

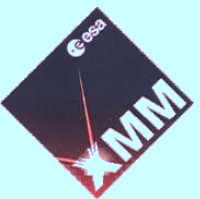
BEATRIZ MINGO FERNANDEZ

Tutor: Andy Pollock

ESAC TRAINEE PROJECT 2007

GAS ABSORPTION LINES ALONG THE LINE OF SIGHT TO MARKARIAN 421

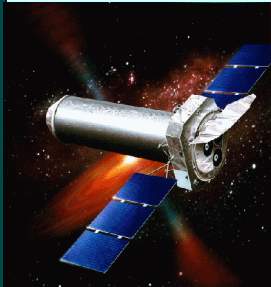
PROJECT SUPPORTED BY THE ESAC FACULTY



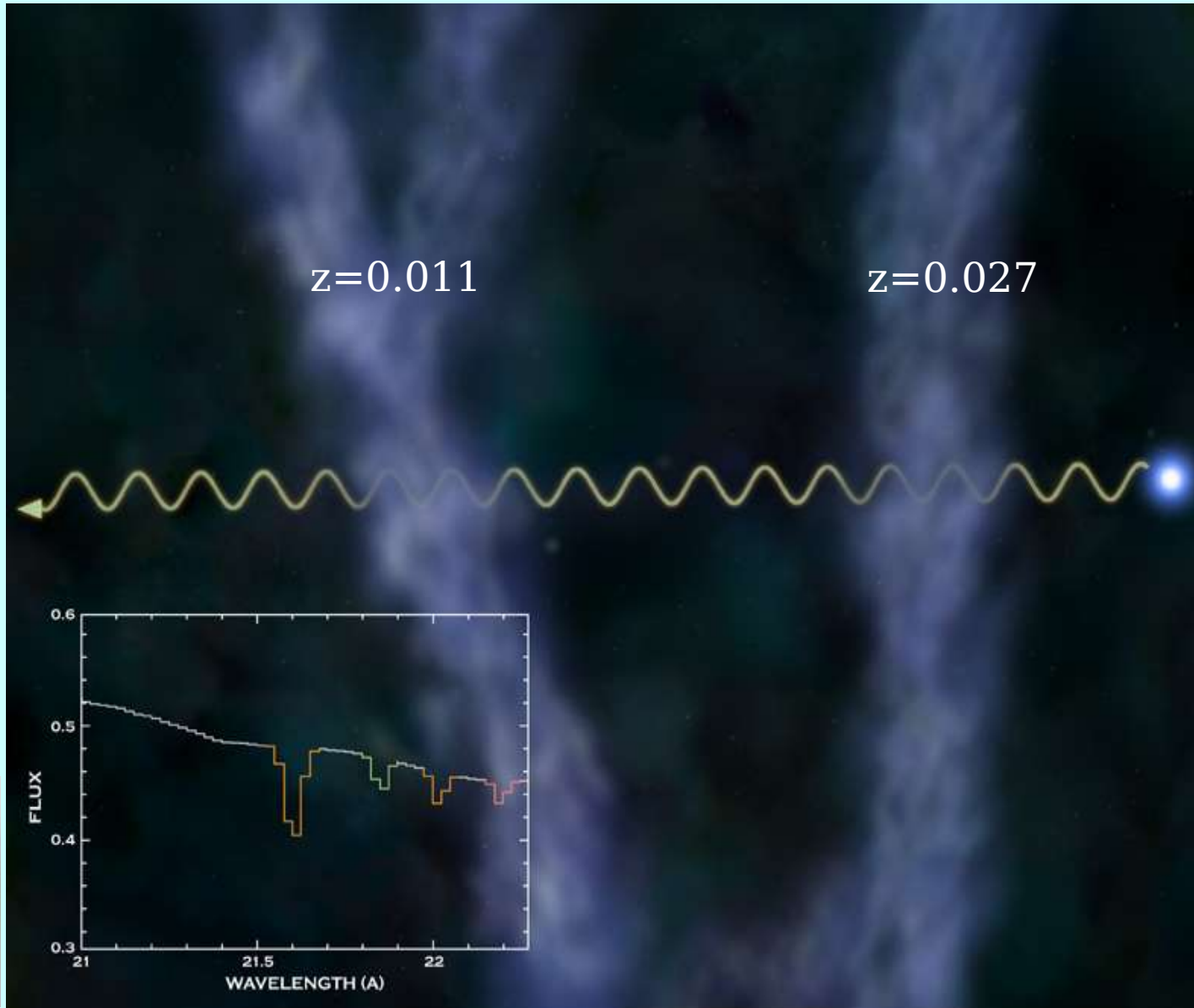
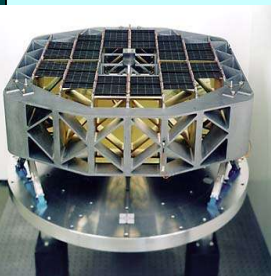
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Absorption from the IGM and the ISM

XMM
Newton



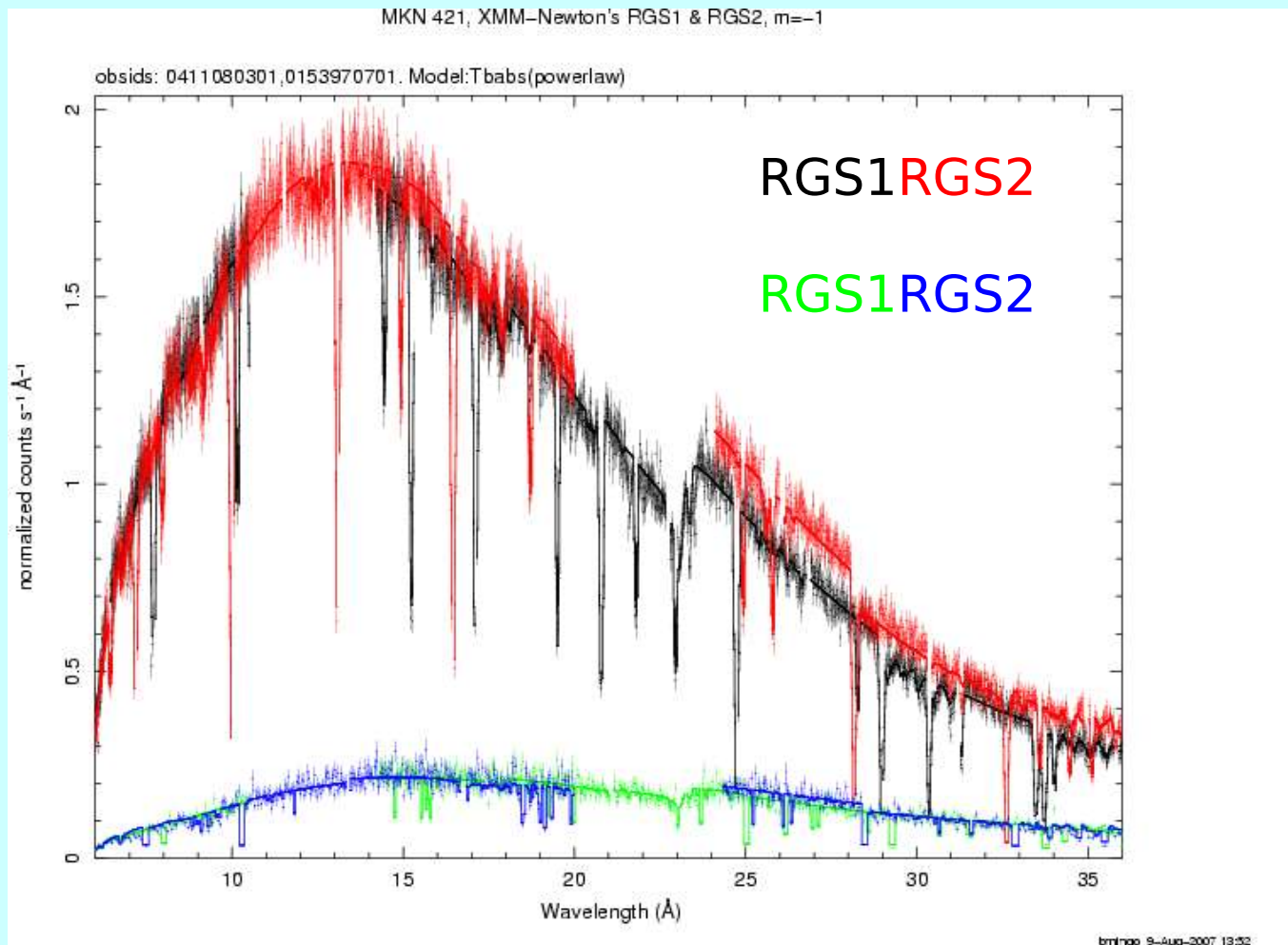
RGS



MKN 421
 $z=0.031$

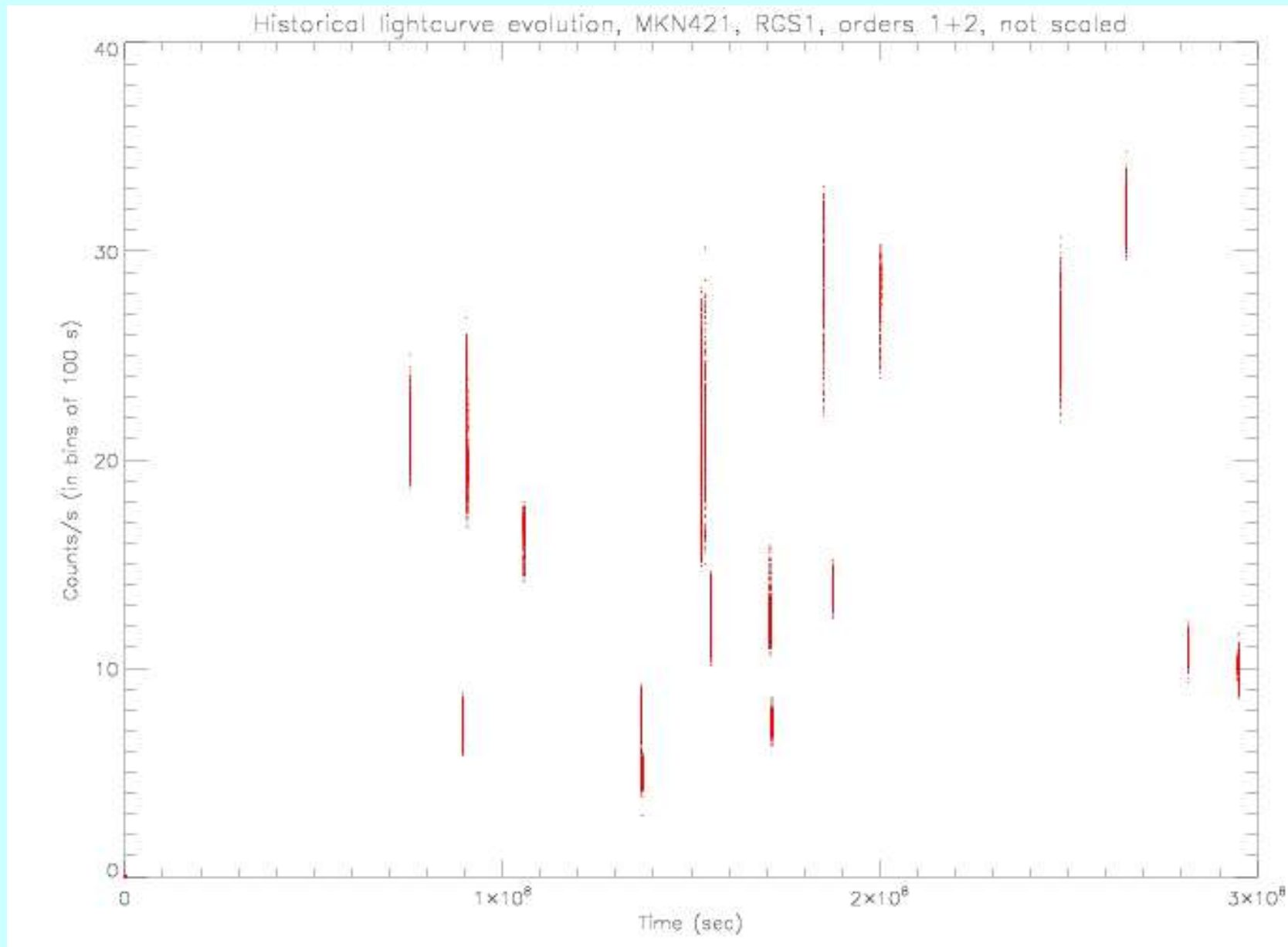


XSPEC's View

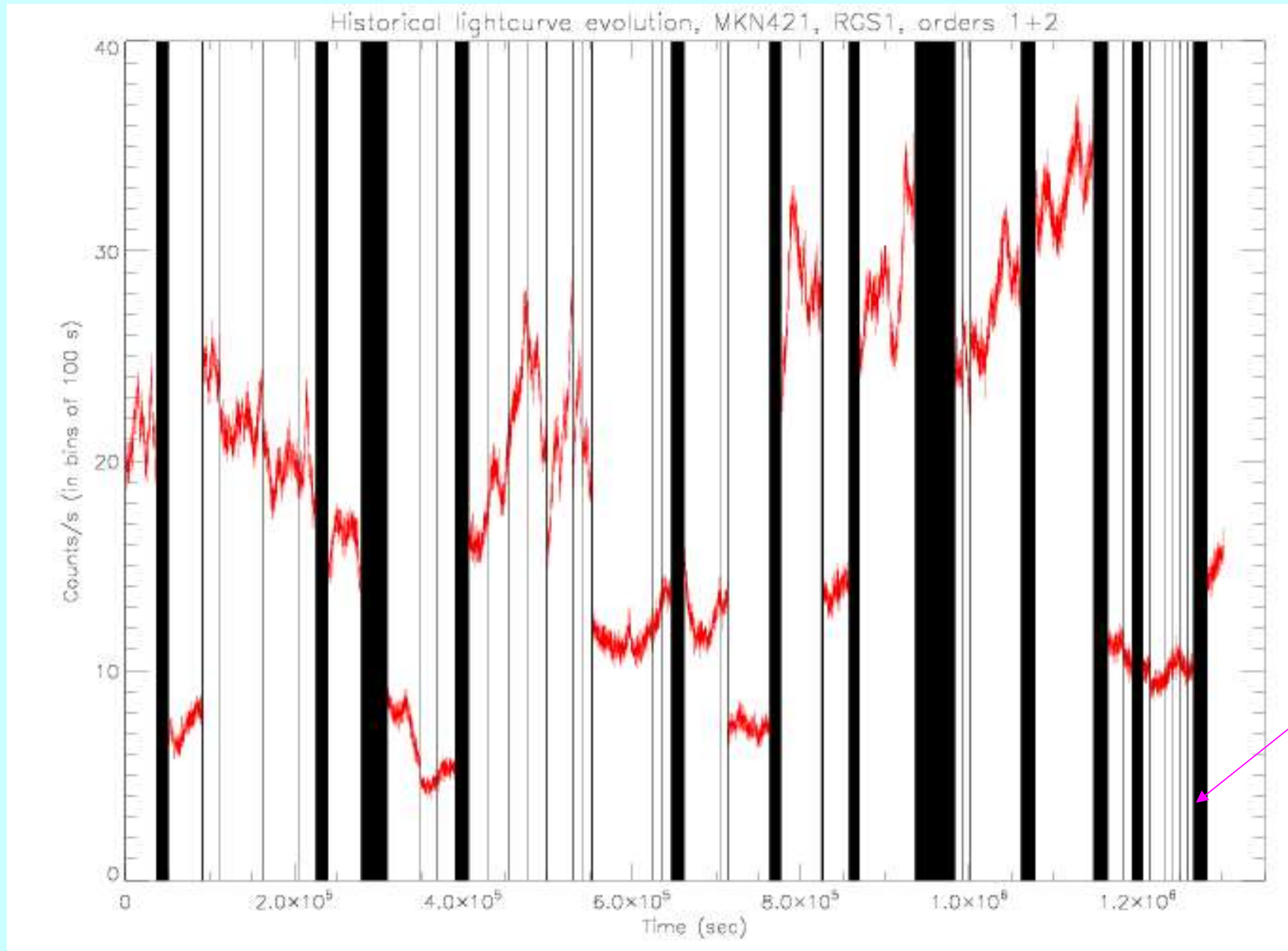


- RGS1,RGS2, order 1
- Absorption lines are not evident in a single spectrum
- We need a combined spectrum to improve the noise/signal and eliminate factual bad features.
- 39 observations available, 1134 ksec

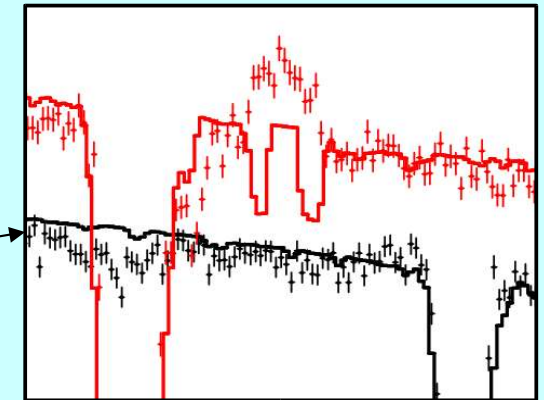
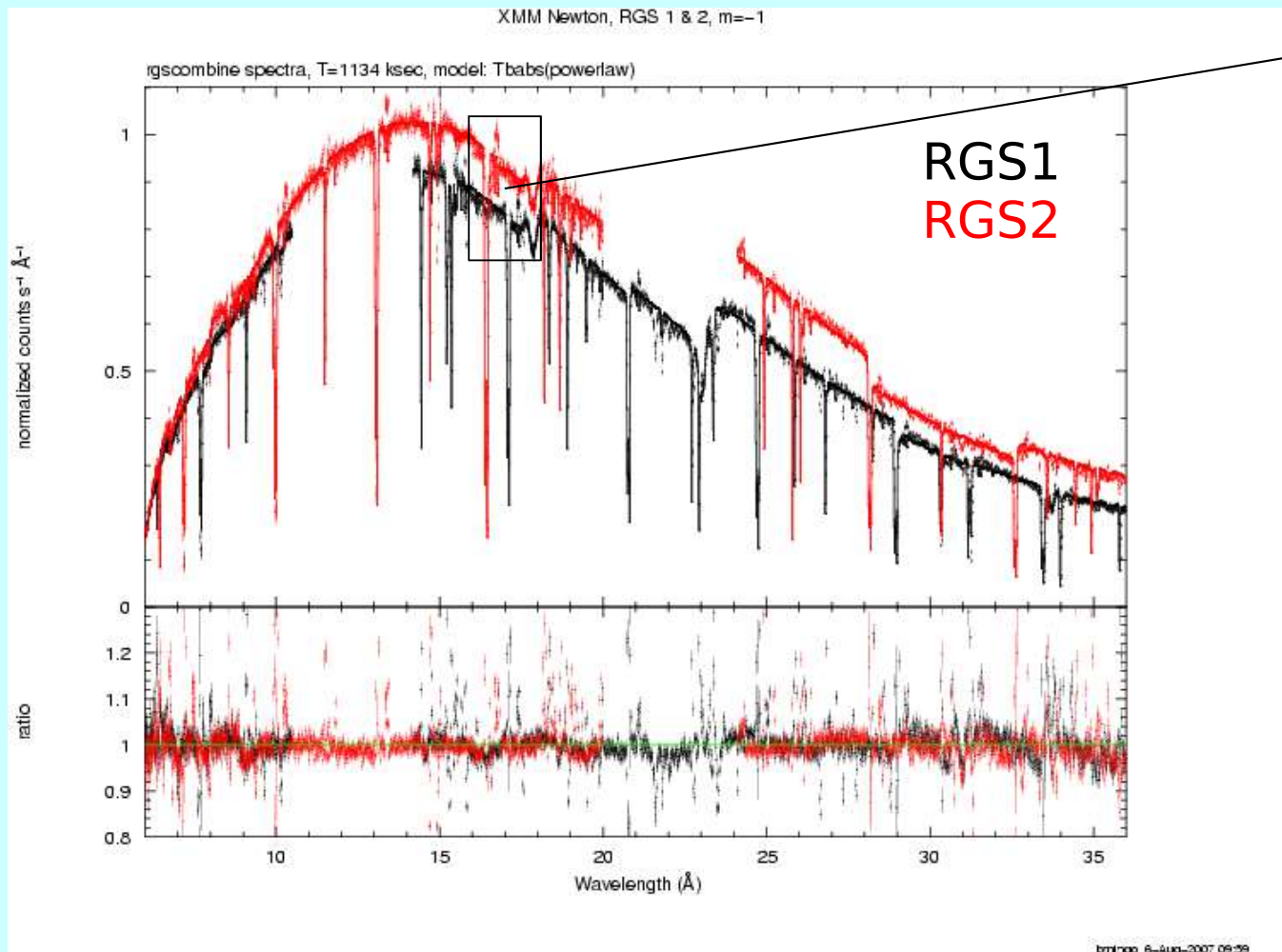
Variability in MKN 421



Variability in MKN 421



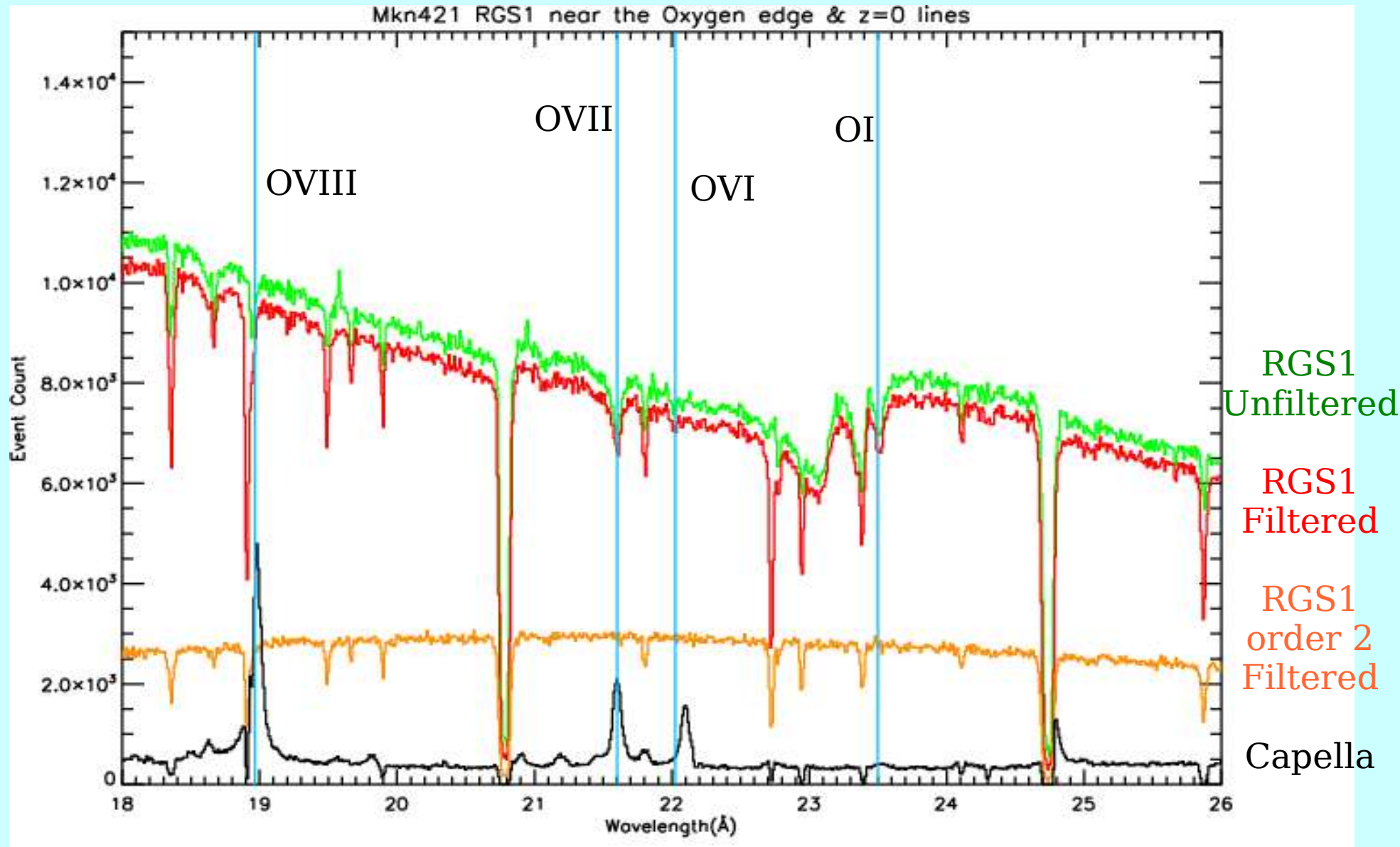
Gaps:
1/1000
of their
real size



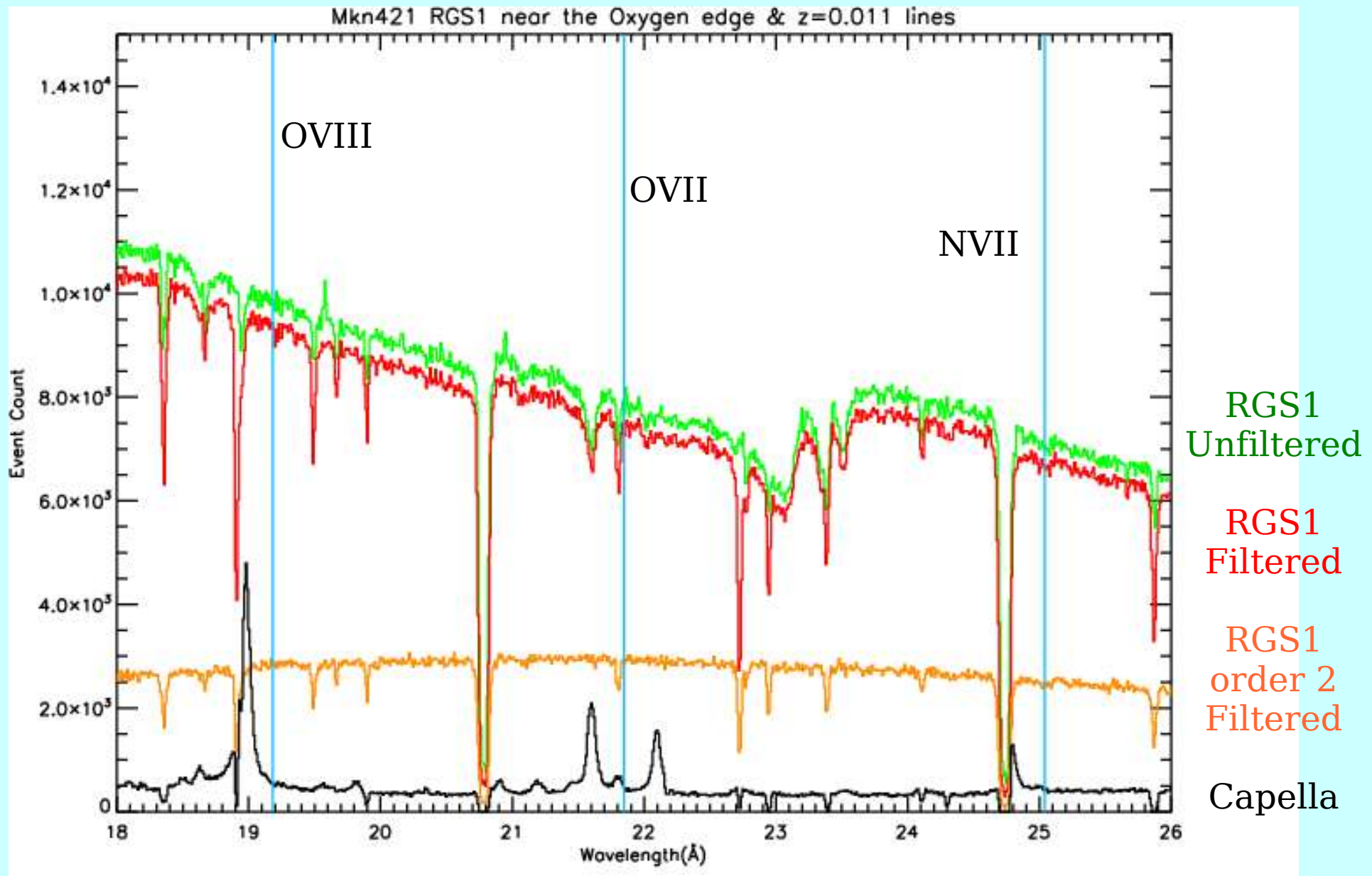
- There is a different grid for each spectrum
- rgscombine doesn't handle it properly
- Problems with offsets and effective areas

- We need a uniform grid for all RGS spectra.
 - Aitor is working on it!
- We can do some basic analysis with IDL
 - Many features are evident in the spectra even without tools like XSPEC.
 - Some interesting features turn up when plotting the spectra in a uniform wavelength grid with IDL

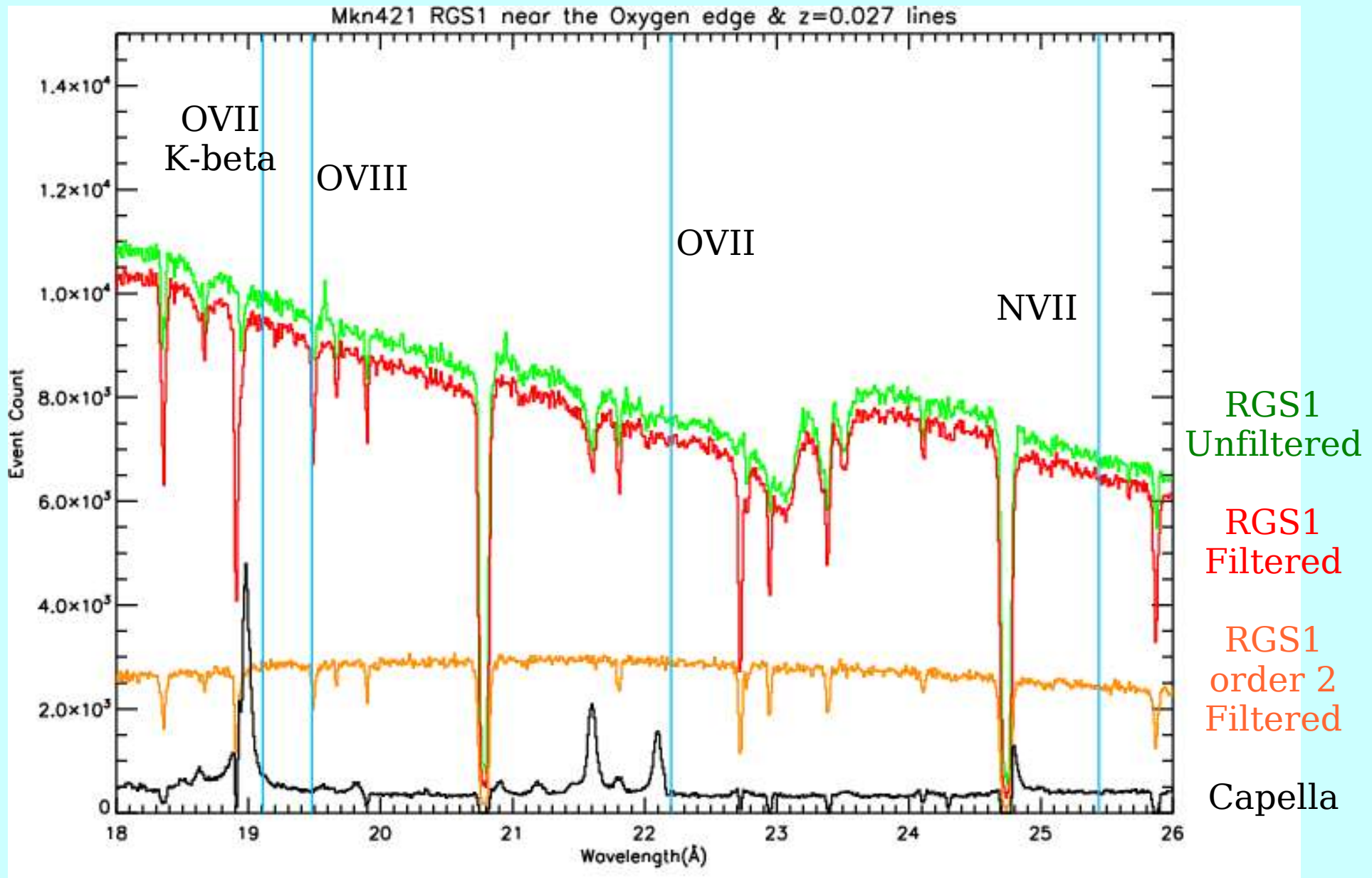
ISM lines in MKN 421



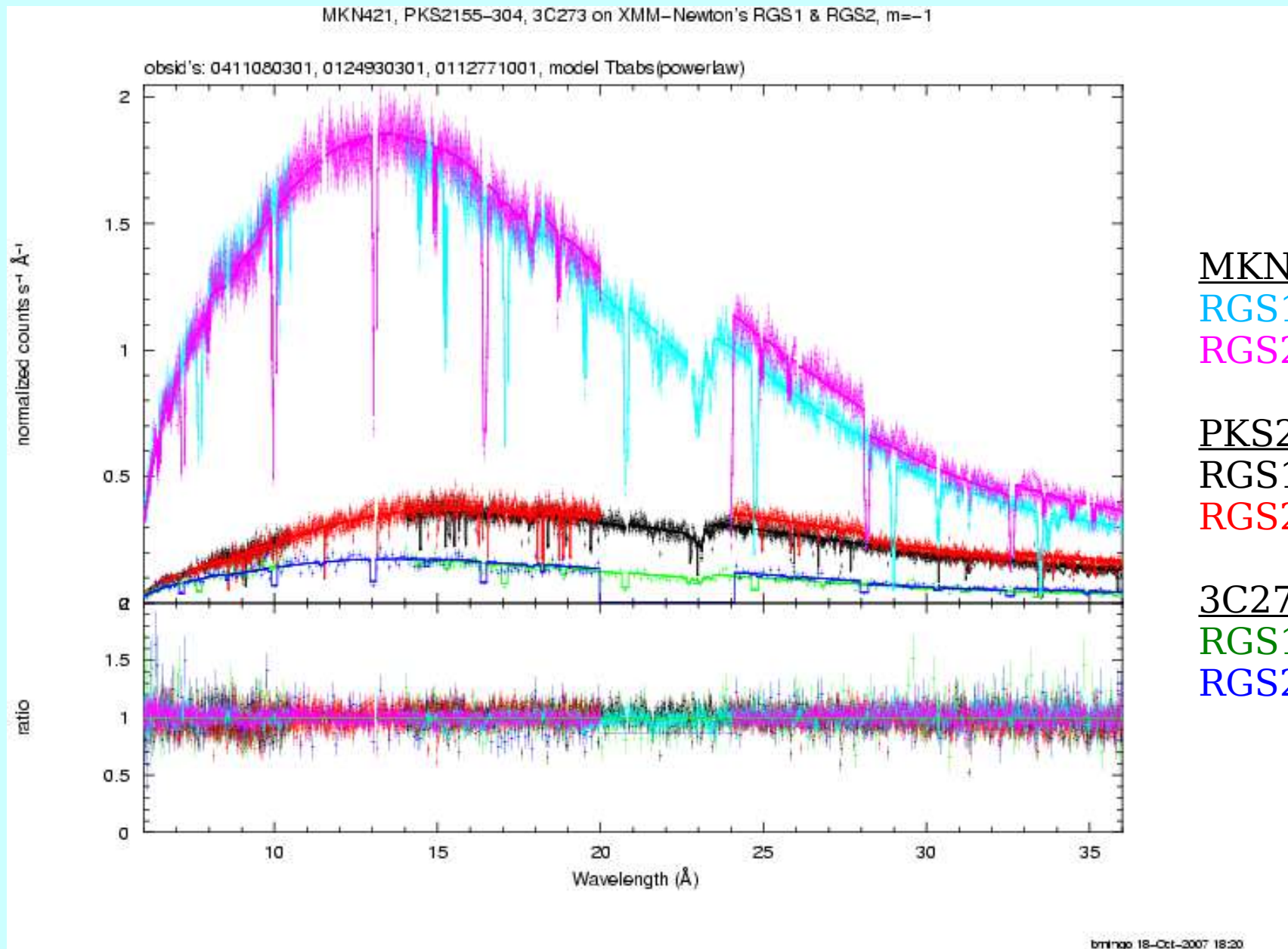
Z=0.011 WHIM candidate



Z=0.027 WHIM candidate



Future steps



MKN 421

RGS1

RGS2

PKS2155-304

RGS1

RGS2

3C273

RGS1

RGS2



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