Bkg modeling for hot medium z Clusters

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Focus

Bkg treatment for:

Low SB

Extended emission NOT filling FOV

Hard Band 1.5,2.0-10 keV

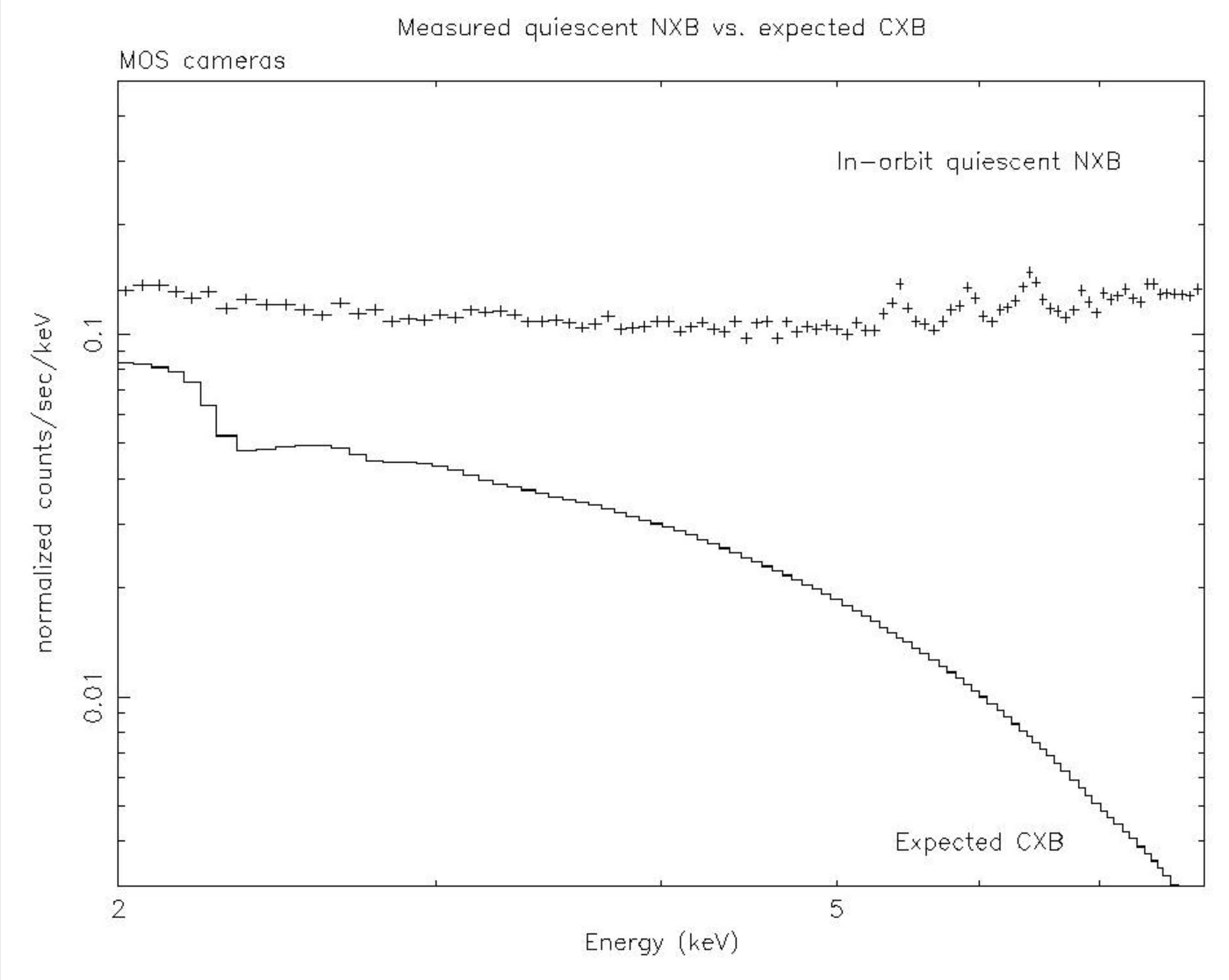
The Bkg components

2 Components dominate

1) NXB from high E particles

2) Soft Protons

CXB plays a minor (negligible) role in hard band



ome Consider tions

Double Subtraction not particularly usefull

- SP spectrum variable in time, vignetted (possibly with time dependent vignetting) very difficult to calibrate
- Best option is to remove it to the best of our ability
- High E NXB spectrum does not vary with intensity (De Luca & Molendi 2004) can be accounted for through simple renorm.

The ecipe

1. Cut data with fixed thrs. (better than sigma clipping or growth curve) Allows a homogenous treatment for different sources and for background data
2. Apply In/Out Diagnostic (De Luca & Molendi 2004) to MOS and pn (new!)
3. Remove observation significantly (more than 20% of total bkg contributed by soft protons) contaminated by “quasi quiscent” soft proton component that cannot be cleaned through data thrs.

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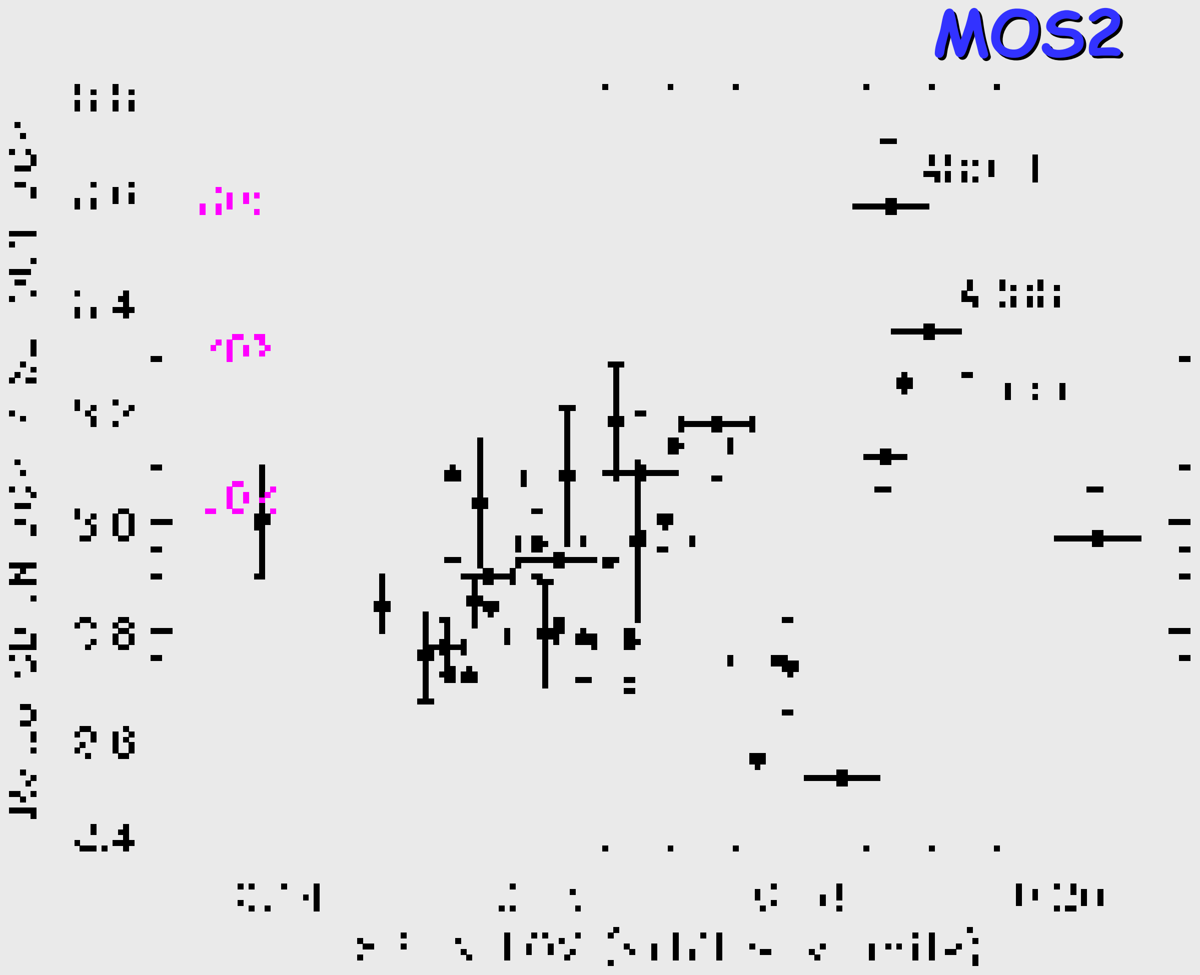

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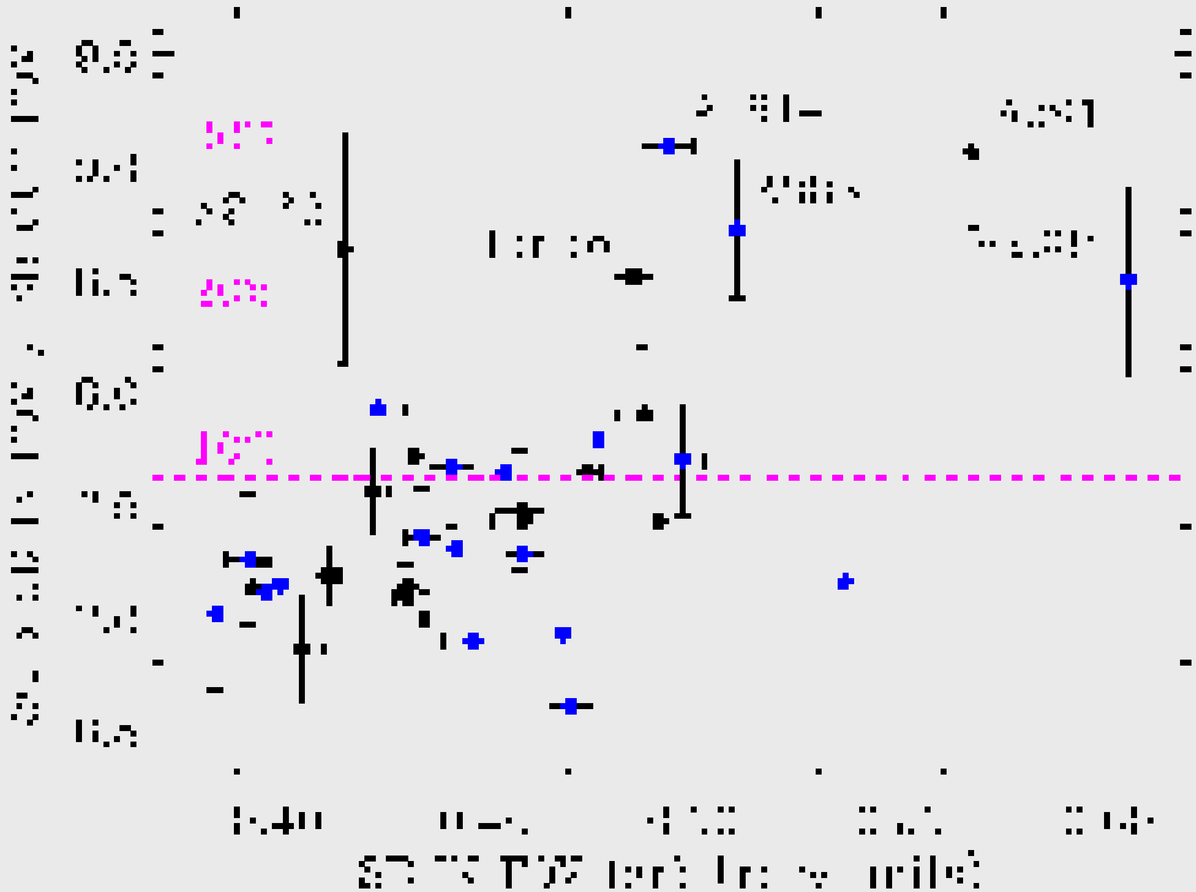

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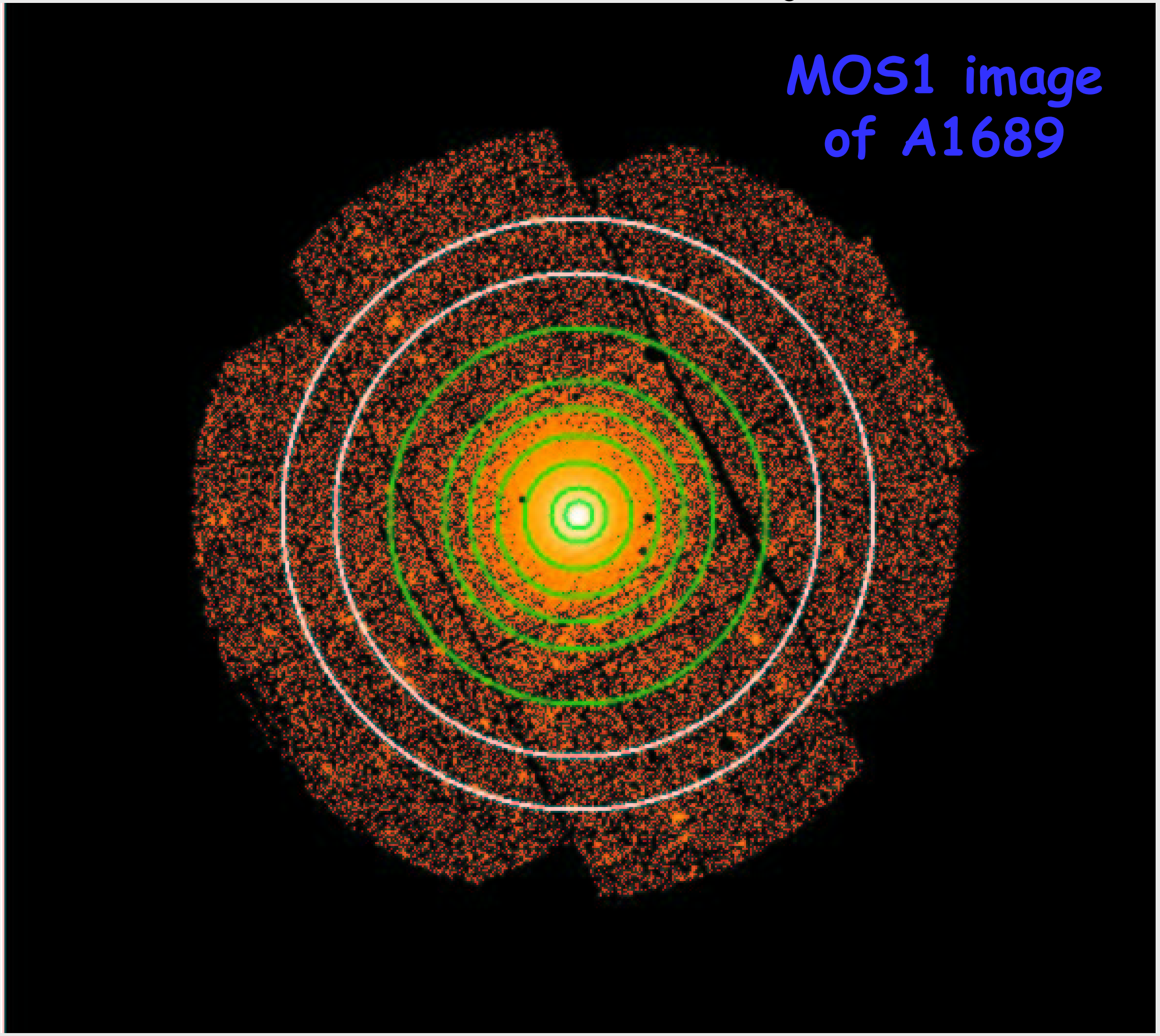
Pn Out of FOV contaminated from SP because of OOT events, however data has been thresholded, SP contamination outside FOV should be very modest.

No differen e in distri tion of eFF l e and FF la k oints

The ecipe

- Produce bkg compilation with exp time 00 ks.
- Bkg Expo ime has to be 20 30 times longer than typical source observation
- Statistical error in bkg subtraction is almost all due to source statistics
- Bkg observations processed in the same way as the source observation.

The ecipe



Renormalize Bkg spectrum to source spectrum using outer ring (not contaminted by source emission) in the 4-10 keV band.

The ecipe

he use of a band as similar as possible to the one used for spectral fitting reduces the systematic error in measurement associated to the difference in spectral shape of the bkg in the source and background observation.

The ecipe

The tacit assumption in the renorm procedure is that the bkg in the sou and bkg observation have the same spectral shape, this is true to the best of our knowledge for the high E NXB, it is not for the SP background. Differences in the small but still not negligible SP contribution to the background in the sou and bkg observations may lead to slightly different bkg spectral shapes. The impact on the T measure is minimized by performing the norm in a band as similar as possible to the one used for spectral fitting.

The Effect of SP contamination on MOS and Pn

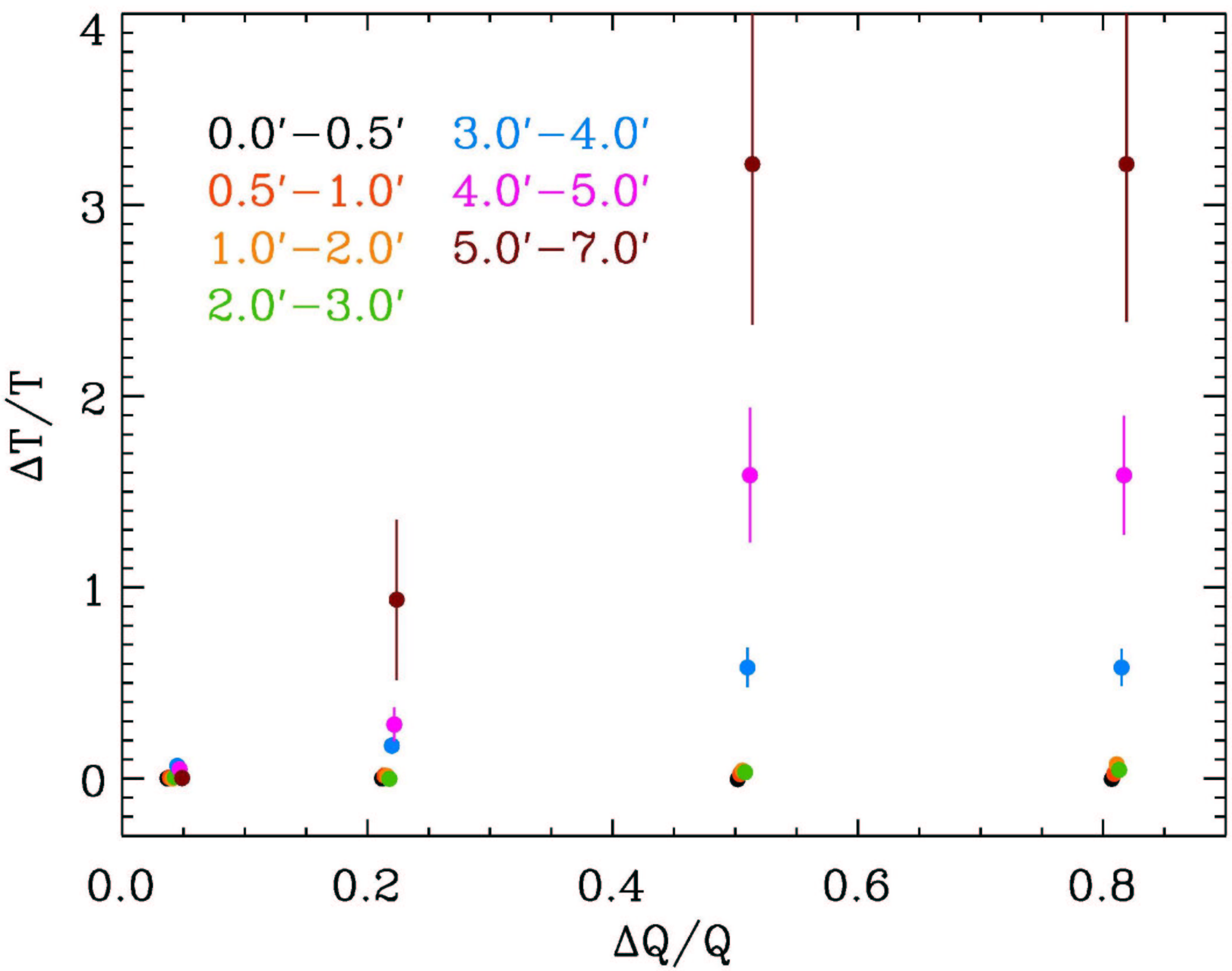
Raise the SP threshold to allow more SP in the source observation and see what happens to T measures

ΔT/T variation of best fit T with respect to that found when using standard thrs

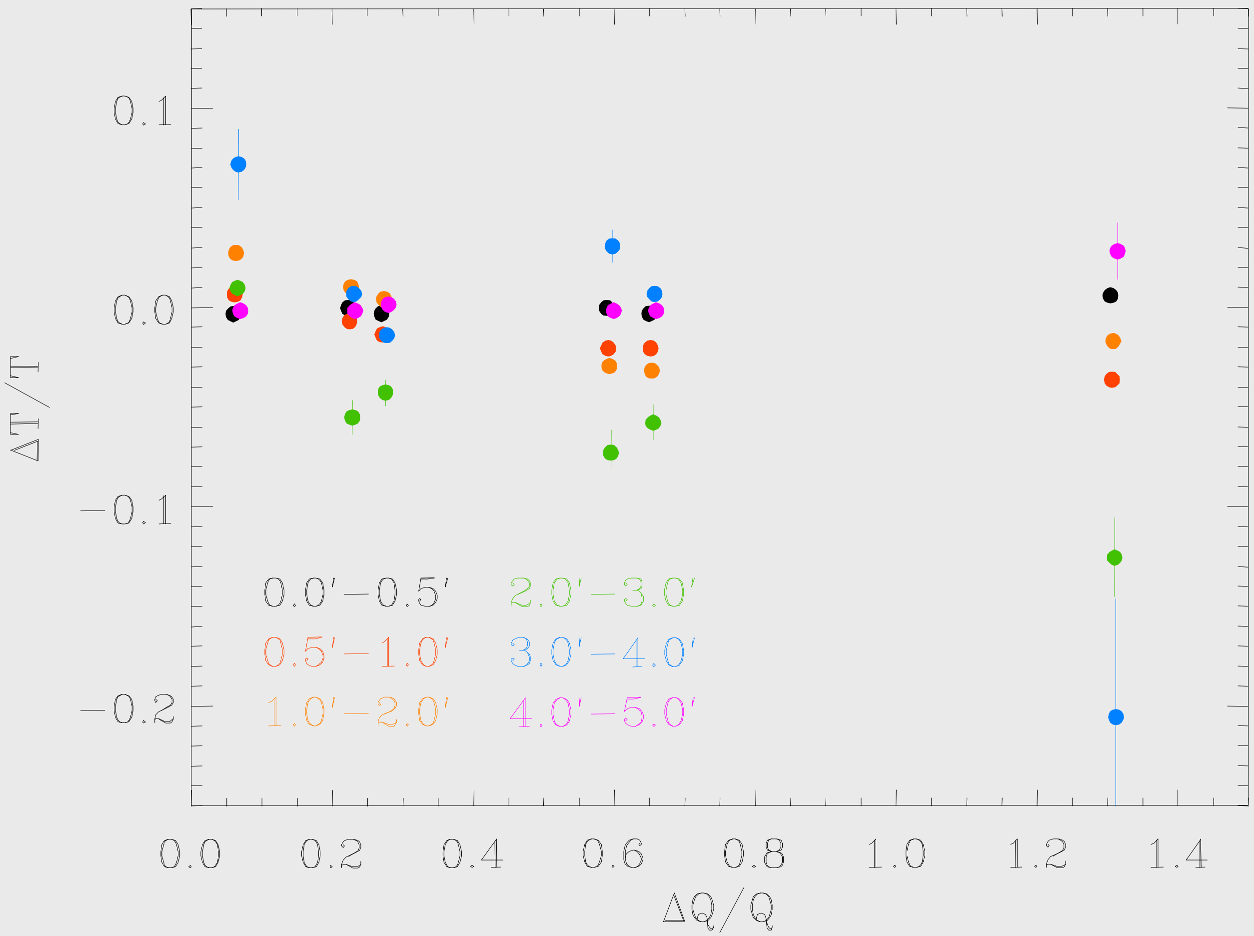
vs

ΔQ/Q relative variation of Q (norm factor) with respect to that found when using standard thrs

The Effect of SP contamination on MOS



The Effect of SP contamination on Pn



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1. In MOS the SP spectrum is typically harder than the NXB high E spectrum, a simple renormalization when the sou obs is badly contaminated by SP will lead to a systematically higher T.

2. In Pn the SP spectrum is very similar in shape to the NXB high E spectrum, renorm when spectrum is badly contaminated by SP will lead to errors in T of the order of 5-10%, with higher or lower T found depending on the specific SP spectrum.

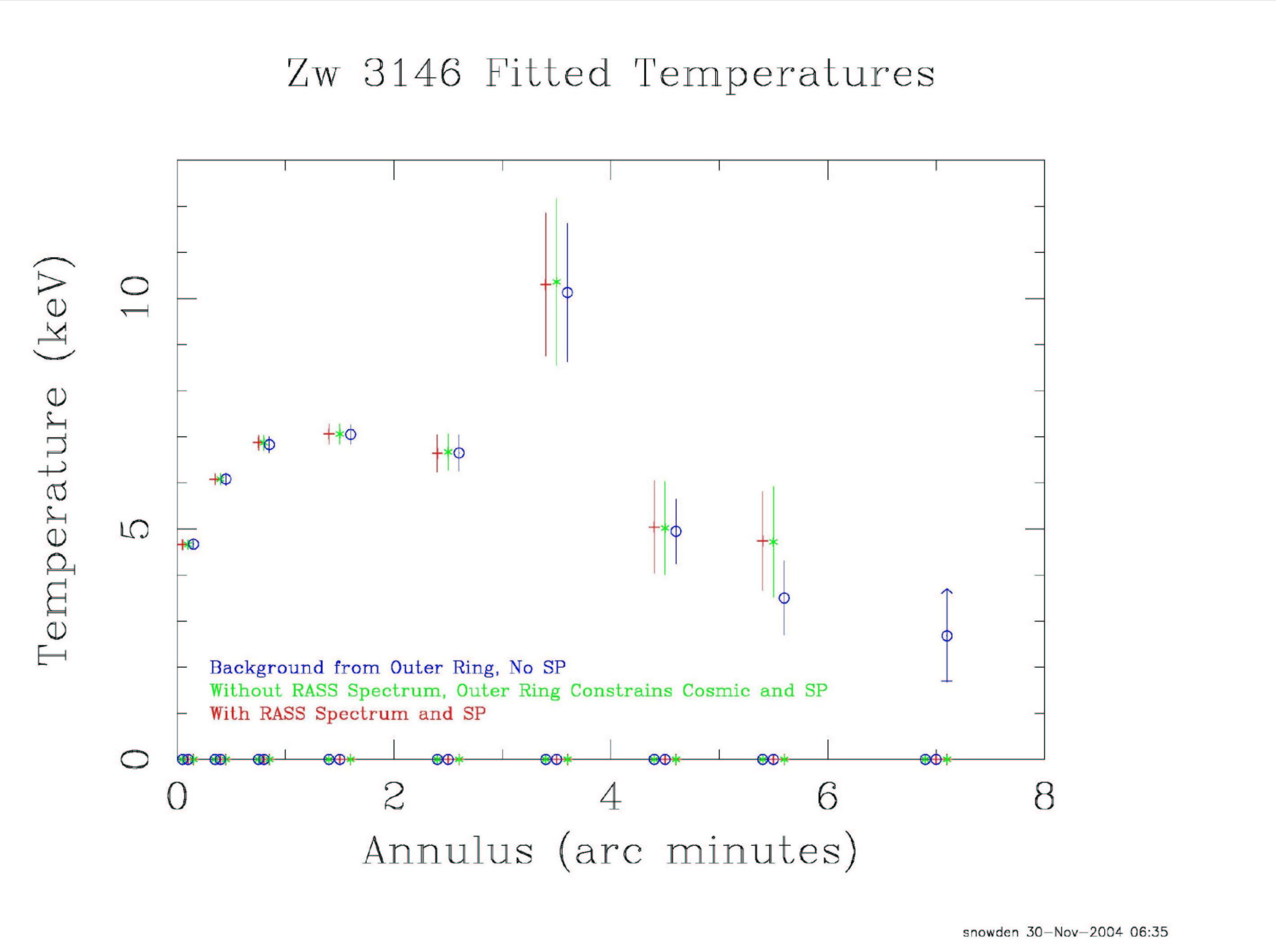
pectr l fitting

Since we are interested in T eV
s ectral fittin is done in a hard
band we have tried . eV and
eV

o f r do n do e go

With this technique we get reliable T estmates for sou/bkg down to 20% in some cases 15%.

Comp rison ith no den



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