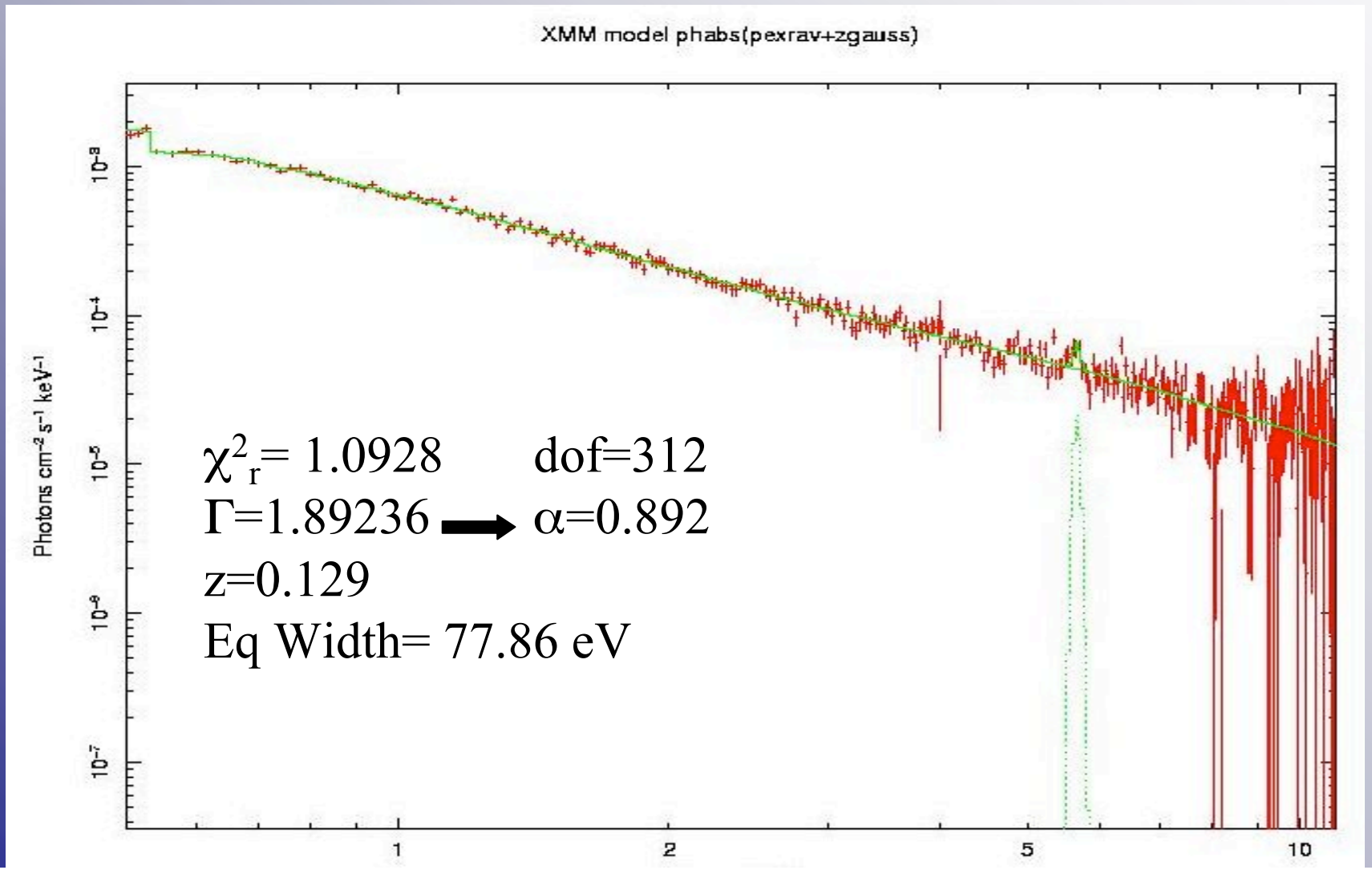
PG 1416-129

- Most of Radio Quiet Quasars are too faint except this one.
- Hard X-ray spectra. Properties unknown.
- Previous researches → Complex and variable spectrum in 2-10 keV band.

Instrument	*Date*	*Energy (keV)*	*α Spectral index*	*Flux (erg $cm^{-2}s^{-1}$)*
Ginga	Feb 1988	2.0-18	0.2 ± 0.1	0.7×10^{-11}
Ginga	Jan 1991	2.0-18	0.5 ± 0.1	0.7×10^{-11}
ROSAT	Jan 1992	0.1-2.4	1.2 ± 0.15	1.2×10^{-11}
ASCA	Jul 1994	0.5-10	0.78 ± 0.02	1.4×10^{-11}
RXTE	Aug 1998	2.5-20.0	0.38 ± 0.06	0.6×10^{-11}
XMM	Jul 2004	2.0-10	0.54 ± 0.02	1.3×10^{-11}
INTEGRAL	Jun-Aug 2003	2.0-100	0.77 ± 0.45	14.1×10^{-11}

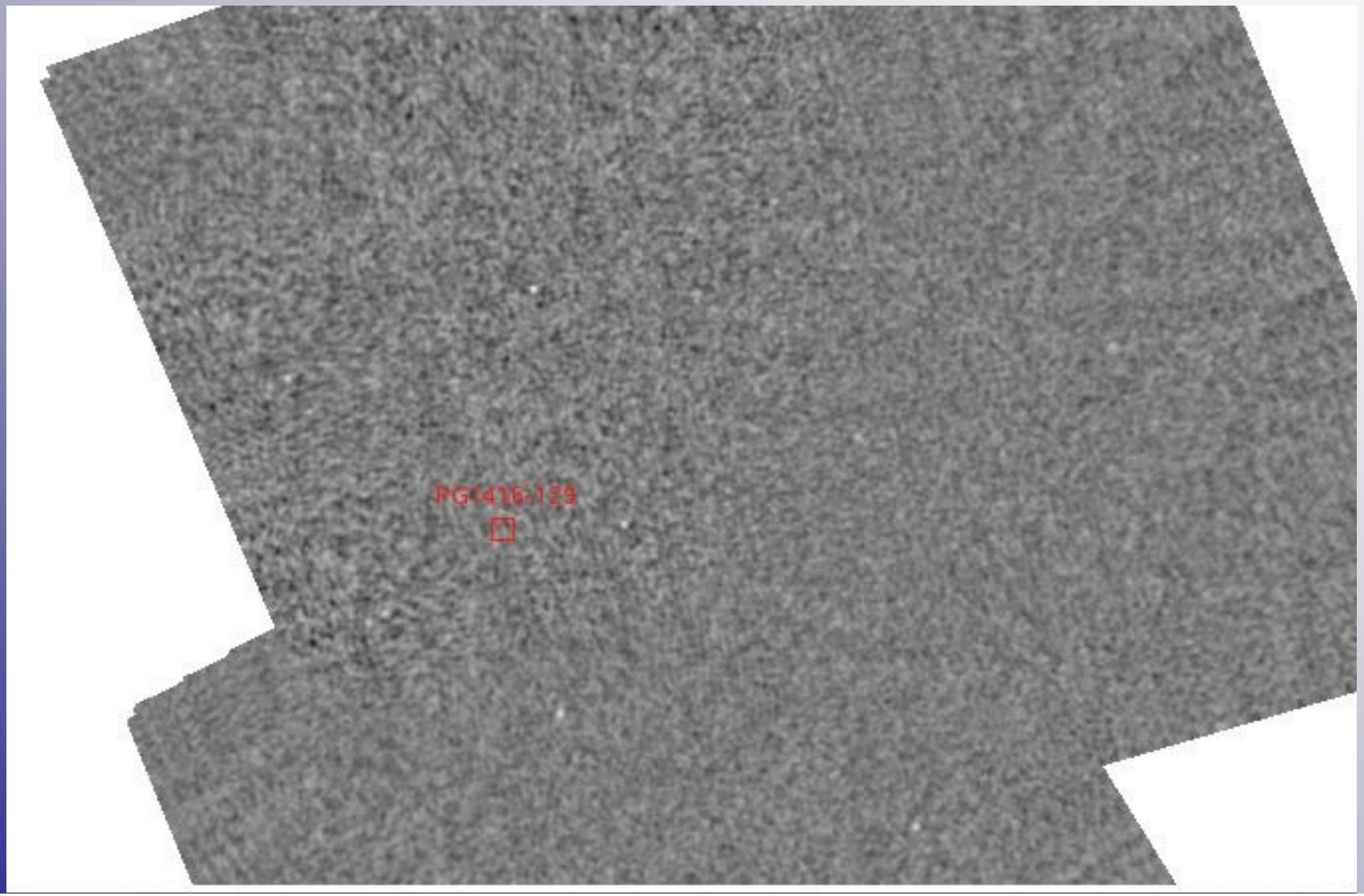

Fit of non–contempory ASCA and RXTE observations
Photons/cm² s keV
0.01
10⁻³
10⁻⁴
10⁻⁵
10⁻⁶
0.5
1
2
5
10
20
channel energy (keV)

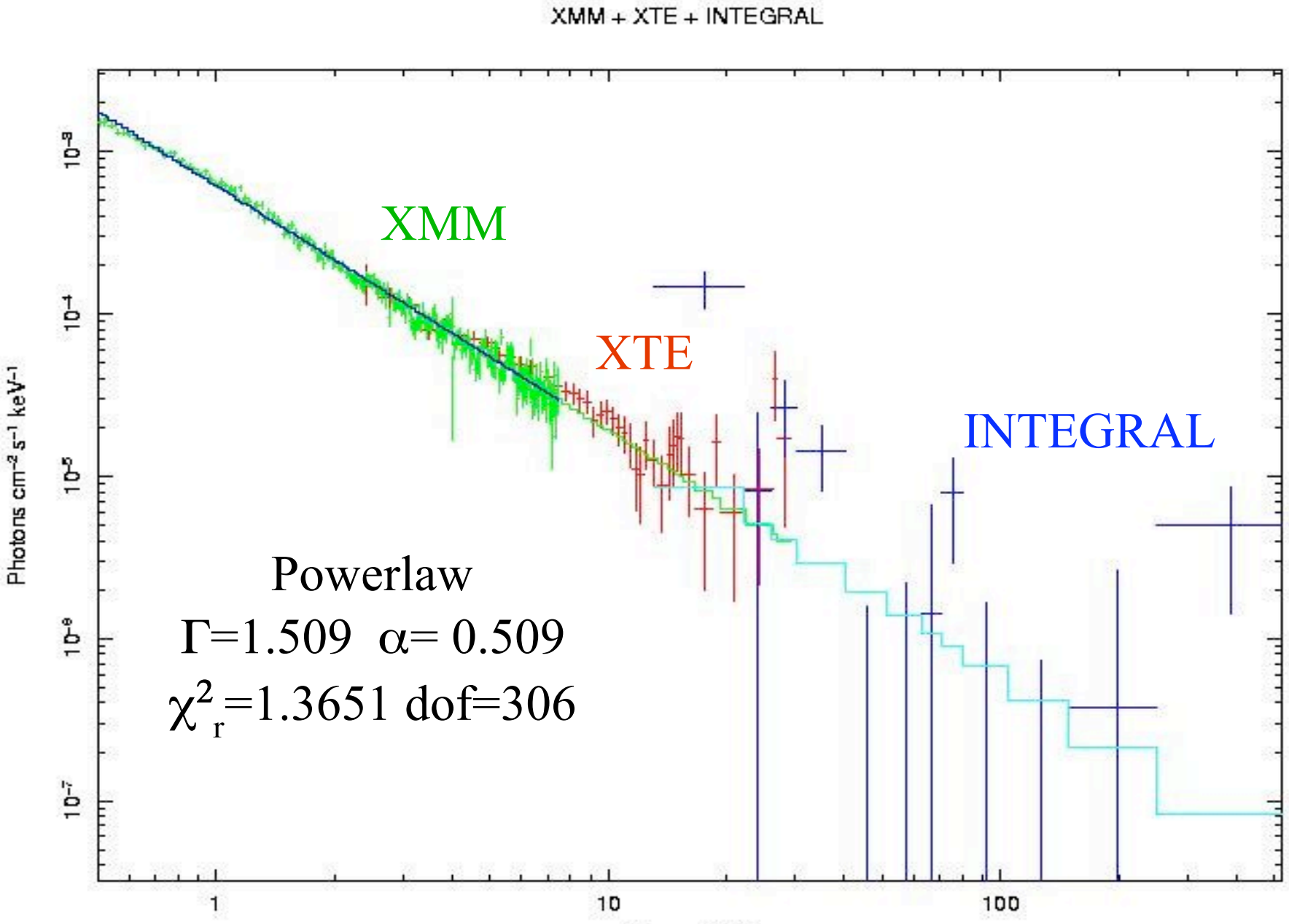
- Fit from XMM data using a combinated model.



- Conclusions:
  - The absortion Fe line is broadened.
  - Bump could be due by reflection.
  - PG 1416-129 is one of the most luminosity objects whit this properties.

It's clearly not detected in the INTEGRAL data in this analysis.




XMM + XTE + INTEGRAL
XMM
XTE
INTEGRAL
Powerlaw
Γ=1.509 α= 0.509
χ²r=1.3651 dof=306
Photons cm⁻² s⁻¹ keV⁻¹
10⁻³
10⁻⁴
10⁻⁵
10⁻⁶
10⁻⁷
1
10
100

MeV Selected Blazars

- Objects very bright on medium energy γ-Ray but unremarkable on X-Ray and unstudied with INTEGRAL (hard X-ray band)

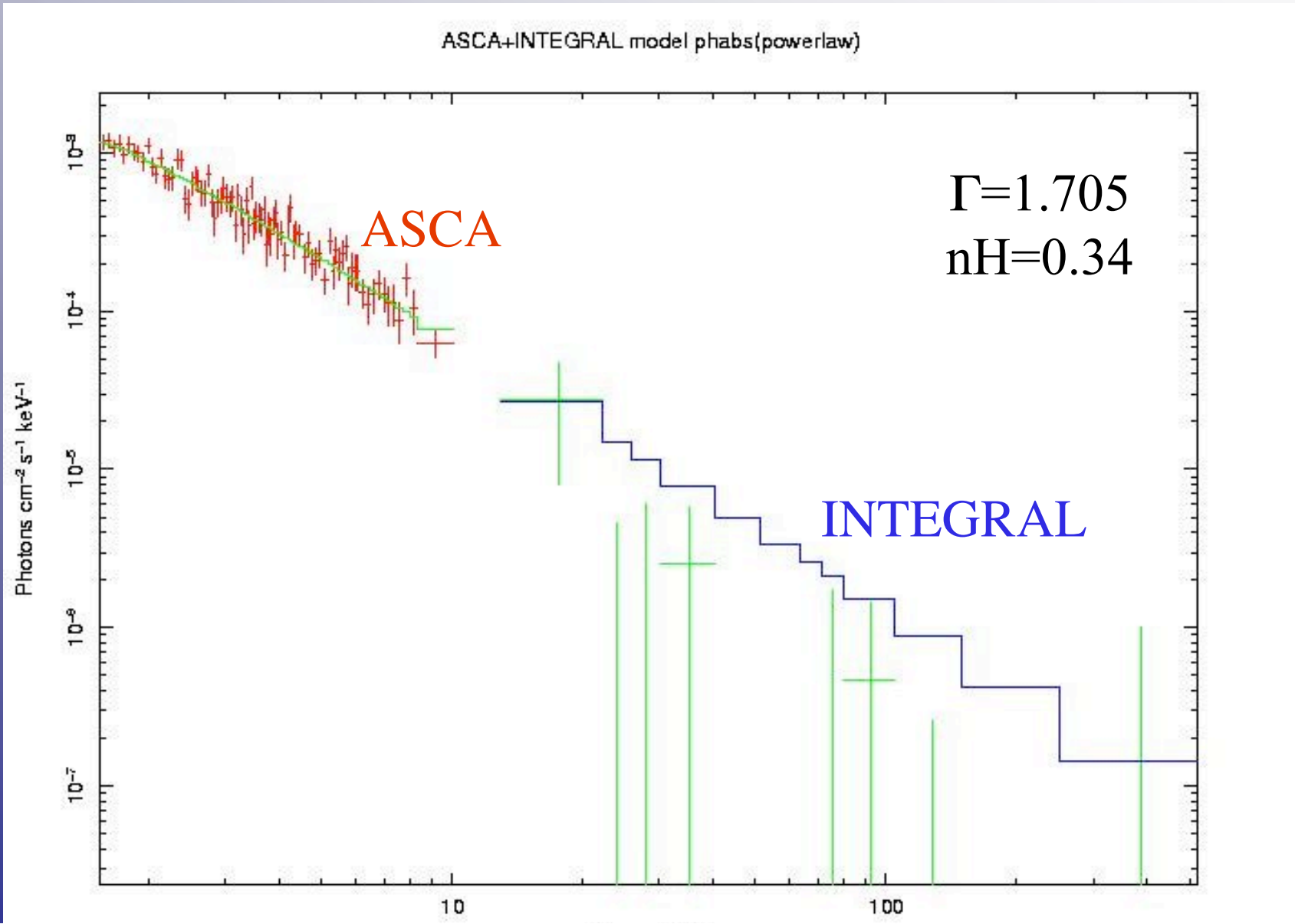
- Scientific aims:
  - Determine if the hard X-ray spectral properties of MeV blazars differ from other AGN.
  - Determine if any of the objects are bright enough for a dedicated INTEGRAL observation.

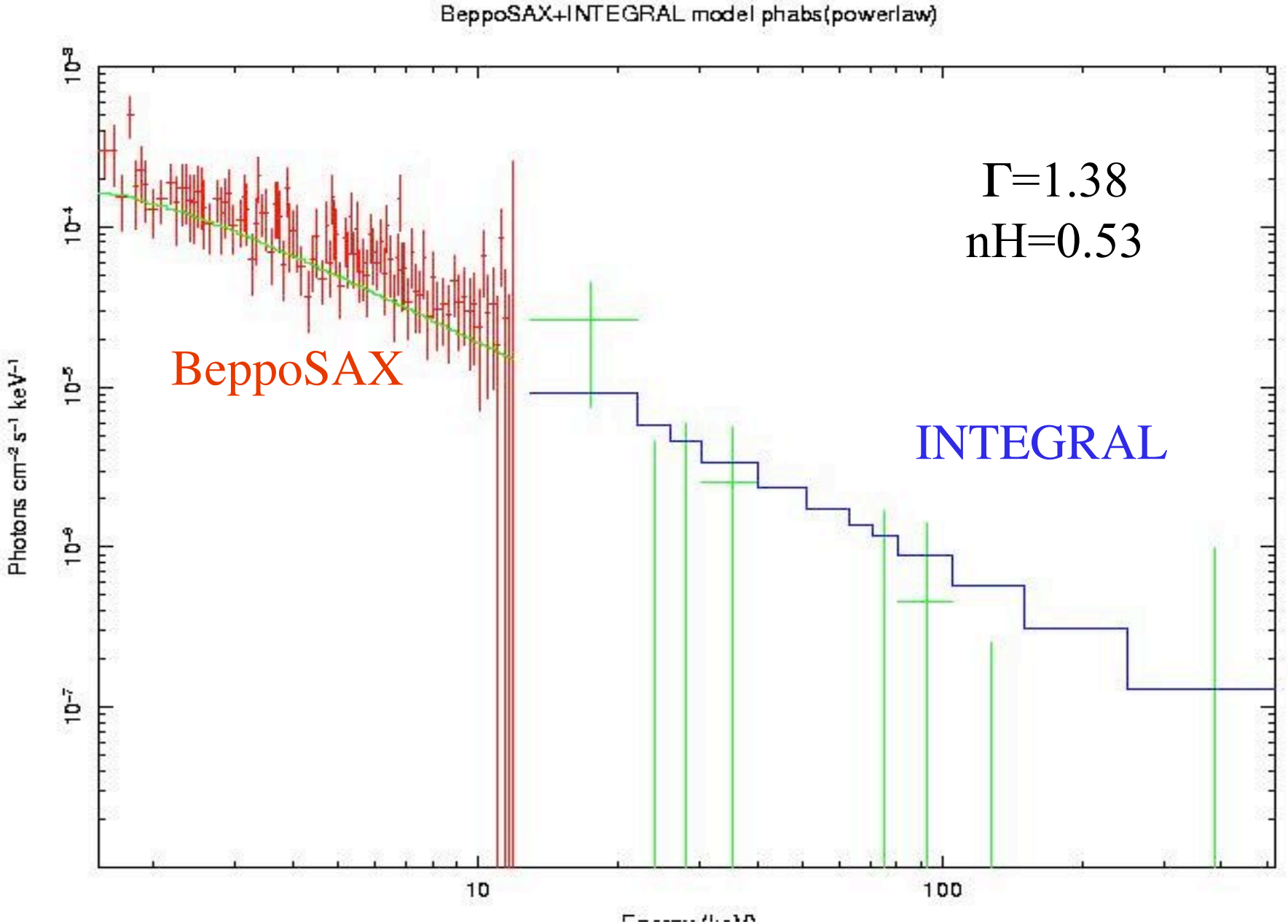
1st source: PKS0528+134

- It is high variable in the MeV band.
- Brightest observed MeV flux, so remarkable.
- It's near the Crab nebula → Large amount of data

- It's supposed to be seen but We don't do it!

- The spectrum → We may use more data.




BeppoSAX+INTEGRAL model phabs(powerlaw)
Photons cm⁻² s⁻¹ keV⁻¹
10⁻³
10⁻⁴
10⁻⁵
10⁻⁶
10⁻⁷
10
100
Γ=1.38
nH=0.53
BeppoSAX
INTEGRAL

- Table fluxes-significances → Choose the next source.

Source	Flux 2-10·10^{-11} erg/cm^{2}s	Flux 2-10 photons	Flux 20-100 photons	Exposure ks	Significance
PKS0528	1,3270	0,00188370	0,00038906	993,65	**12,065561**
PKS2230	0,2890	0,00041024	0,00008473	208,00	**1,2022177**
3C454.3	1.1000	0,09387271	0,01938850	208,00	**4.5760**
3C273	17,5000	0,02484156	0,00513078	191,80	**69,907200**
	11,7000	0,01660836	0,00343030	58,23	**25,752523**
PKS0208	0,8330	0,00118246	0,00024423	55,00	**1,7819463**
	0,2190	0,00031087	0,00006421	92,00	**0,60591376**
3C279	1,4600	0,00207250	0,00042805	178,31	**5,623369**
	0,5990	0,00085029	0,00017562	139,19	**2,0384133**
PKS1622	1,2370	0,00175594	0,00036267	196,2	**4,9977593**
PKS1222	5,2990	0,00752202	0,00155360	100,00	**15,284577**

FUTURE

- Write up X-Ray properties of PG1416-129.
- Study the rest of sources looking at the table to choose the best one to continue.
- Write the proposal if it's possible.
- Lot of work to do.