

The High Energy Spectrum of 1E1740.7-2942

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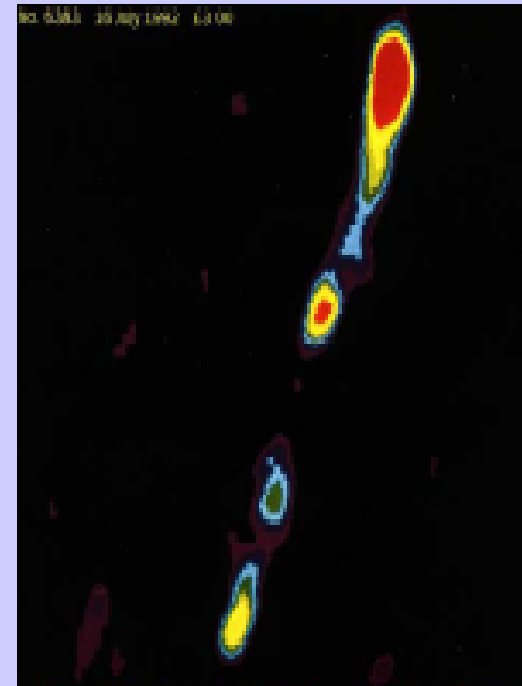
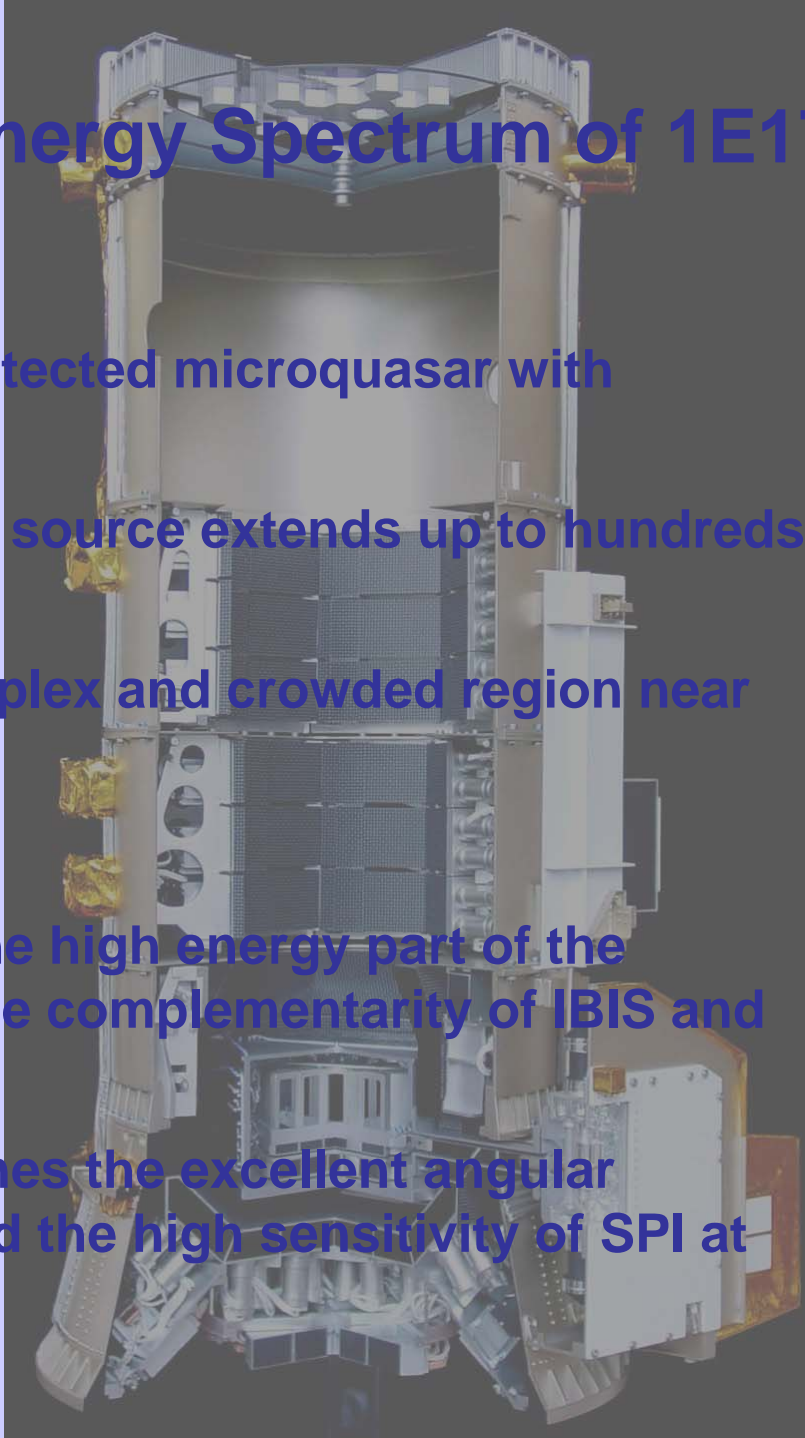
1E1740 is the first detected microquasar with extended radio jets

The spectrum of this source extends up to hundreds of keV

It is located in a complex and crowded region near the Galactic Center

In order to explore the high energy part of the spectrum we used the complementarity of IBIS and SPI.

This analysis combines the excellent angular resolution of IBIS and the high sensitivity of SPI at high energy



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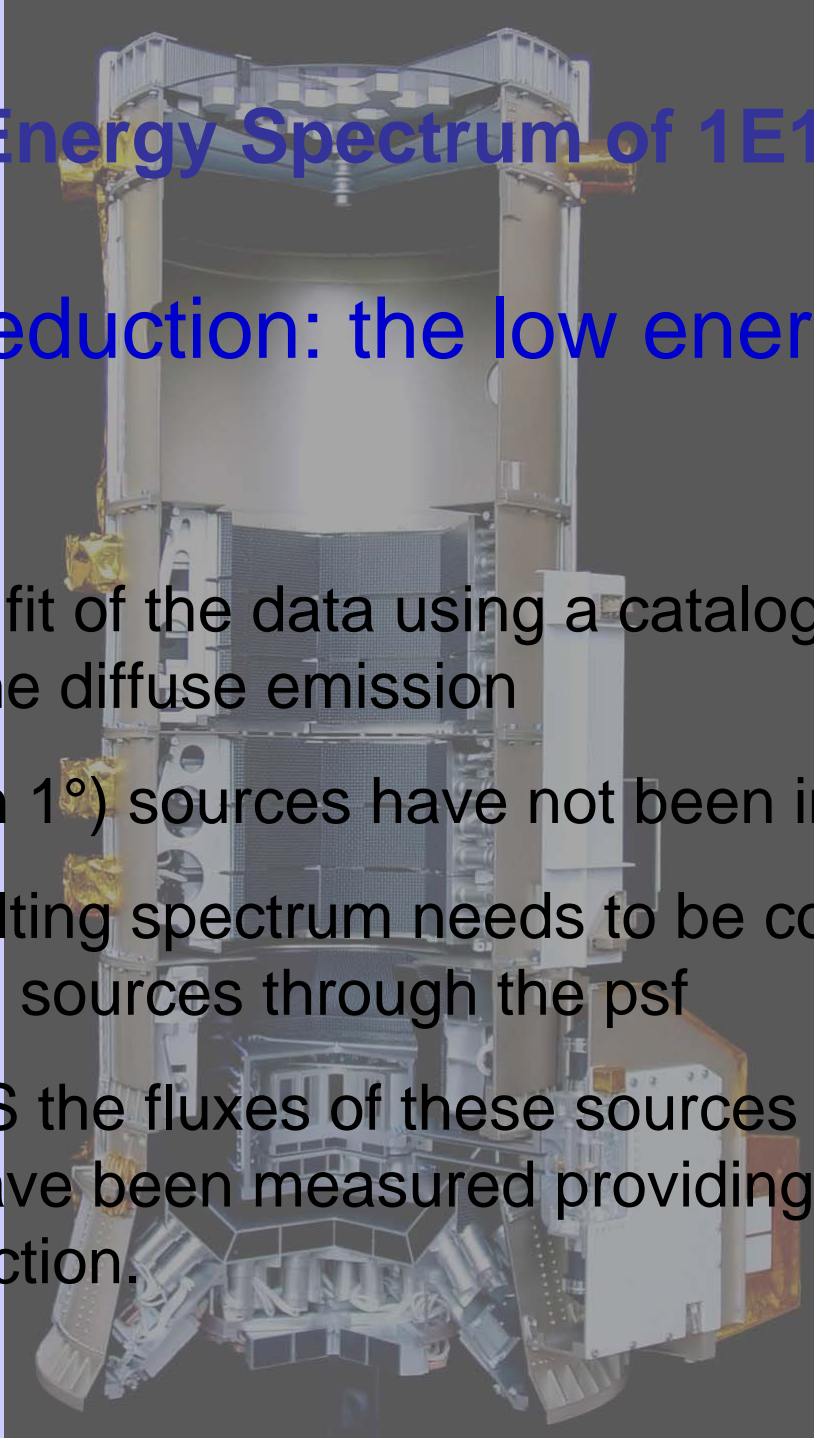
SPI data reduction: the low energy part

Simultaneous fit of the data using a catalog of 66 sources at 40 keV plus the diffuse emission

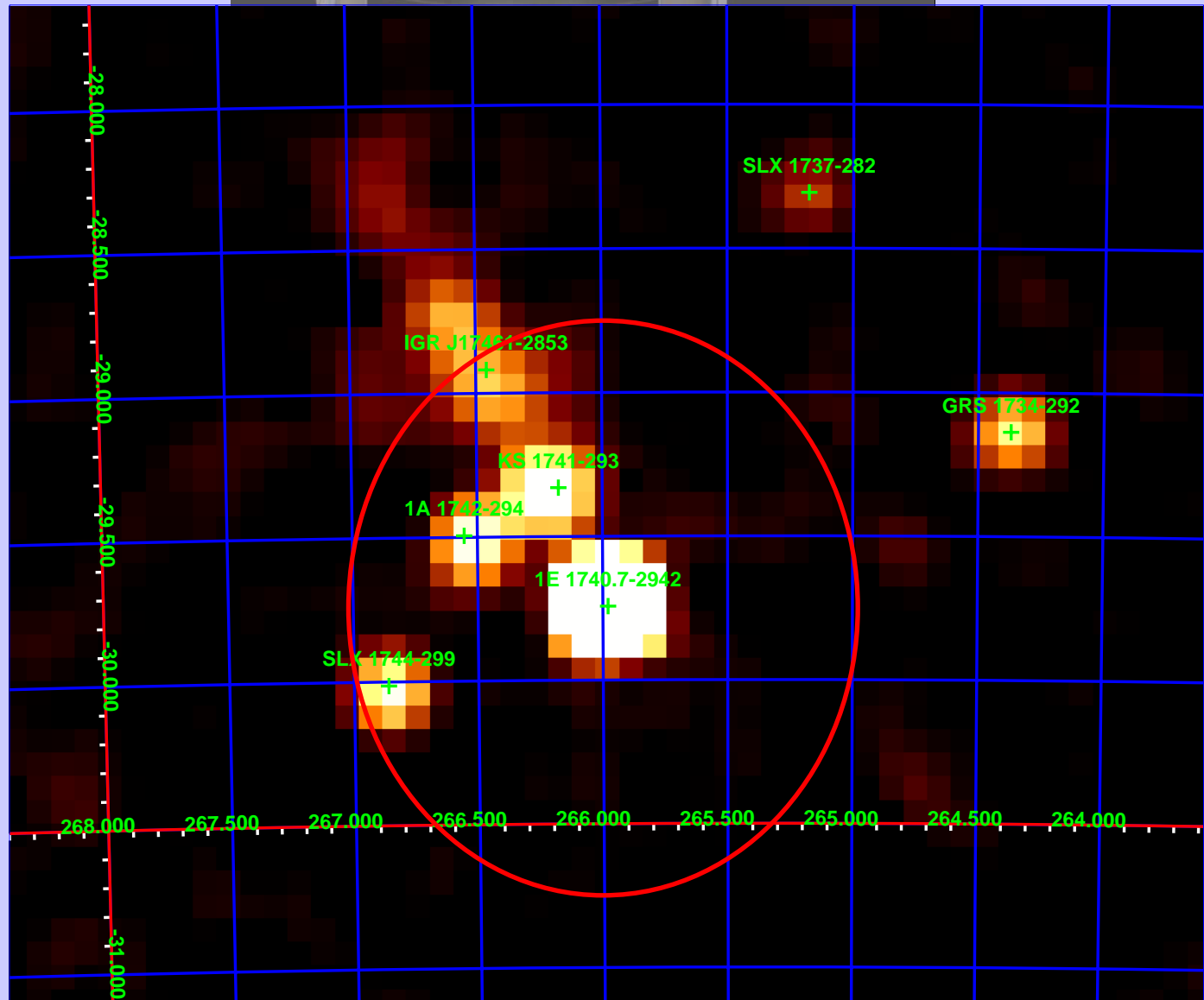
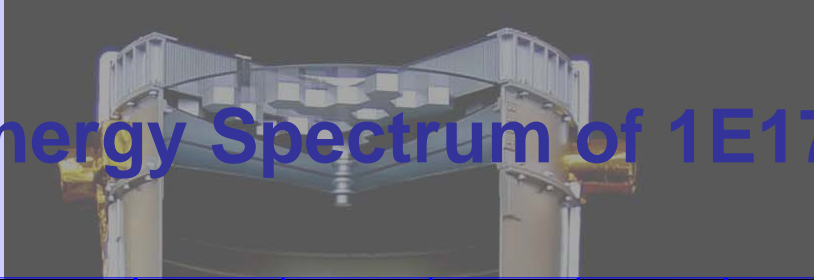
Nearby (within 1°) sources have not been included

Then the resulting spectrum needs to be corrected of the effect of these sources through the psf

Thanks to IBIS the fluxes of these sources for the same time period have been measured providing the necessary spectral correction.



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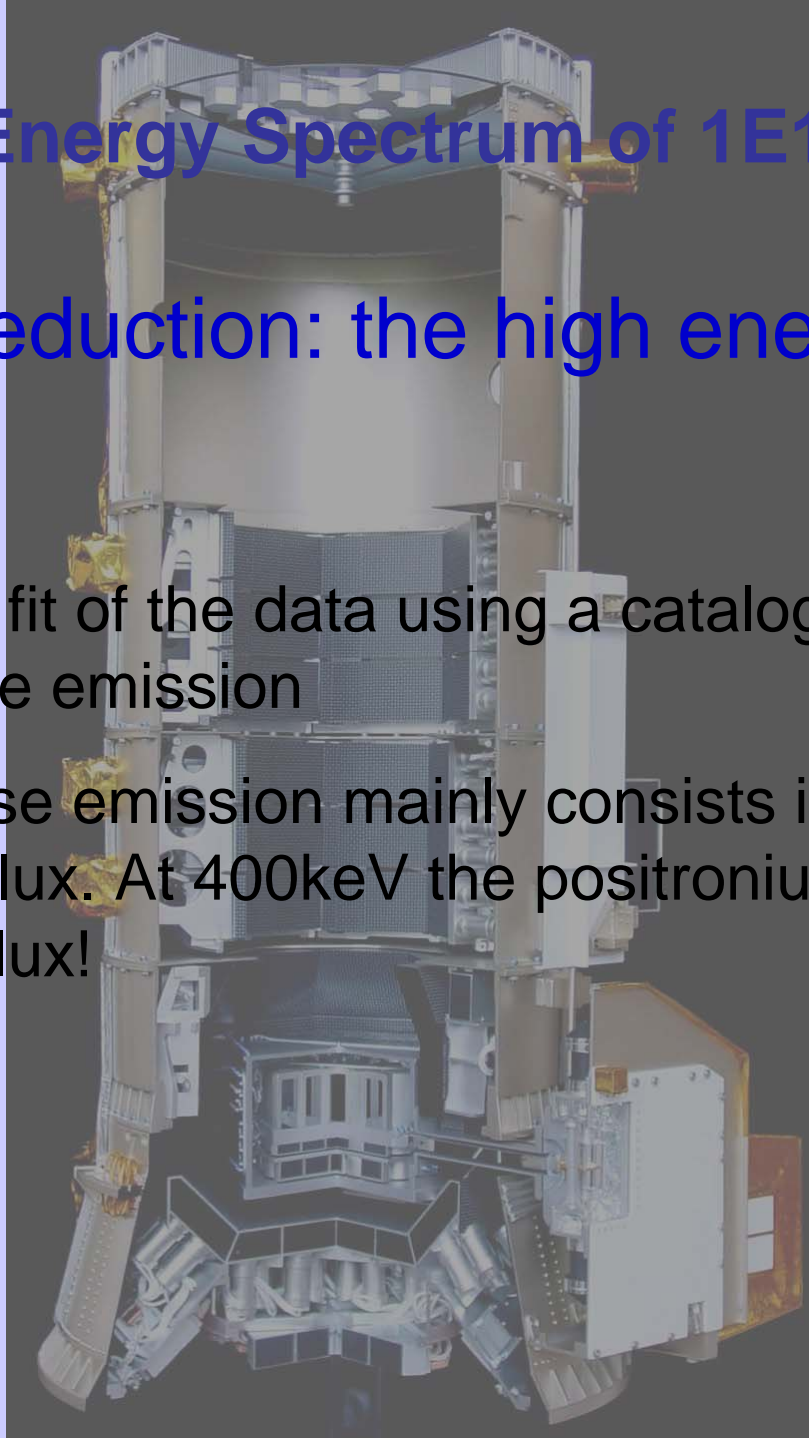


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SPI data reduction: the high energy part

Simultaneous fit of the data using a catalog of 4 sources plus the diffuse emission

Here the diffuse emission mainly consists in the positronium and 511 keV flux. At 400keV the positronium flux is 10 times the 1E flux!

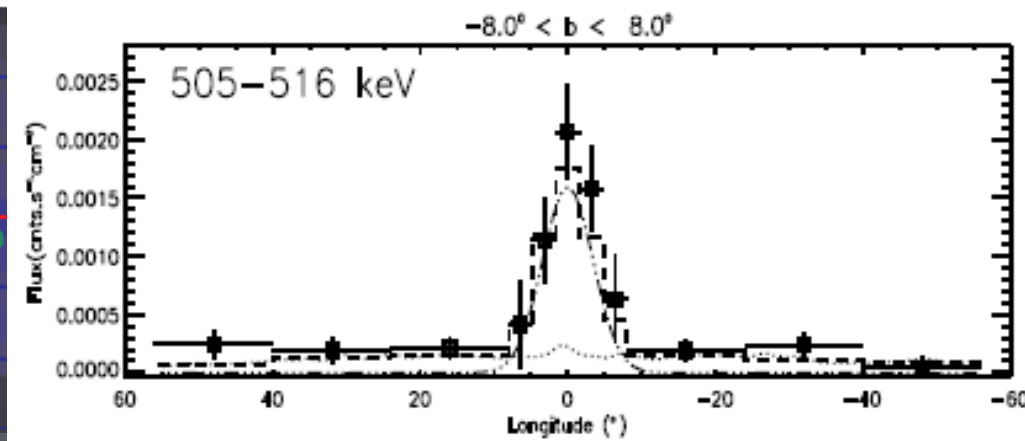
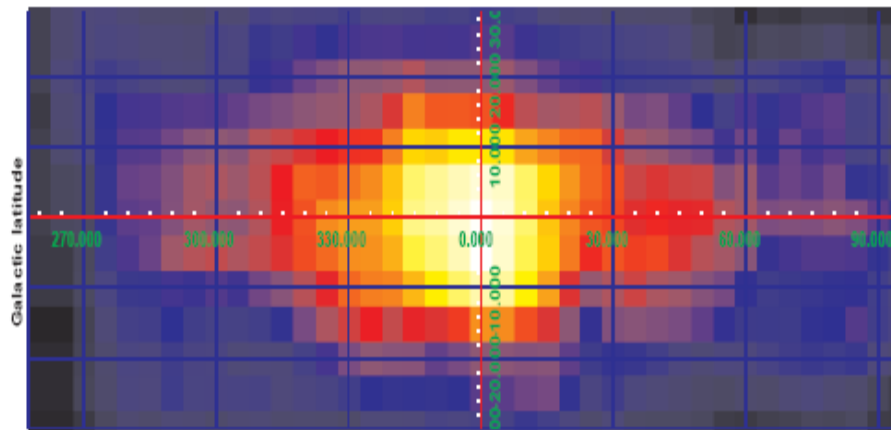
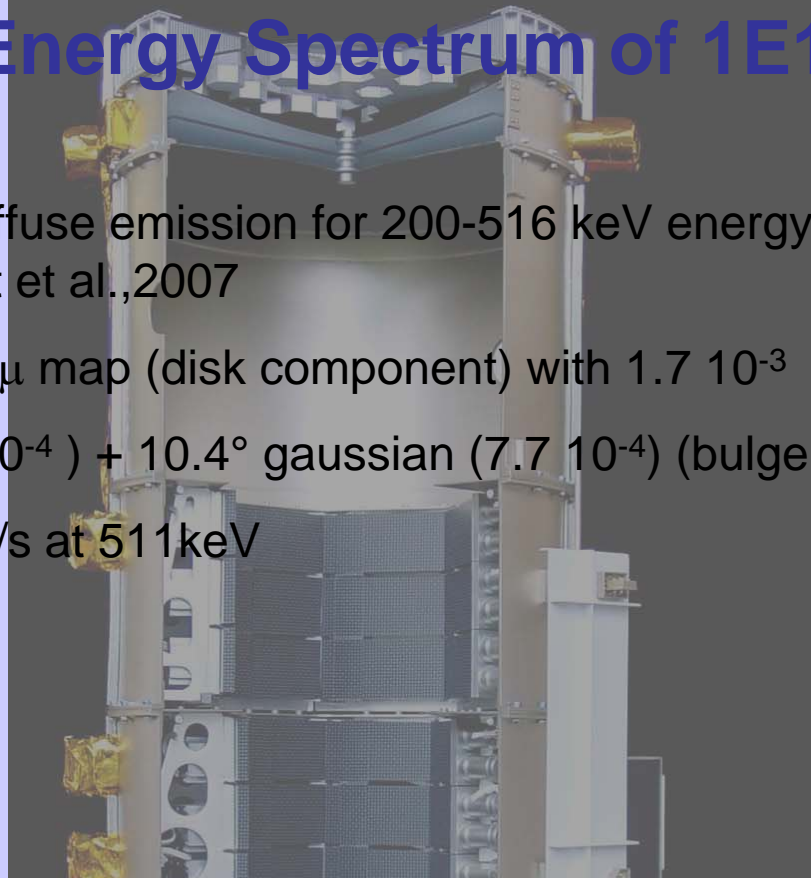


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Parameters for the diffuse emission for 200-516 keV energy range are extracted from survey work: Bouchet et al., 2007

Superposition of 240μ map (disk component) with $1.7 \cdot 10^{-3}$ ph/cm²/s + 3.0° gaussian ($2.0 \cdot 10^{-4}$) + 10.4° gaussian ($7.7 \cdot 10^{-4}$) (bulge component)

Fluxes are in Ph/cm²/s at 511keV

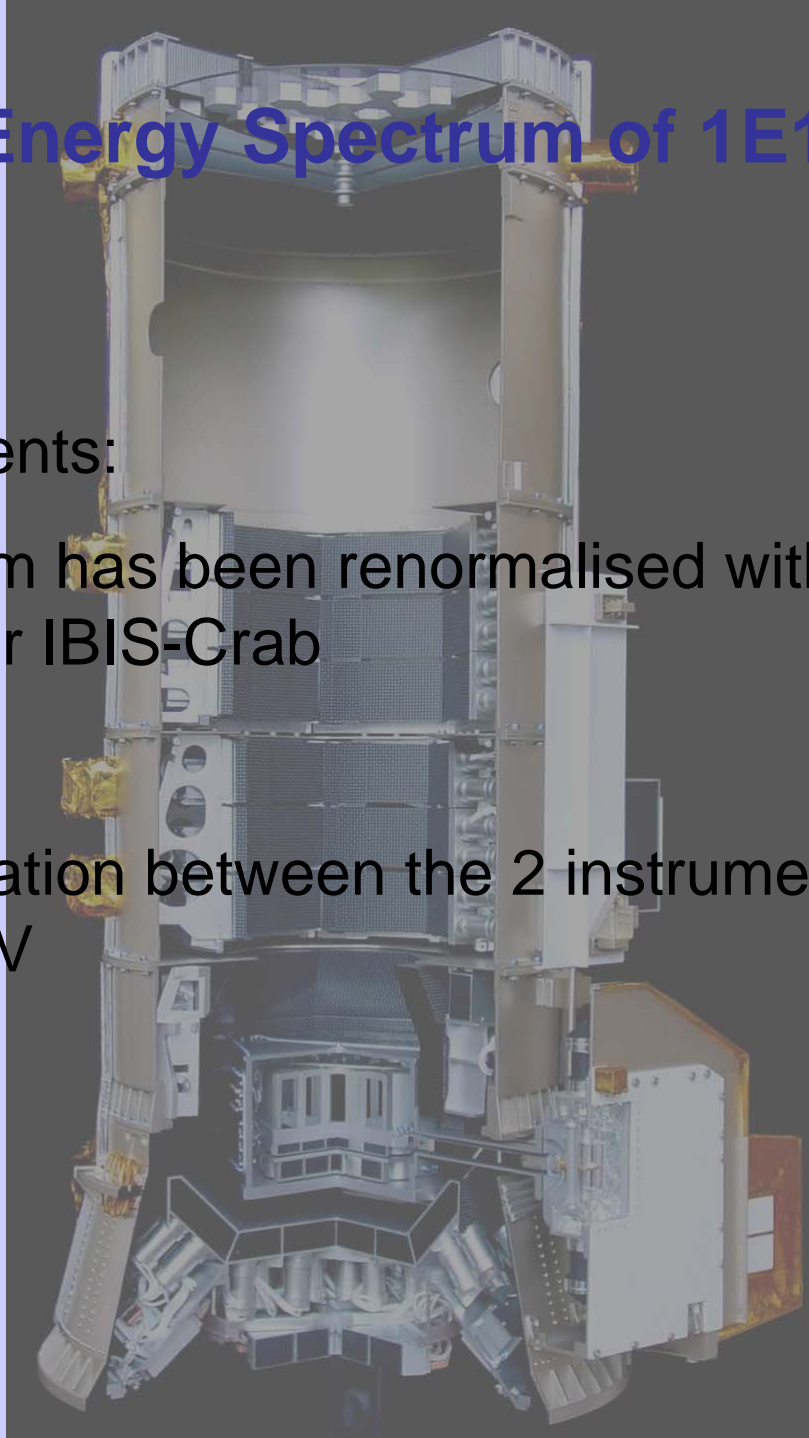


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Last adjustments:

IBIS spectrum has been renormalised with the ratio of SPI-Crab over IBIS-Crab

The normalisation between the 2 instruments is within 10% at 20 keV

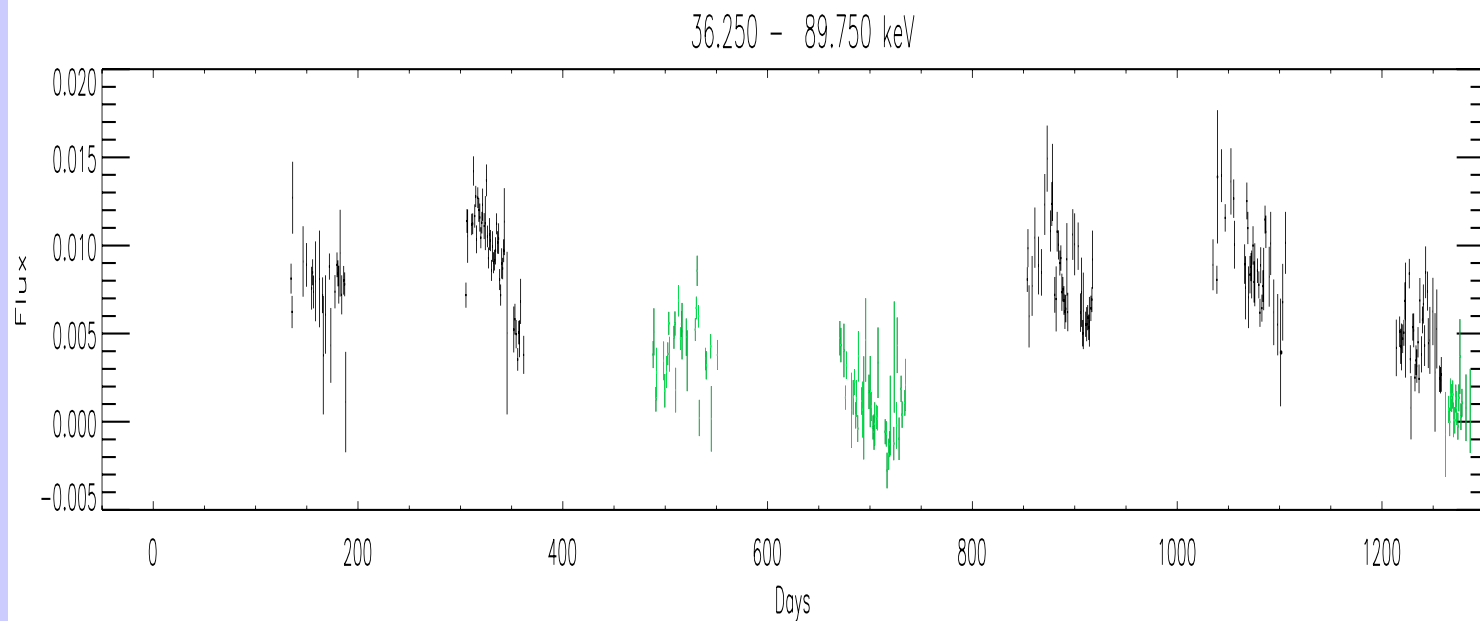


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Data selection:

HARD state 2003 + 2005

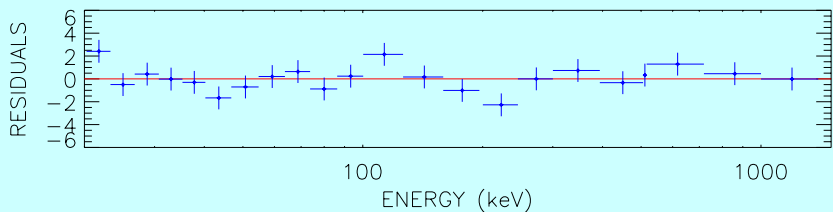
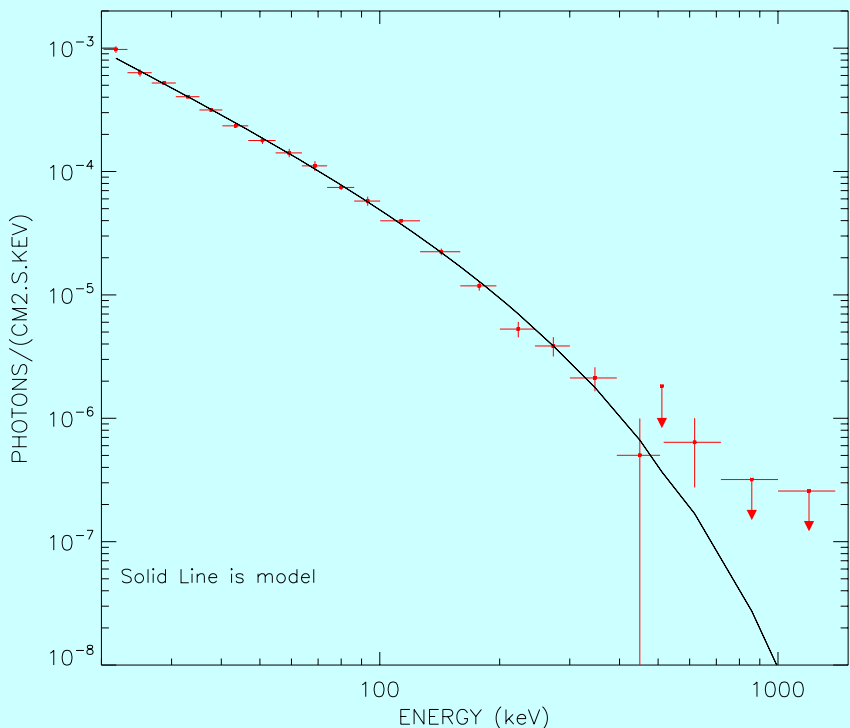
Soft state 2004 + spring 2006



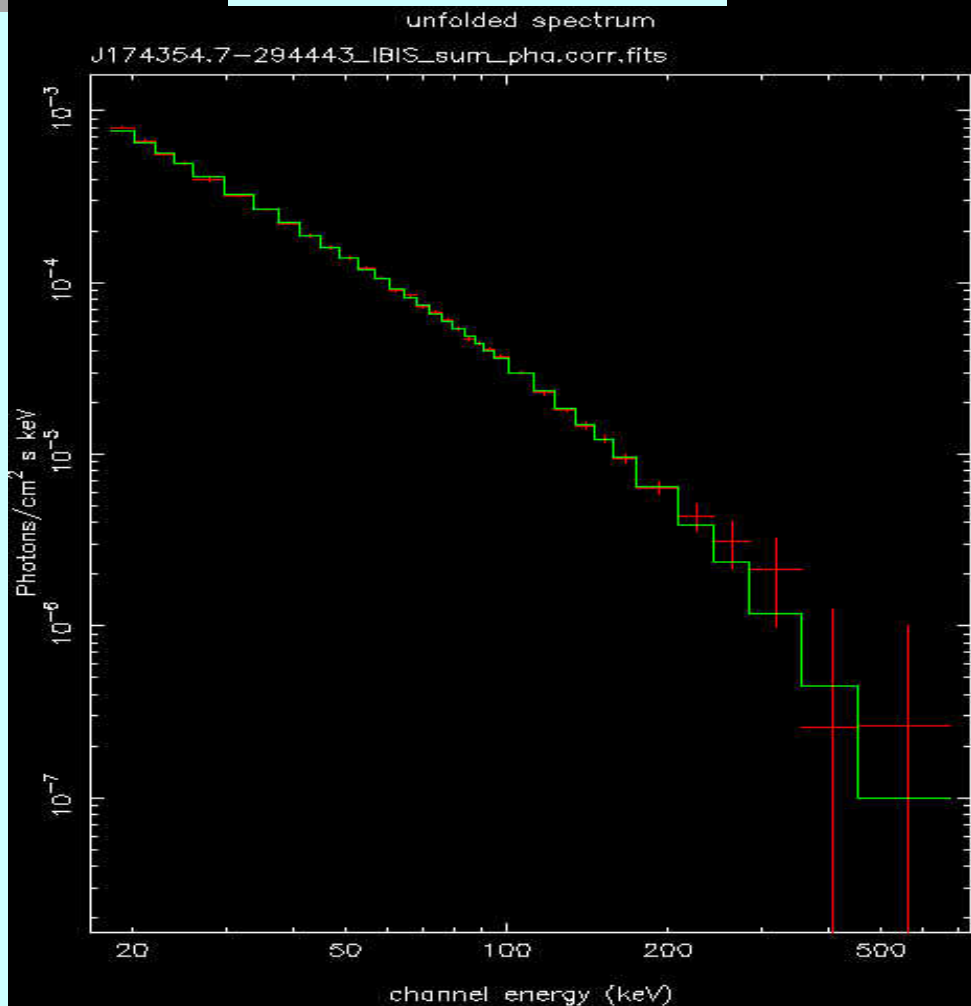
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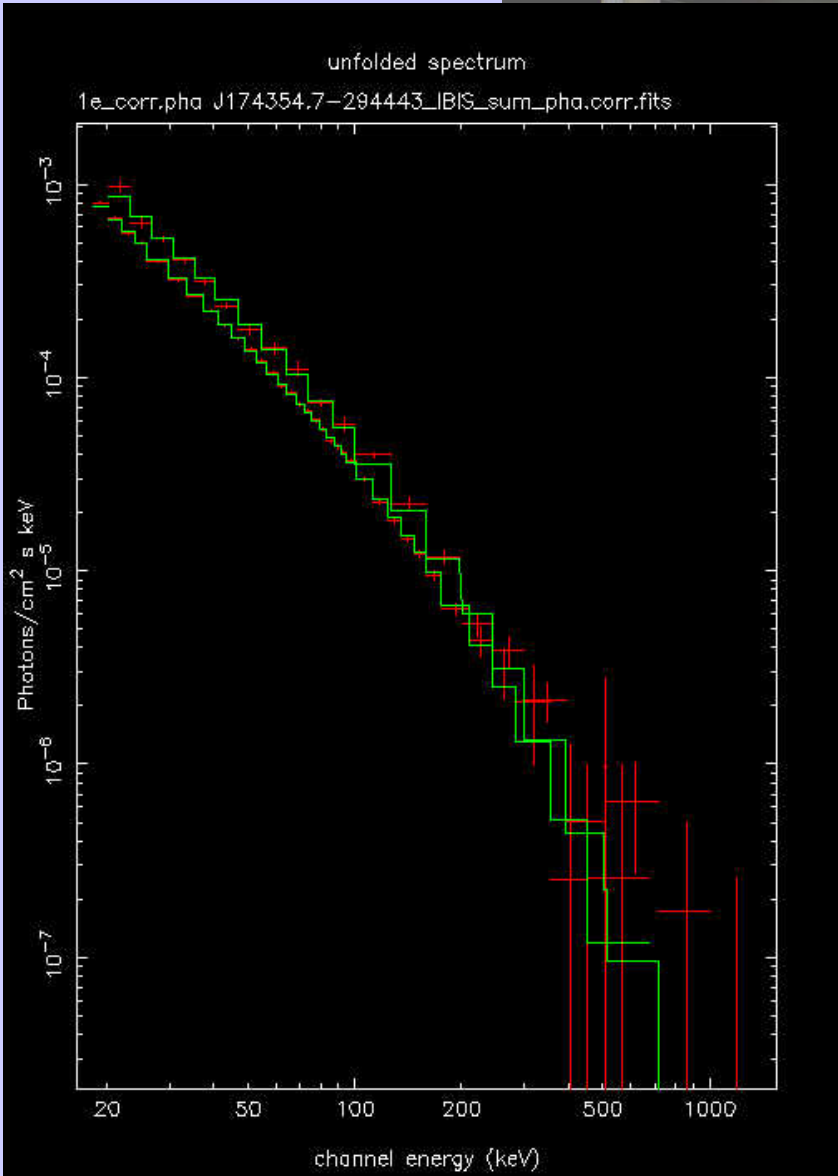
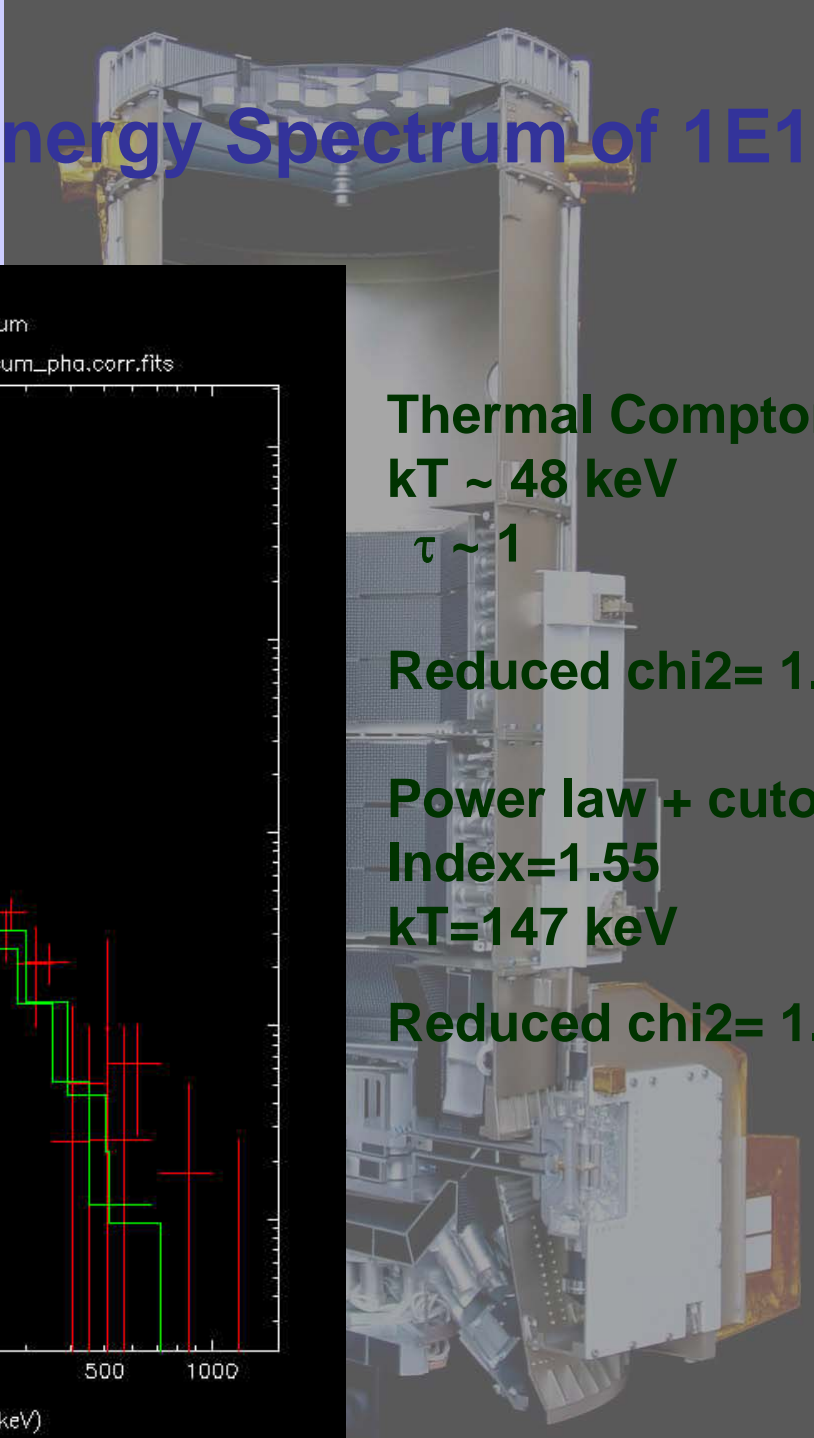
1E1740.7-2942 SPI



1E1740.7-2942 IBIS



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Thermal Comptonisation (Comptt)

kT ~ 48 keV

$\tau \sim 1$

Reduced chi2= 1.5 (53 d.o.f.)

Power law + cutoff:

Index=1.55

kT=147 keV

Reduced chi2= 1.38 (53 d.o.f.)

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CONCLUSION

Through this extreme case we have demonstrated that it is possible to extract data using the two instruments simultaneously.

The mean spectrum of 1E1740.7 in the hard state is compatible with a Comptonisation law with a kT of 50 keV

The source nicely follows a Comptonisation law up to ~ 700 keV

The 2σ upper limit for the 511keV flux is $4 \cdot 10^{-6}$ Ph/cm²/s. But this limit depends strongly on the diffuse 511keV emission distribution.

Future work: low state study – search for spectral variation with time.

