BLC Analysis using the ISDC System

A. Strong

MPE Sept 2001

Data and s/w at ISDC
Remote logon from MPE, works fine

Analysis of ^{60}Co, ^{137}Cs, ^{241}Am @125m

No very systematic analysis – driven by available data

useful for getting experience with ISDC data,
following SPI BLC pipeline development

spiskymax imaging
various angles
multiple detectors
dithering
IRF performance

Since July ISDAG:
- PSD channel events available
  - (before only 5% of singles events used)
- New IRF with central absorber

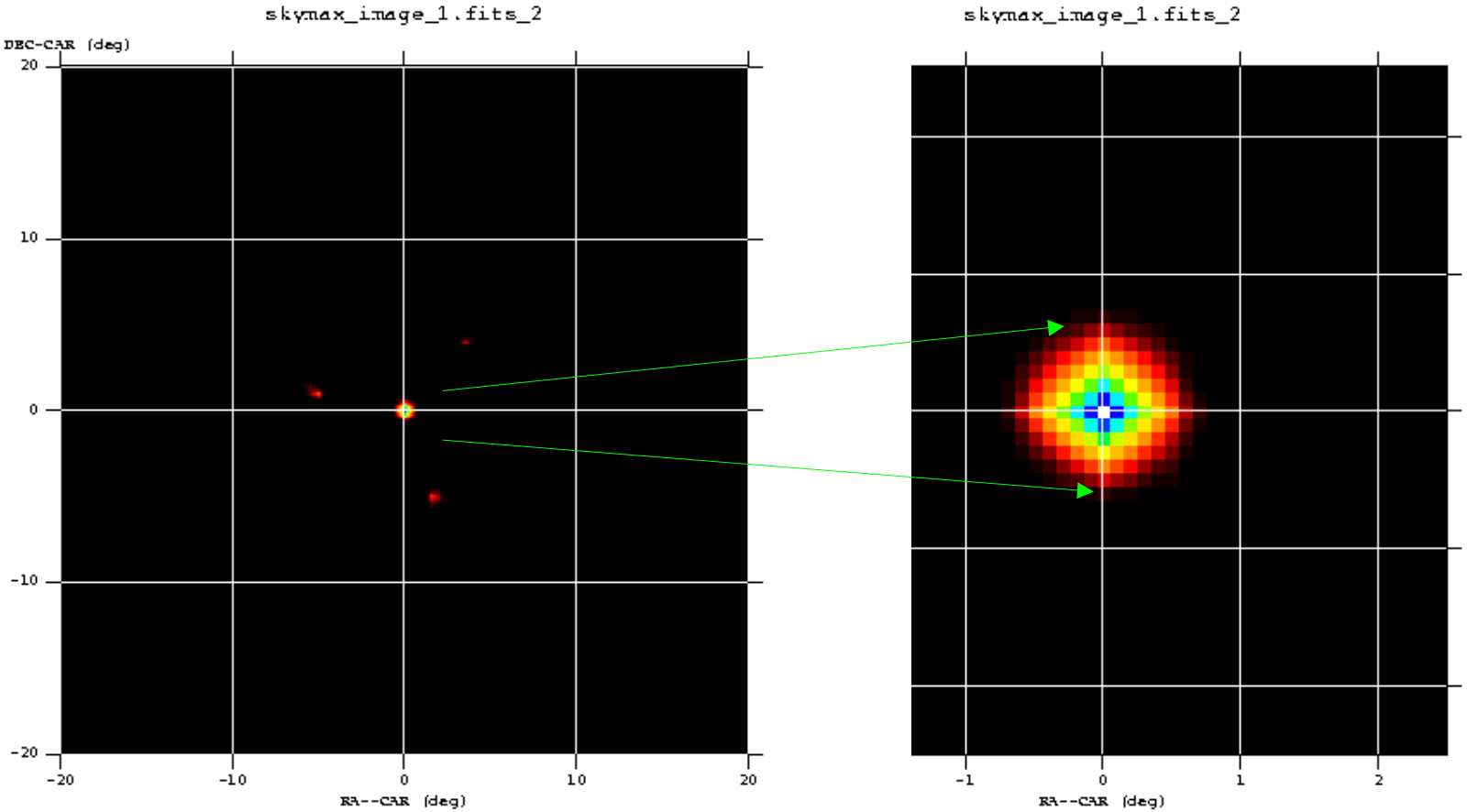
PROBLEMS

Much more BLC data available but still large gaps

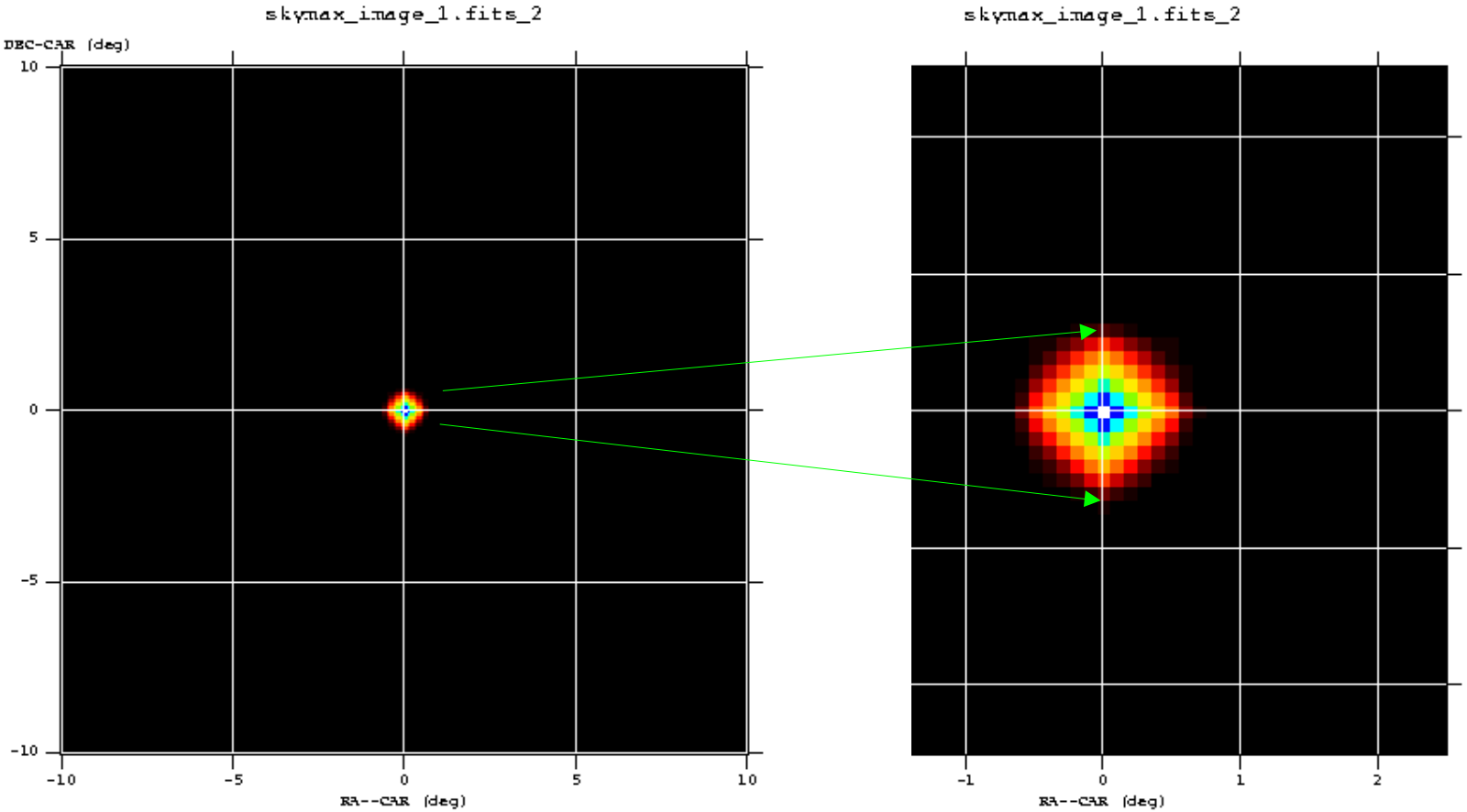
No high–range calibration available, (^{24}Na not studied)

Sum of singles + PSD not working (*spihist* problem)
–> workaround at present, results OK

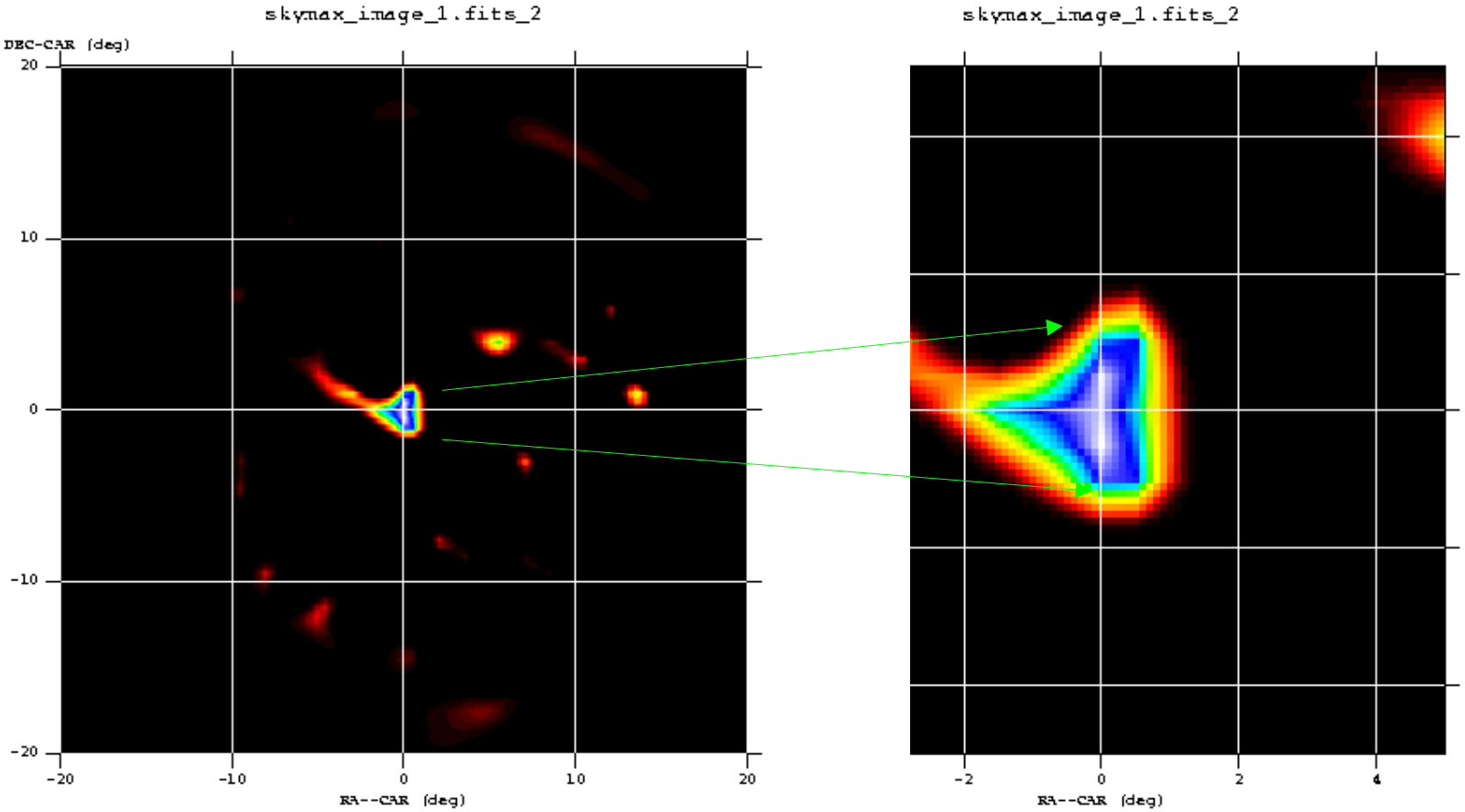
Singles BLC run 31
^{60}Co 1173 keV 125m on−axis
spiskymax IRF from GSFC



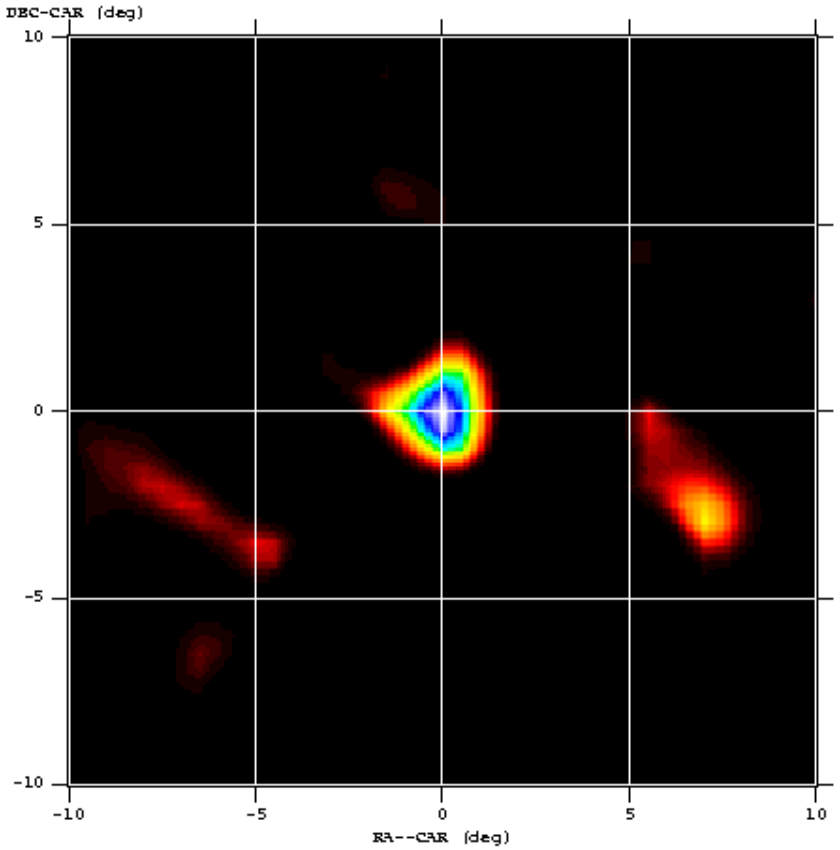
Singles+PSD+doubles+triples BLC run 31
^{60}Co 1173 keV 125m on–axis
spiskymax IRF from GSFC



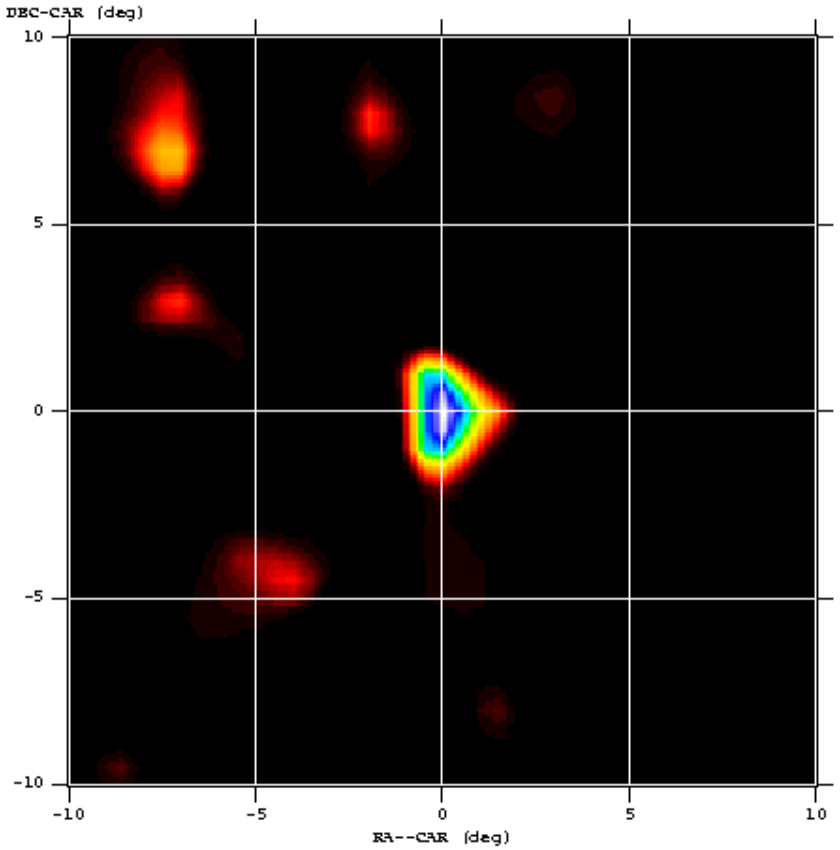
Singles BLC run 37
^{60}Co 125m 2°
spiskymax IRF from GSFC



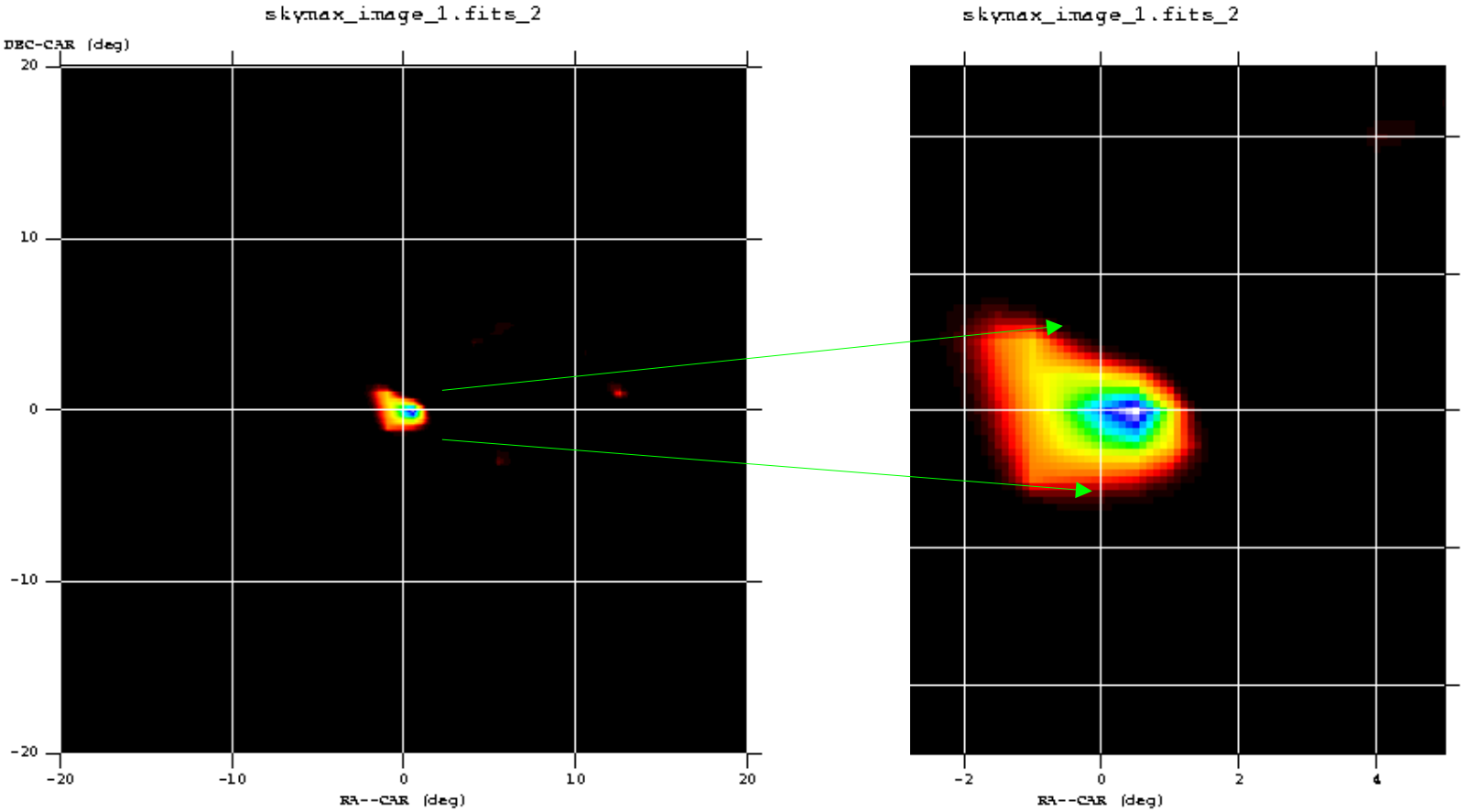
Singles+PSD+doubles+triples BLC run 37
^{60}Co 125m 2º
spiskymax IRF from GSFC



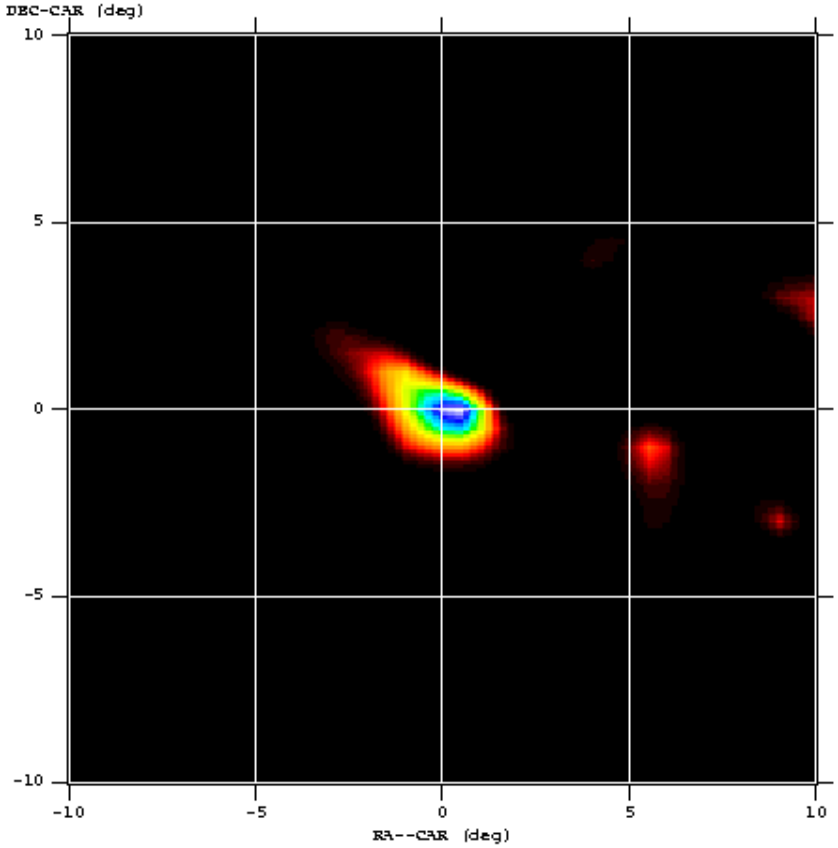
Singles+PSD+doubles+triples BLC run 47
^{60}Co 125m –2°
spiskymax IRF from GSFC



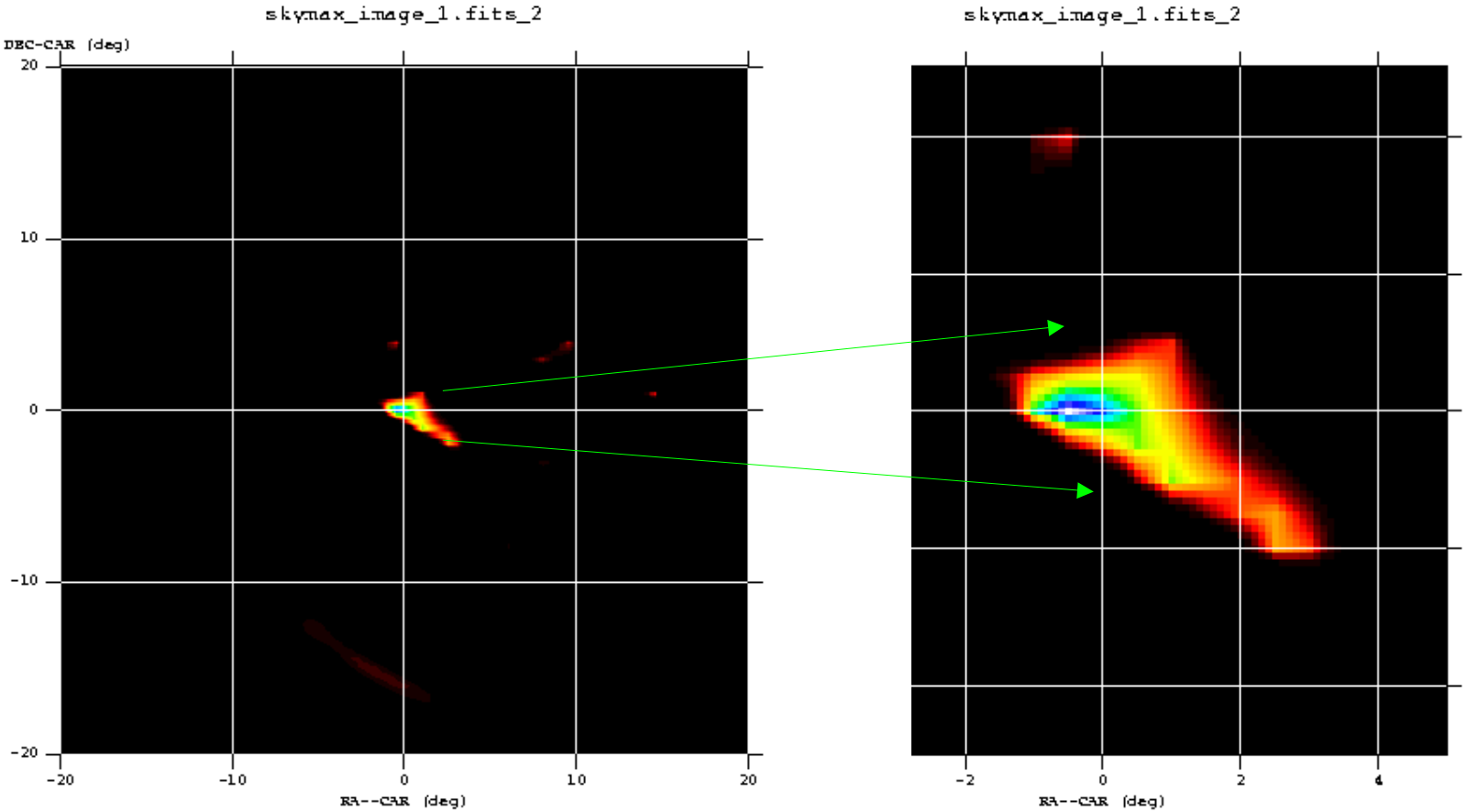
Singles BLC run 38
^{60}Co 125m 4°
IRF from GSFC



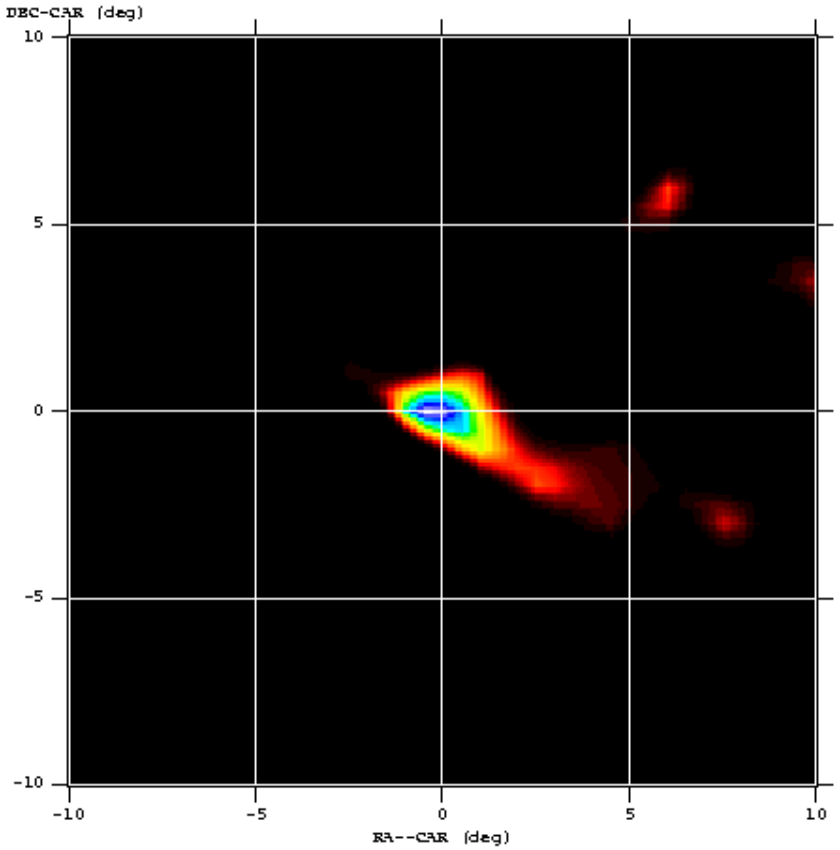
Singles+PSD+doubles+triples BLC run 38
^{60}Co 125m 4º
IRF from GSFC



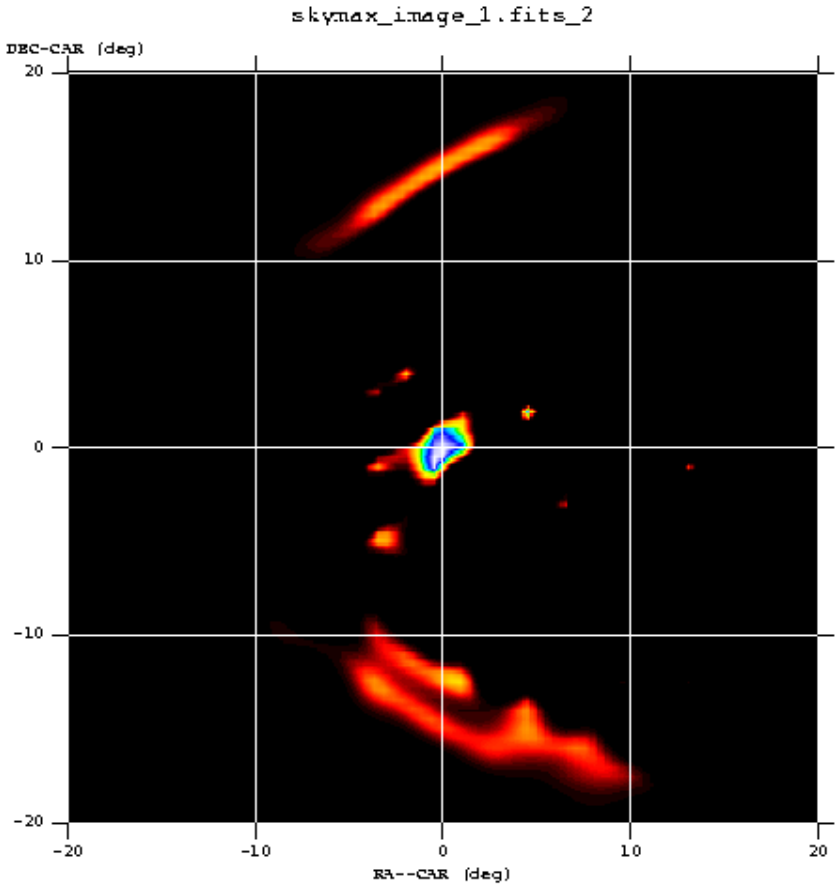
Singles BLC run 39
^{60}Co 125m 6°
IRF from GSFC



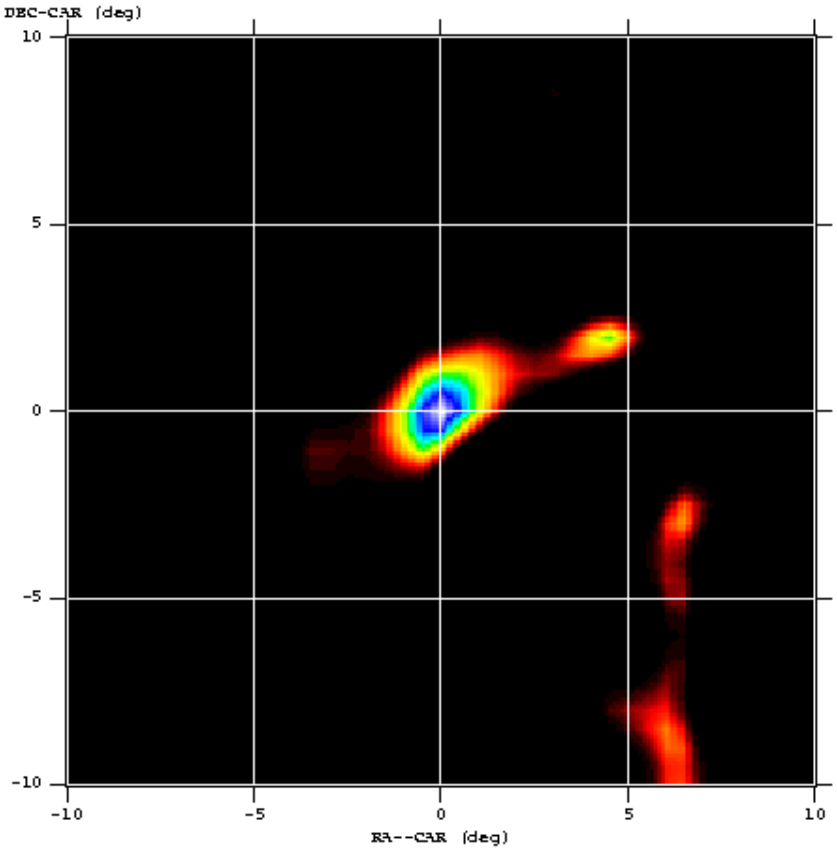
Singles+PSD+doubles+triples BLC run 39
^{60}Co 125m 6^{o}
IRF from GSFC



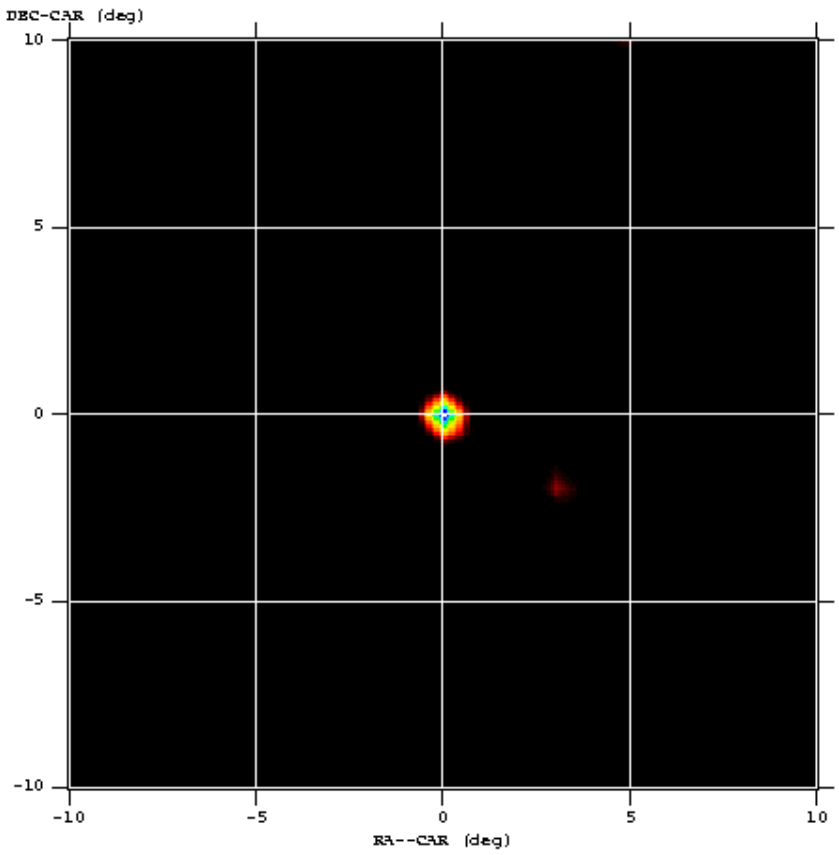
Singles BLC run 40,41
^{60}Co 125m 8^{o}
IRF from GSFC



Singles+PSD+doubles+triples BLC run 40, 41
^{60}Co 125m source at 8º , 10º
IRF from GSFC

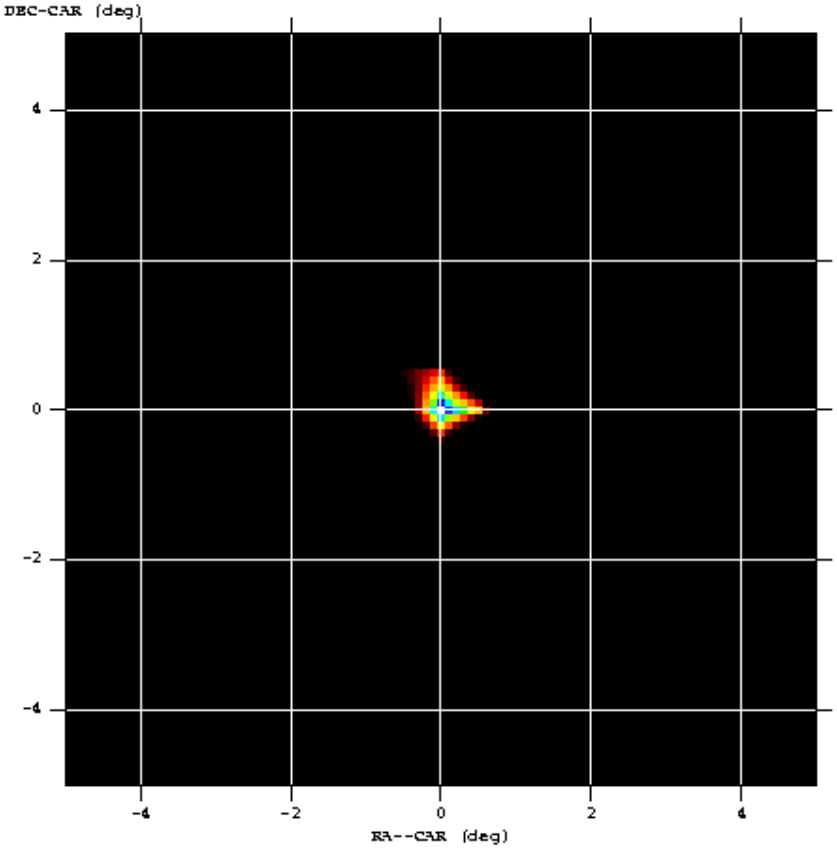


8º

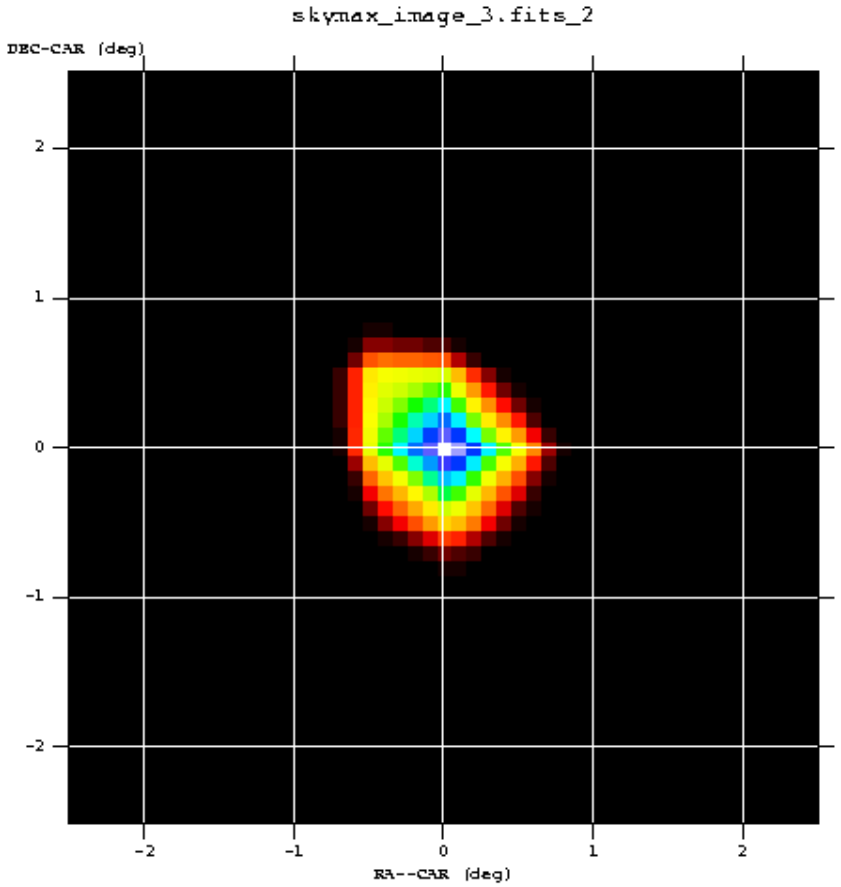


10º

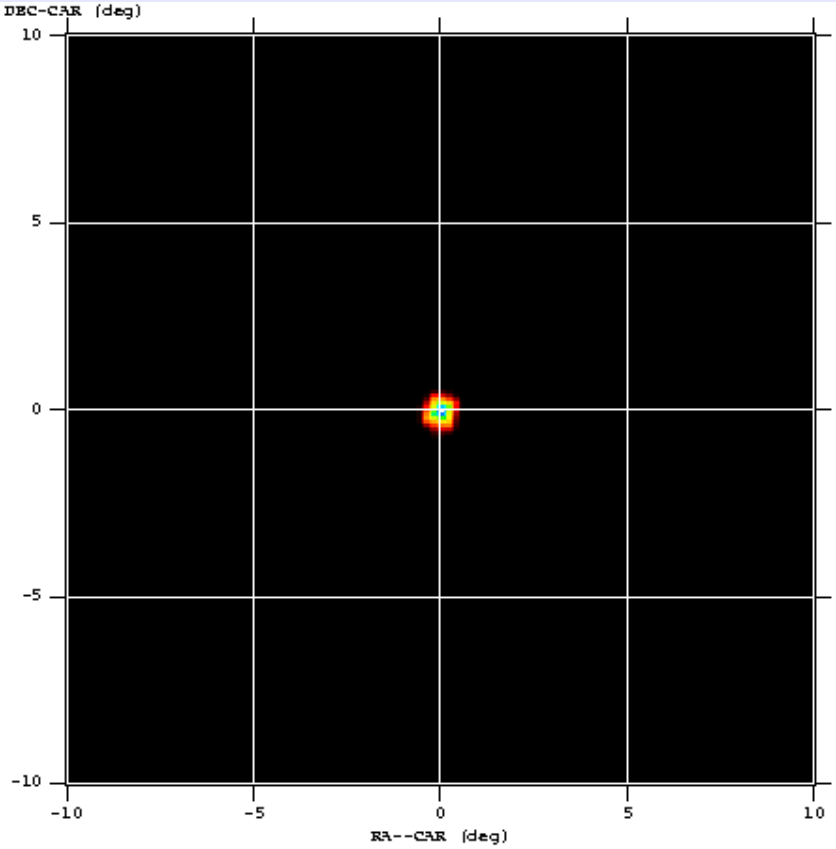
Multidetectors: Singles(no PSD) + doubles +triples
^{60}Co 125m on–axis
spiskymax IRF from GSFC



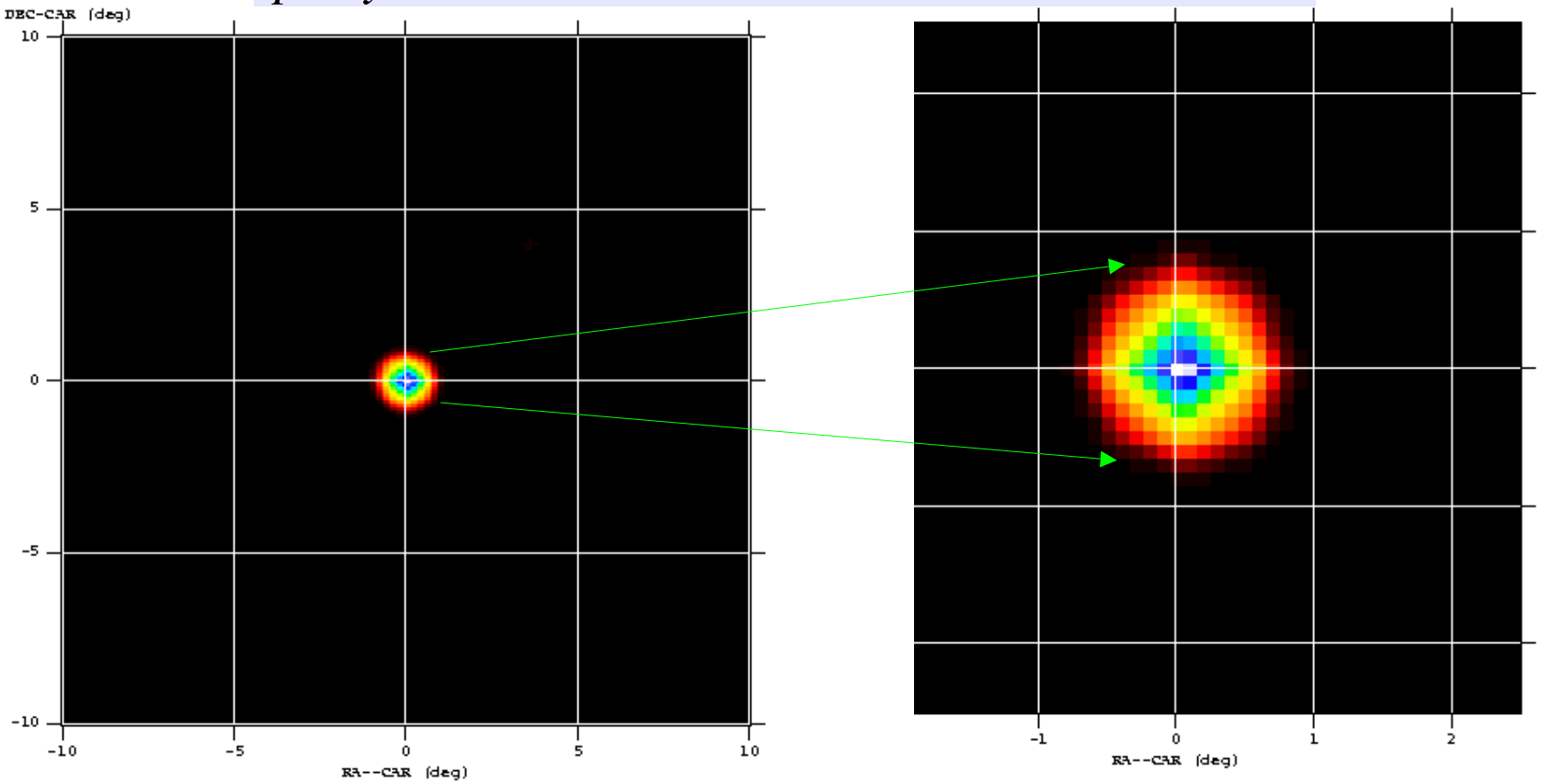
Multidetectors: Singles(no PSD) + doubles +triples
^{60}Co 125m 11 pointings
spiskymax IRF from GSFC



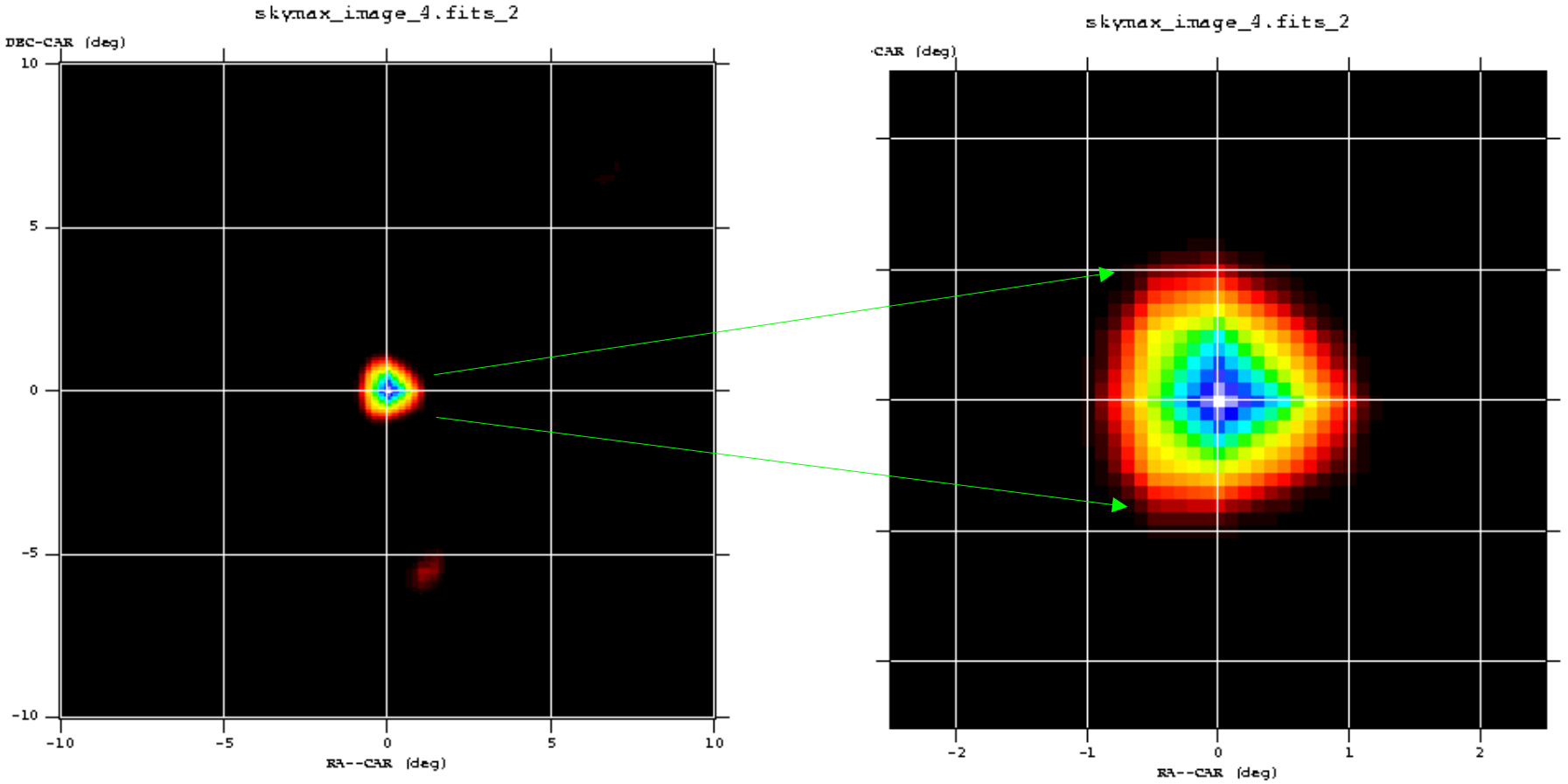
Singles+PSD + doubles +triples
BLC run 214
^{60}Co 125m 1 pointing on–axis 30º *rotation about X*
spiskymax IRF from GSFC



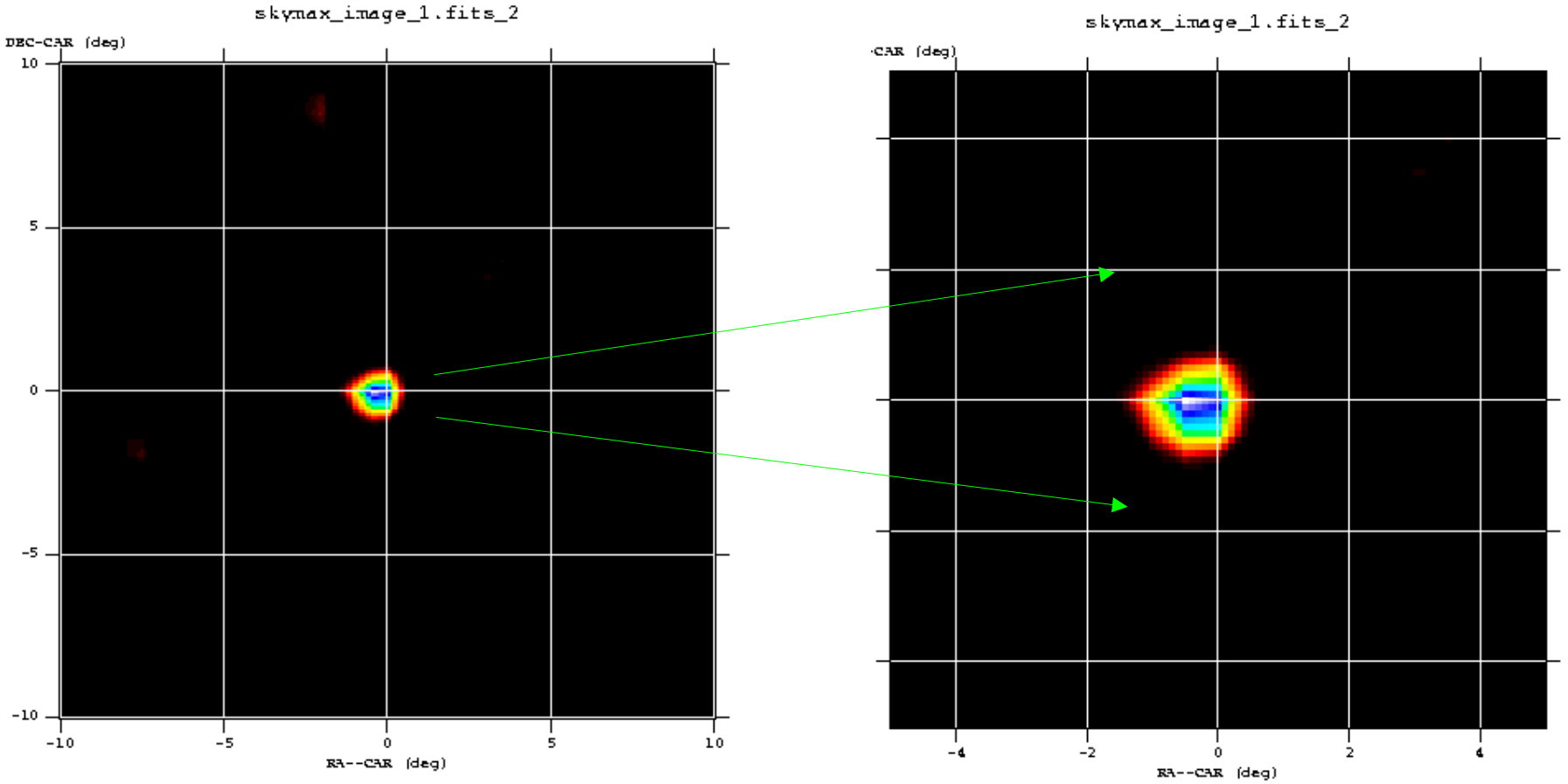
Multidetectors: Singles+PSD + doubles +triples
^{60}Co 125m 11 pointings
spiskymax IRF from GSFC



Multidetectors: doubles + triples ONLY
^{60}Co 125m 1 pointing, on−axis, BLC run 31
spiskymax IRF from GSFC



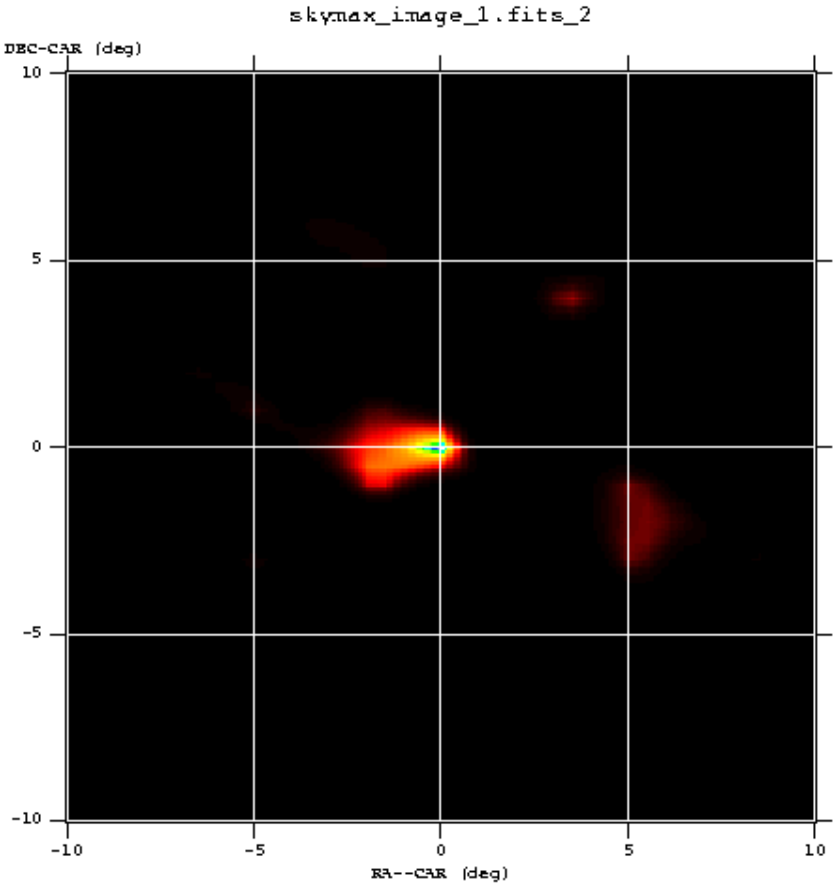
Multidetectors: doubles + triples ONLY
^{60}Co 125m 1 pointing, 2°, BLC run 37
spiskymax IRF from GSFC



Multidetectors: singles +PSD +doubles + triples
^{60}Co 125m 2 pointings, 2°, BLC run 31+37 *SUMMED*
spiskymax IRF from GSFC

Analysed as
single pointing
–> 2 sources 2° sep

In absence of
dithering:
poor result

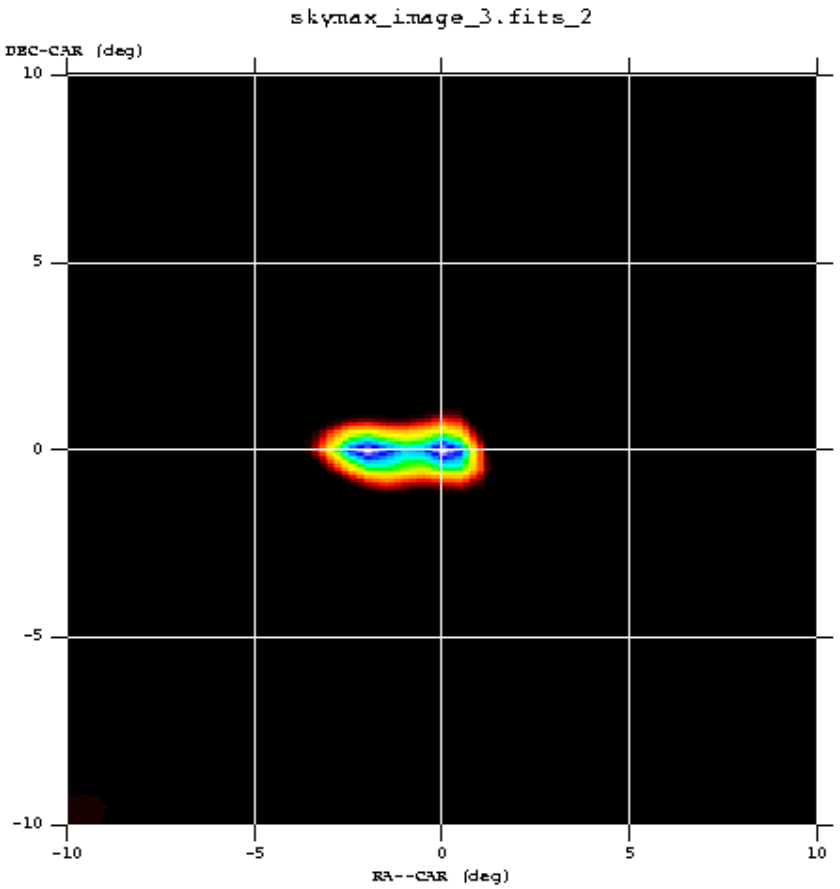


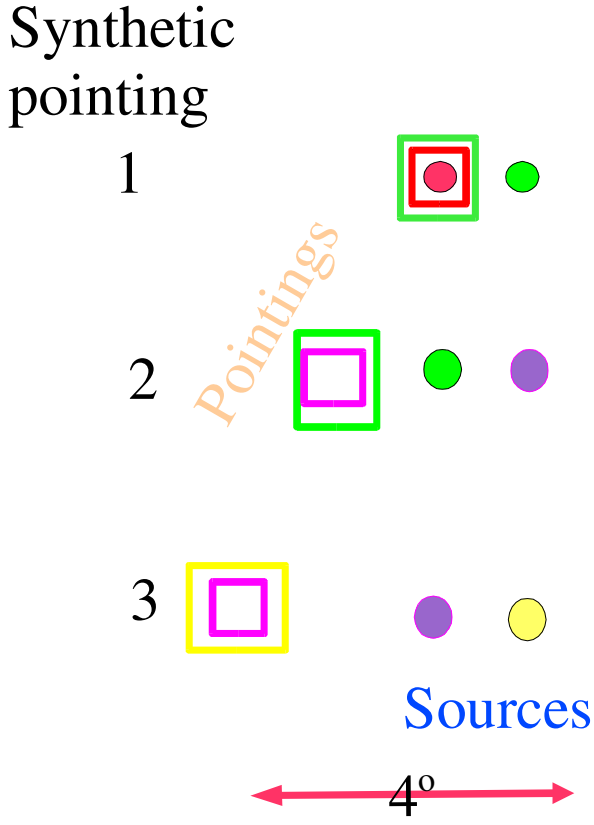
Synthesize dithered observation of 2 sources separated by 2°

^{60}Co 125m singles (no PSD channel)

5 pointings, *spisumhist* to synthesize data

Shows how dithering improves imaging by sampling full mask pattern



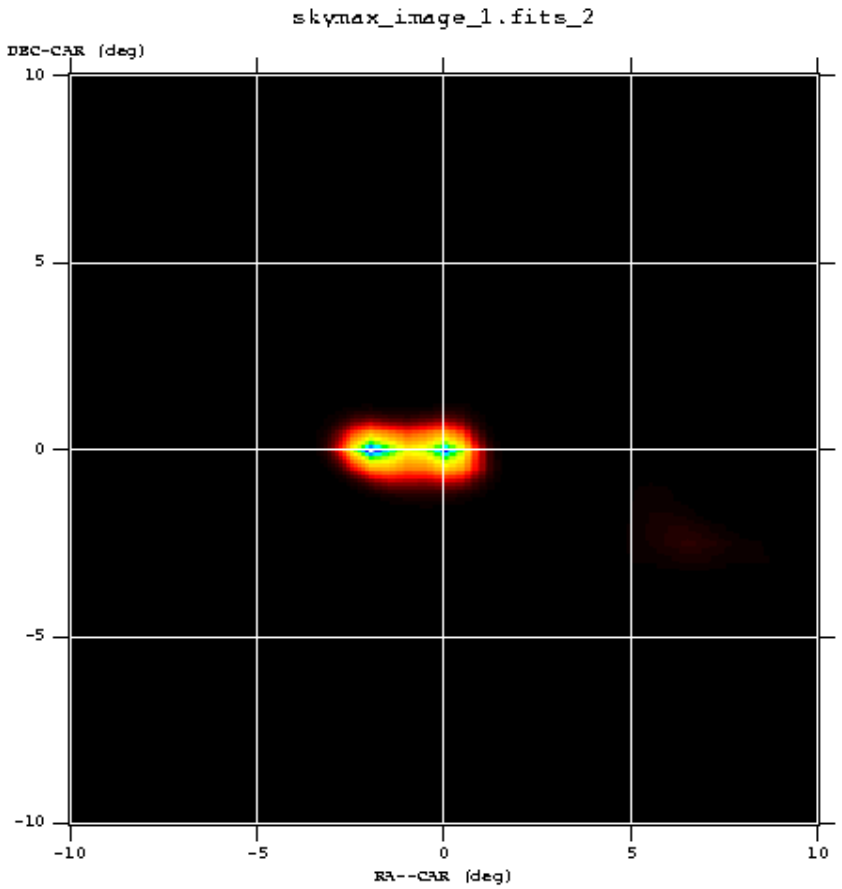


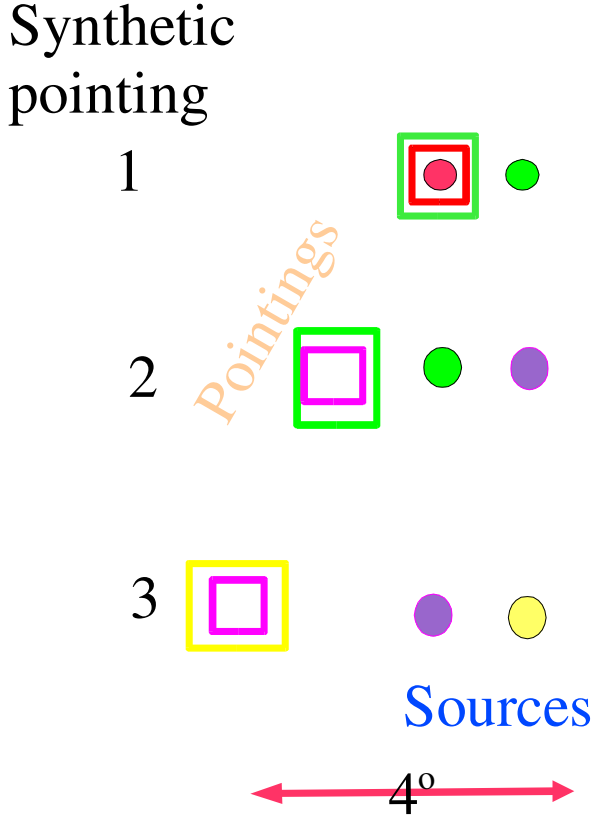
Synthesize dithered observation of 2 sources separated by 2°

^{60}Co 125m singles + PSD +doubles+triples

5 pointings, *spisumhist* to synthesize data

Shows how dithering improves imaging by sampling full mask pattern



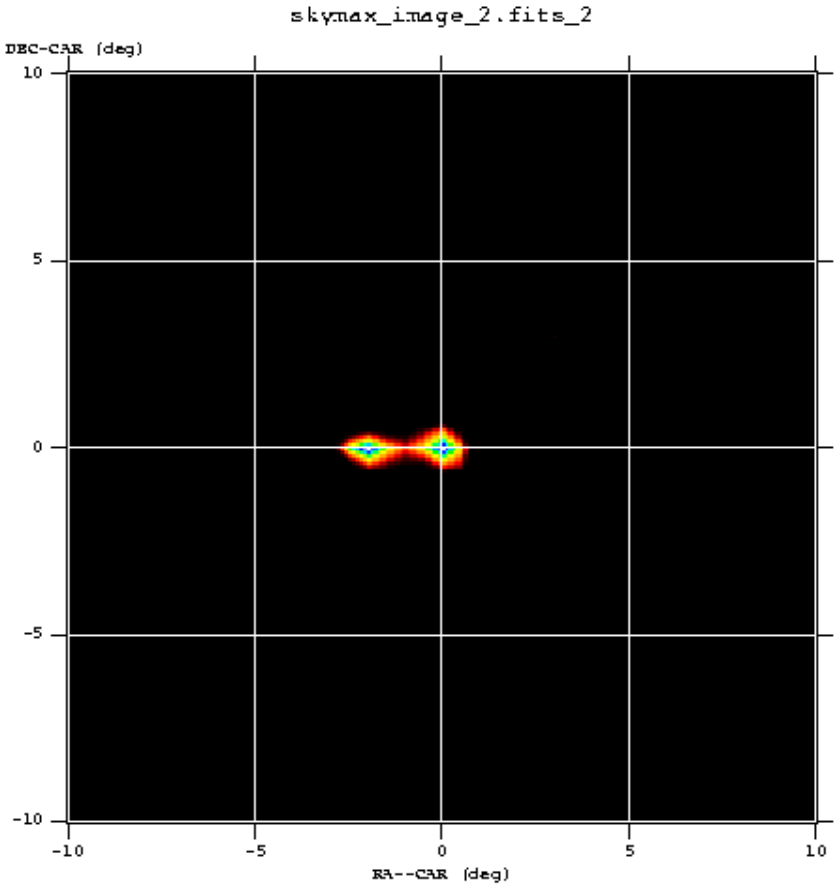


Synthesize dithered observation of 2 sources separated by 2°

^{60}Co 125m singles + PSD +doubles+triples

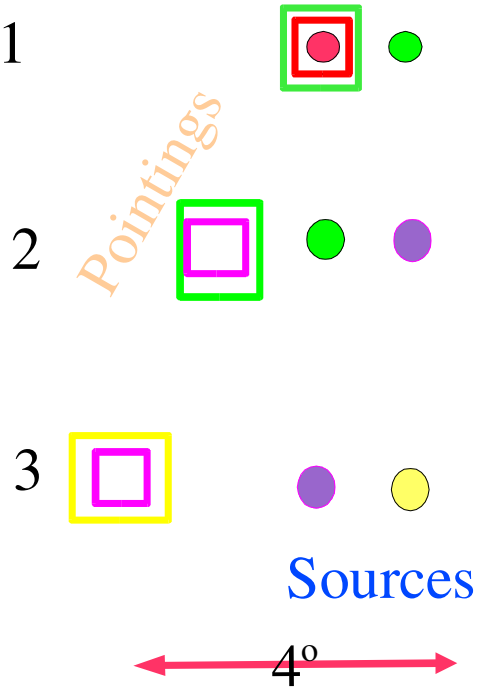
5 pointings, *spisumhist* to synthesize data

Shows how dithering improves imaging by sampling full source pattern



Higher iteration

Synthetic pointing

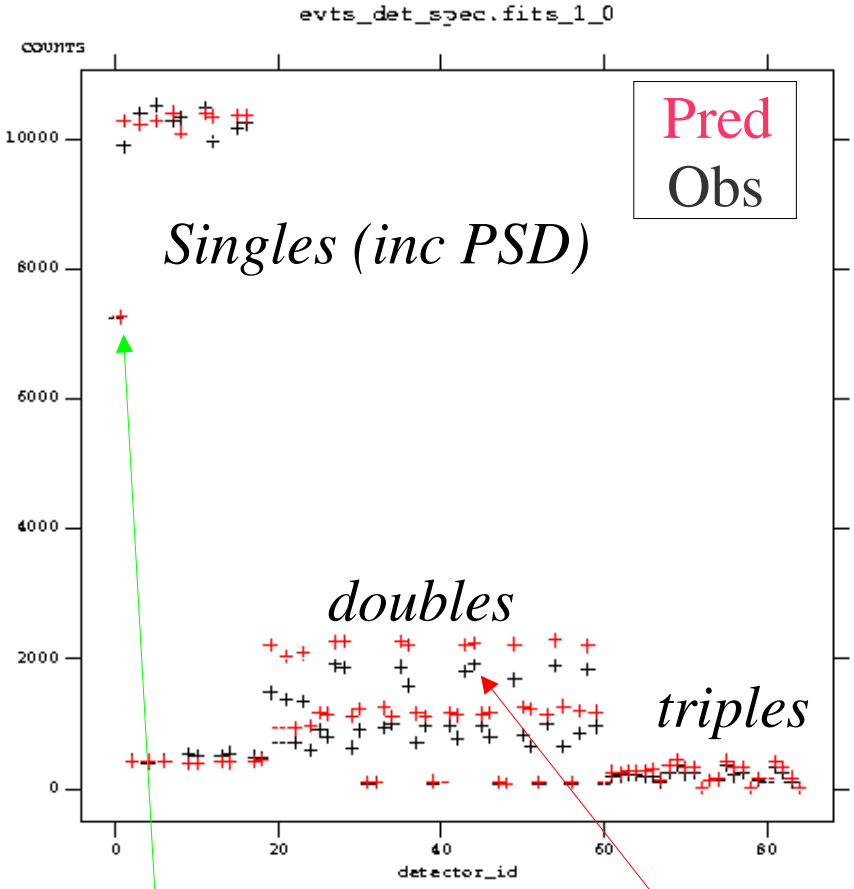


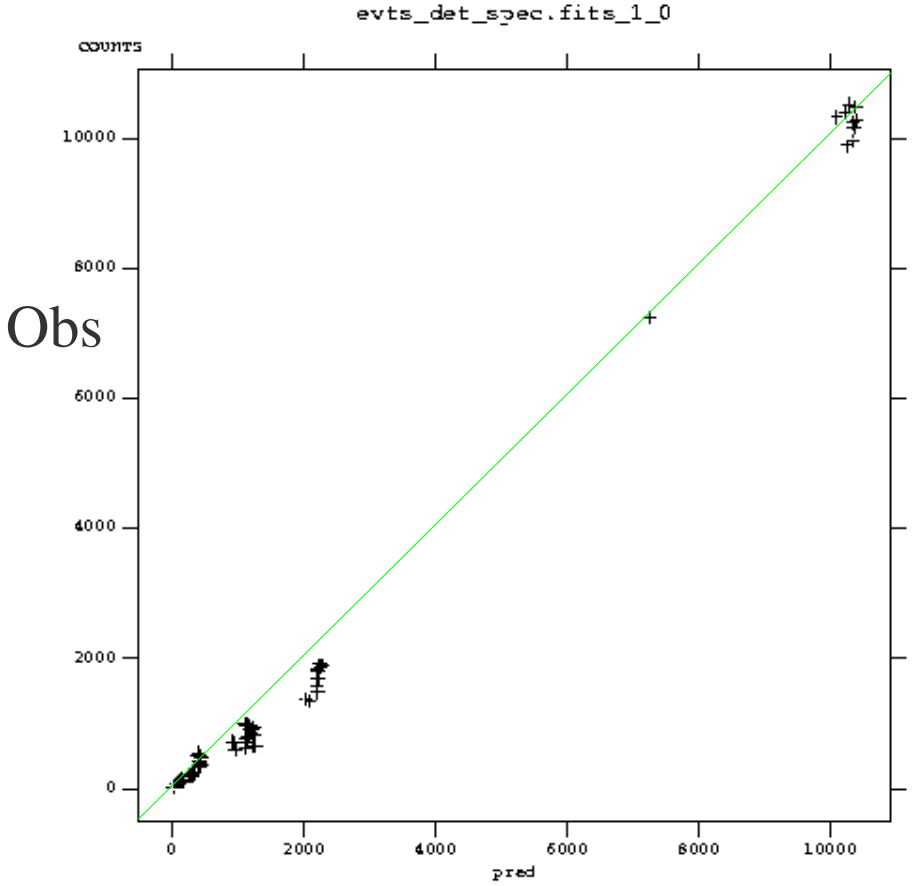
Spihist 2.1.1 and livetime problems, improved in next slide

Comparison of observed and predicted counts

^{60}Co 125m using new GSFC IRFs.

BLC Run 31 on–axis





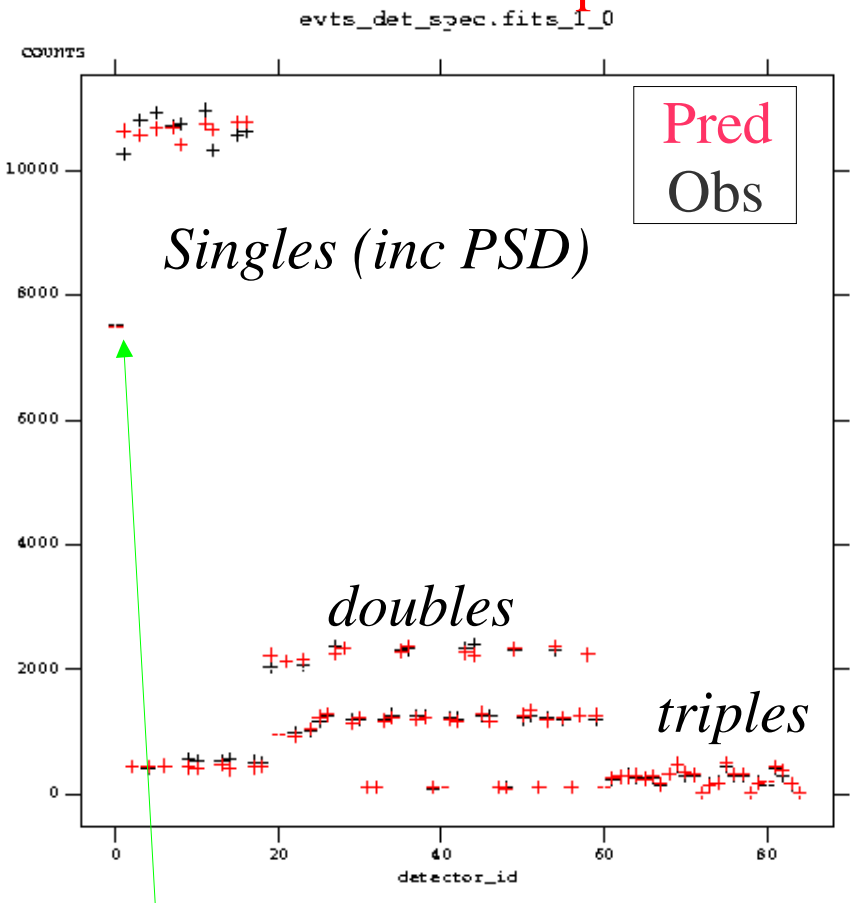
Doubles overpredicted!

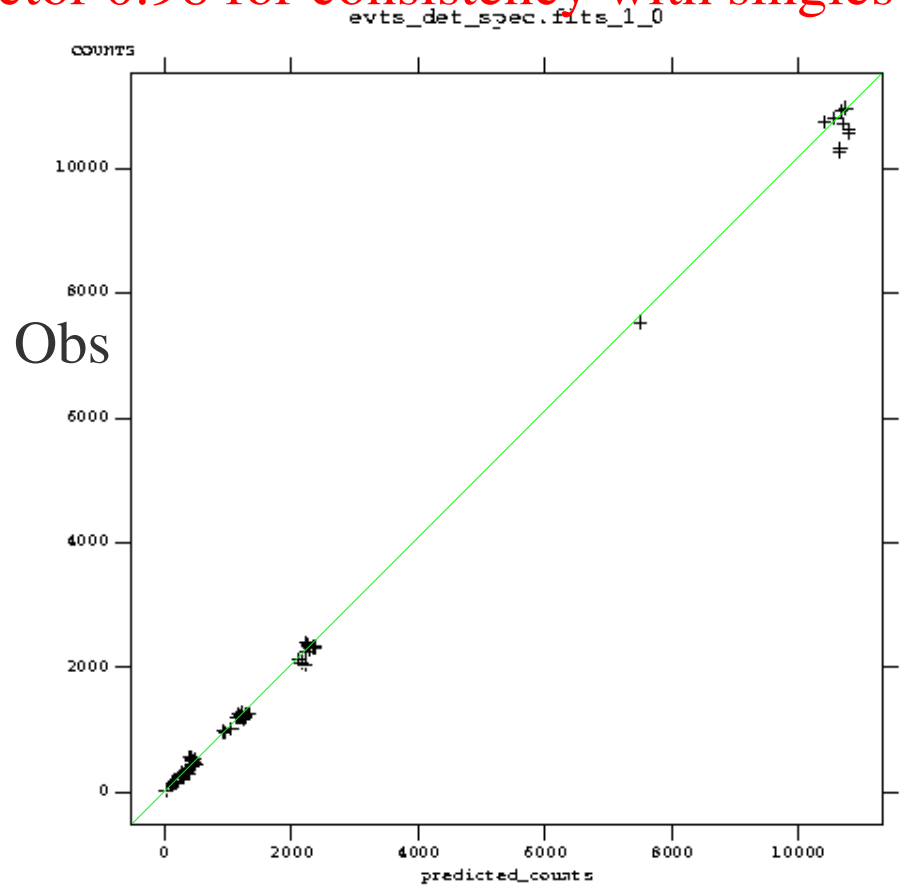
Pred

Central obscurer well modelled

Comparison of observed and predicted counts
^{60}Co 125m using new GSFC IRFs.

BLC Run 31 on–axis, spihist 2.1.2
multiples livetime factor 0.98 for consistency with singles





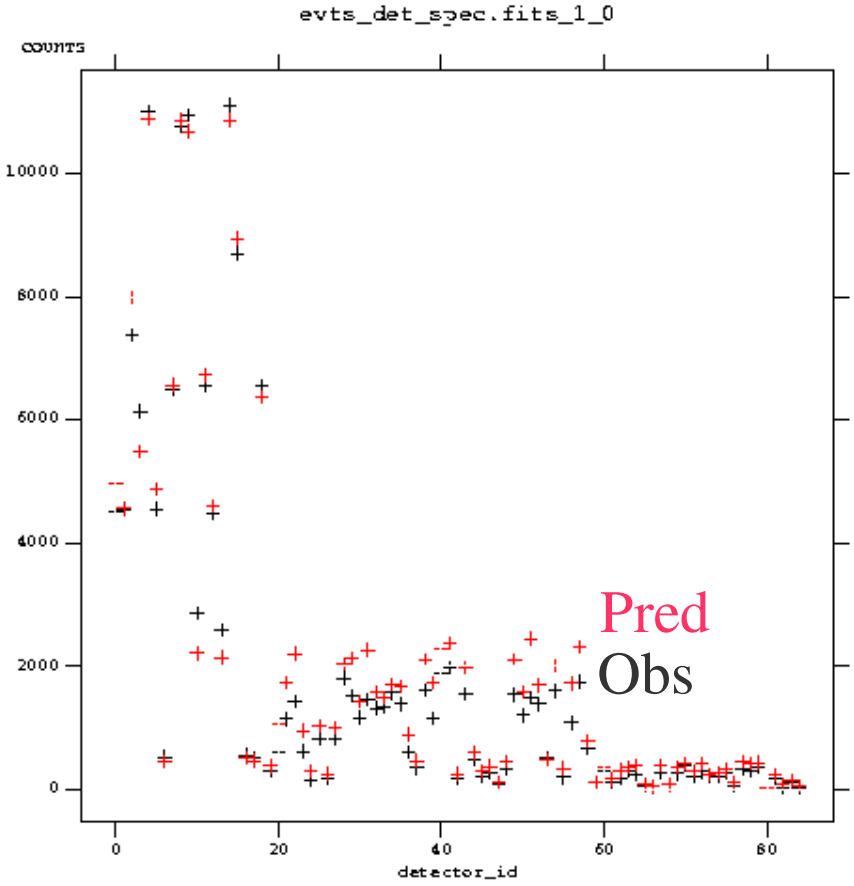
GOOD FIT !

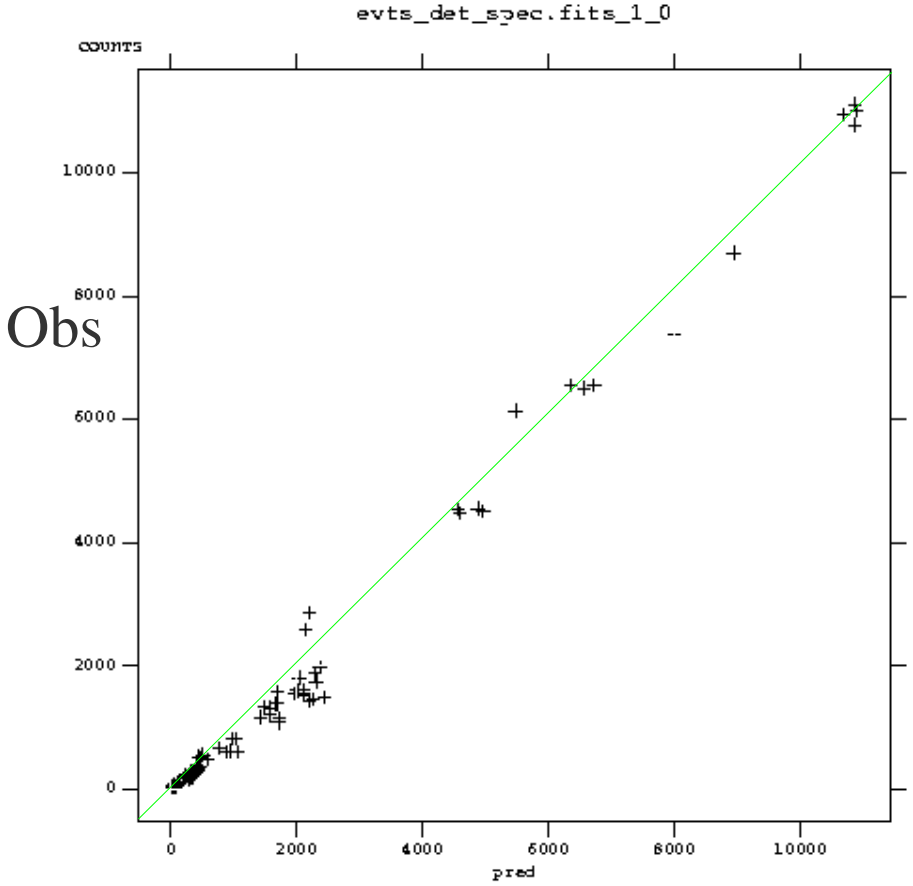
Pred

Central obscurer well modelled

Comparison of observed and predicted counts ^{60}Co 125m using GSFC IRFs.

BLC Run 37 inclination = 2°



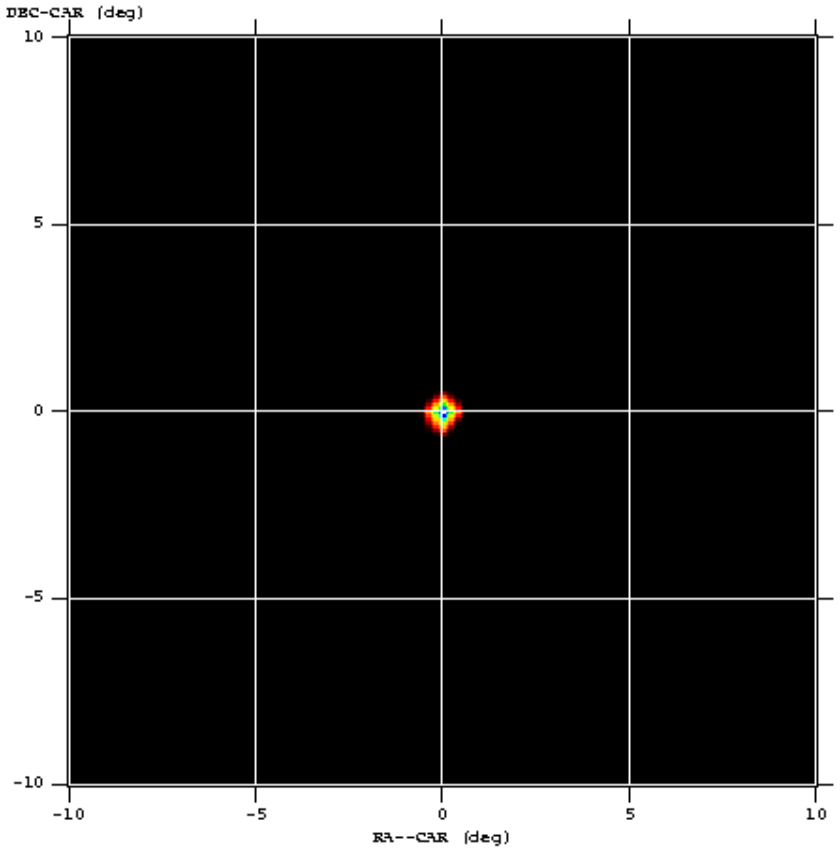


Doubles overpredicted !

Singles+PSD+doubles+triples BLC run 65

^{137}Cs 125m 0 º

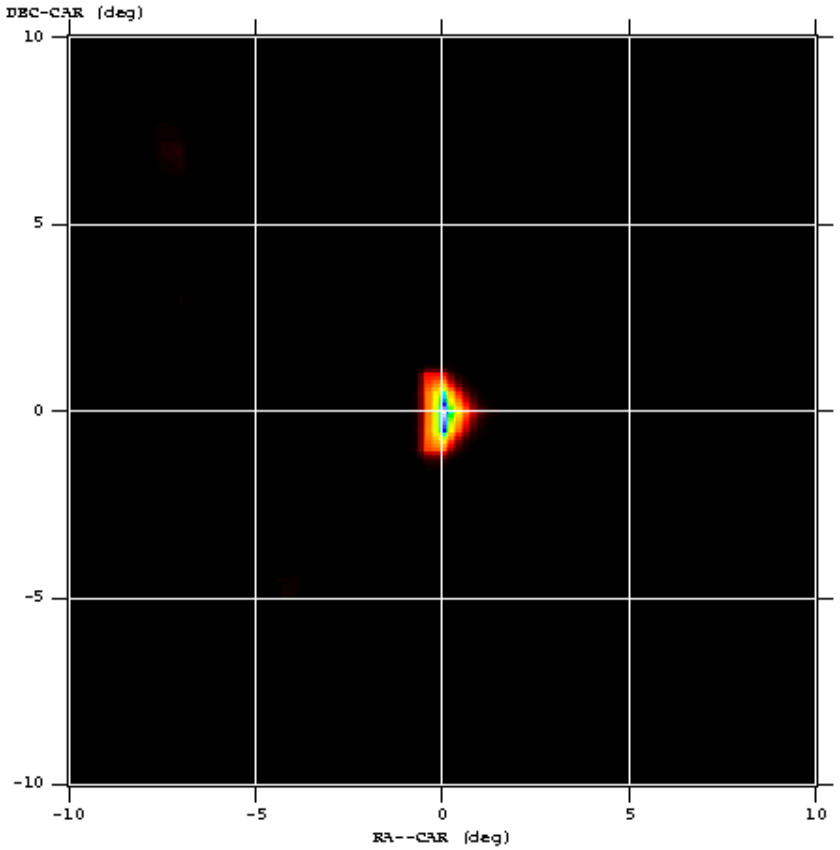
spiskymax IRF from GSFC



Singles+PSD+doubles+triples BLC run 66

^{137}Cs 125m 2 °

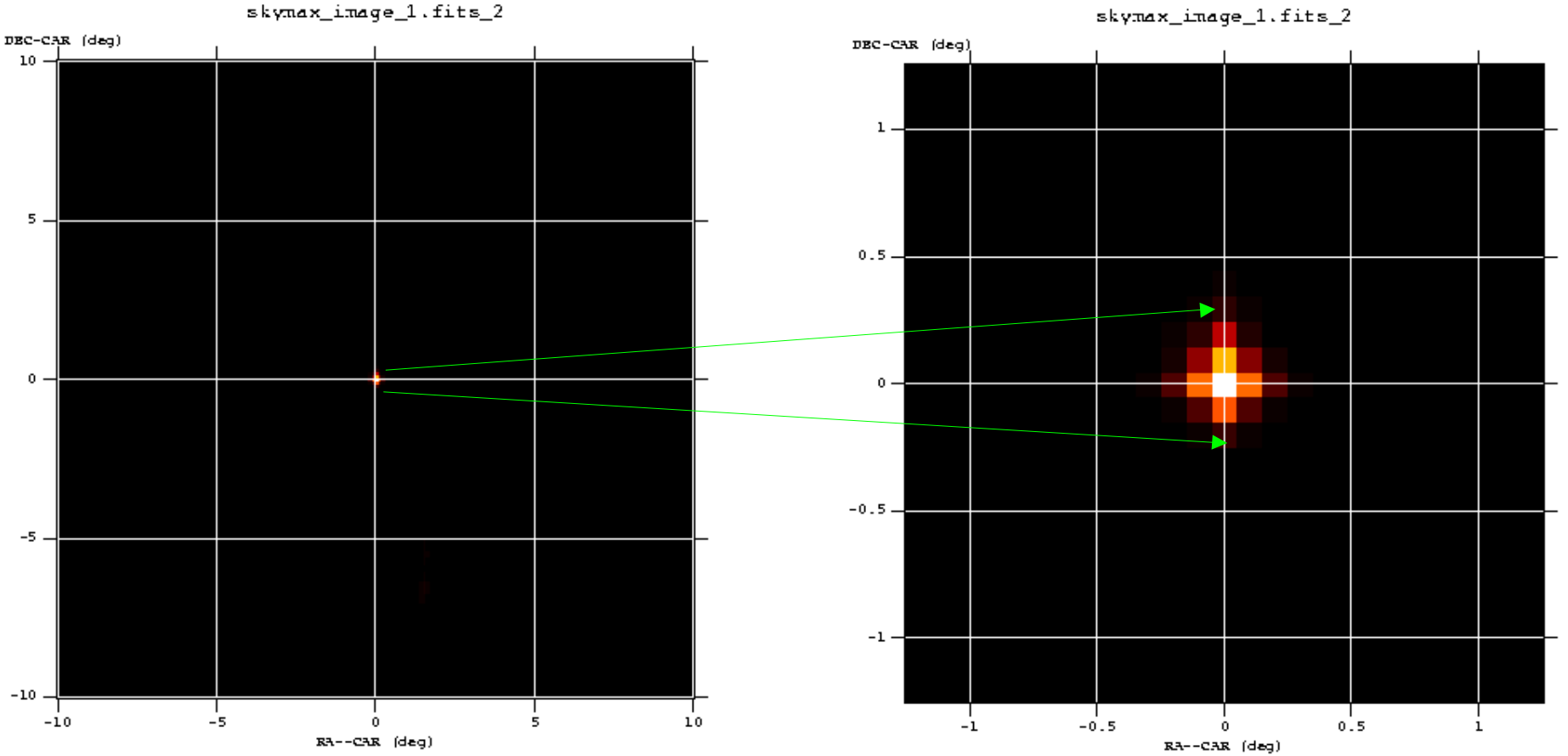
spiskymax IRF from GSFC



Singles+doubles+triples BLC run 134

^{241} Am 59.5 keV 125m 0º

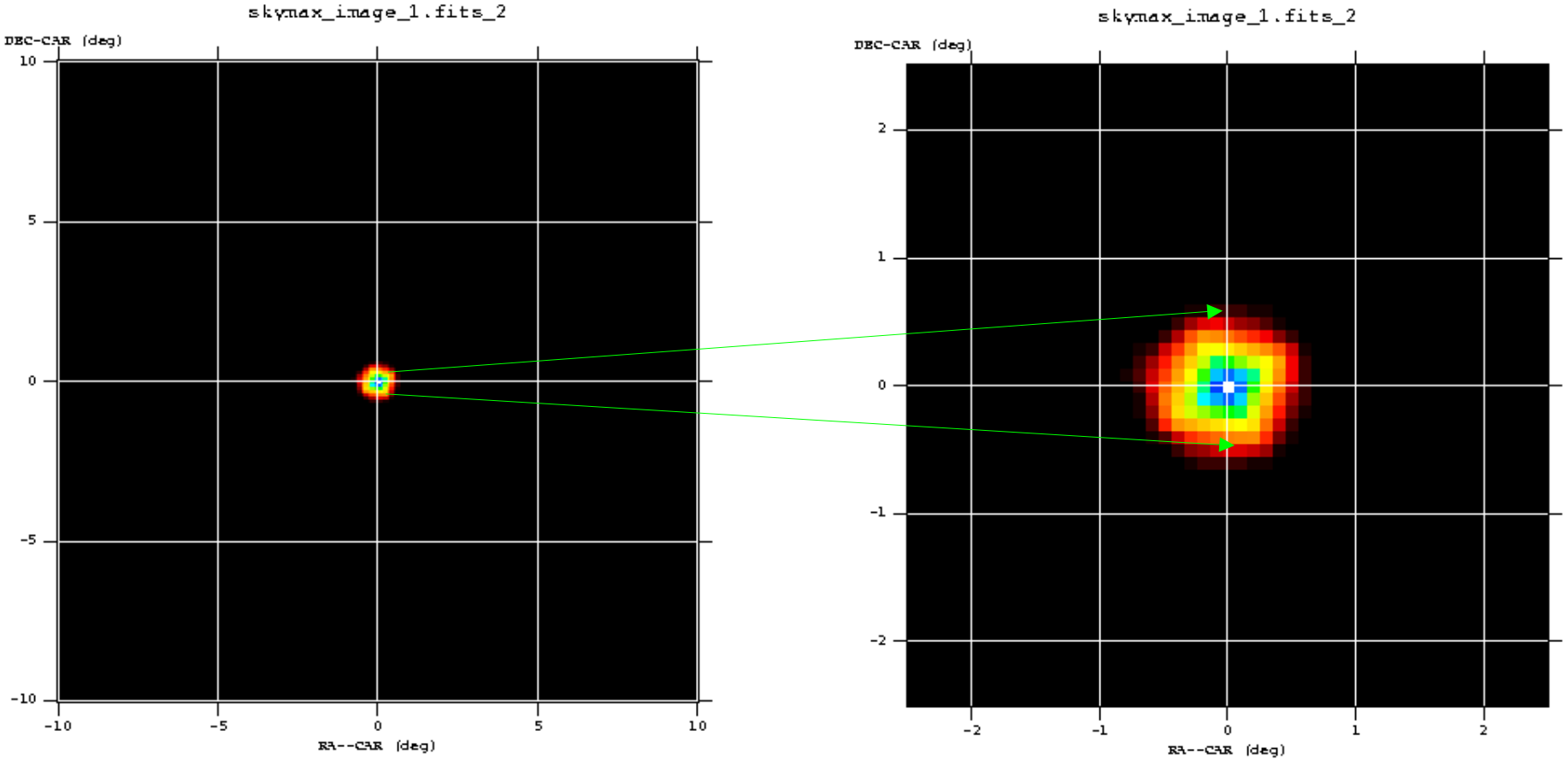
spiskymax IRF from GSFC



Singles+doubles+triples BLC run 329

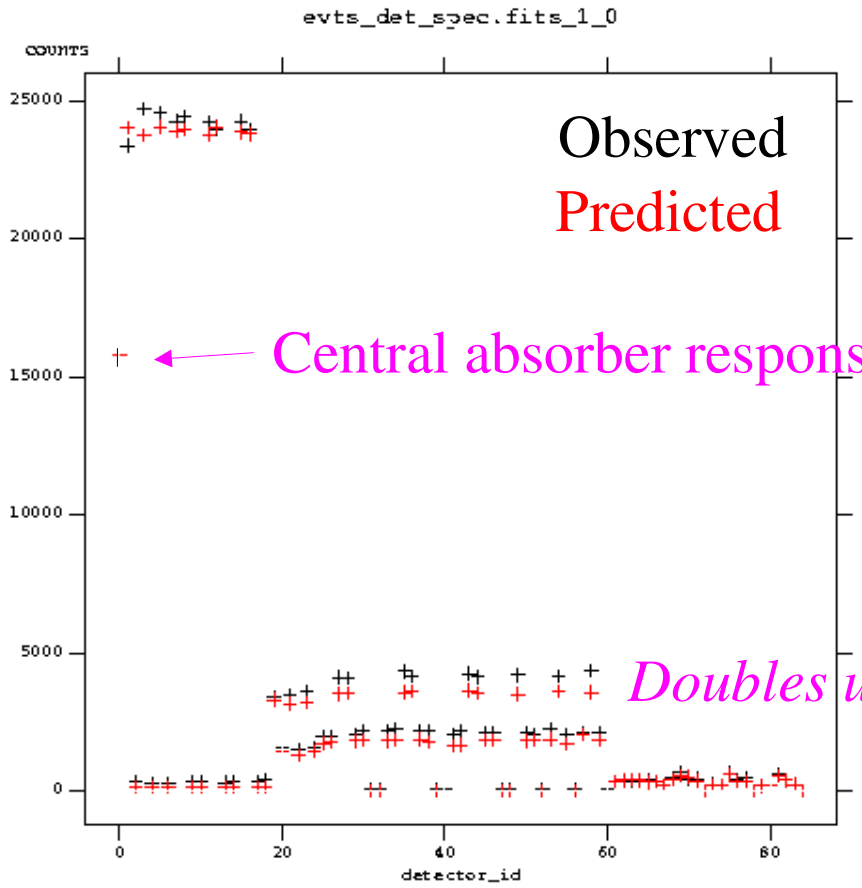
^{24}Na 2754 keV 125m 0°

spiskymax IRF from GSFC



^{137}Cs 661 keV

BLC Run 65 0°

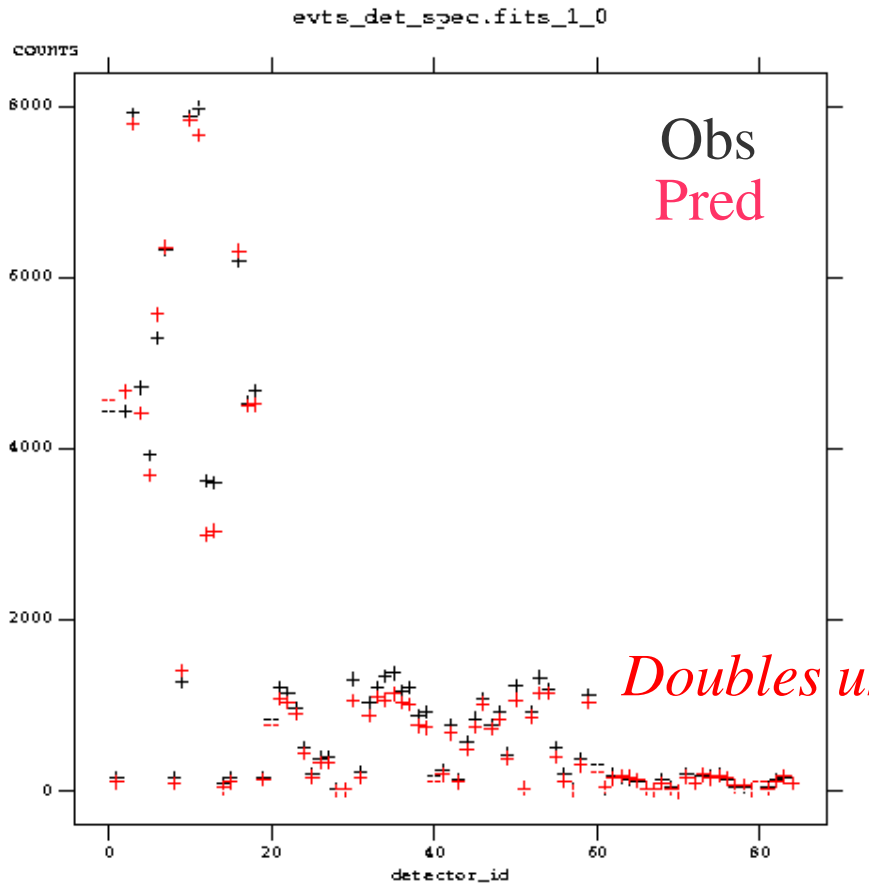


Central absorber response OK

Doubles underpredicted !

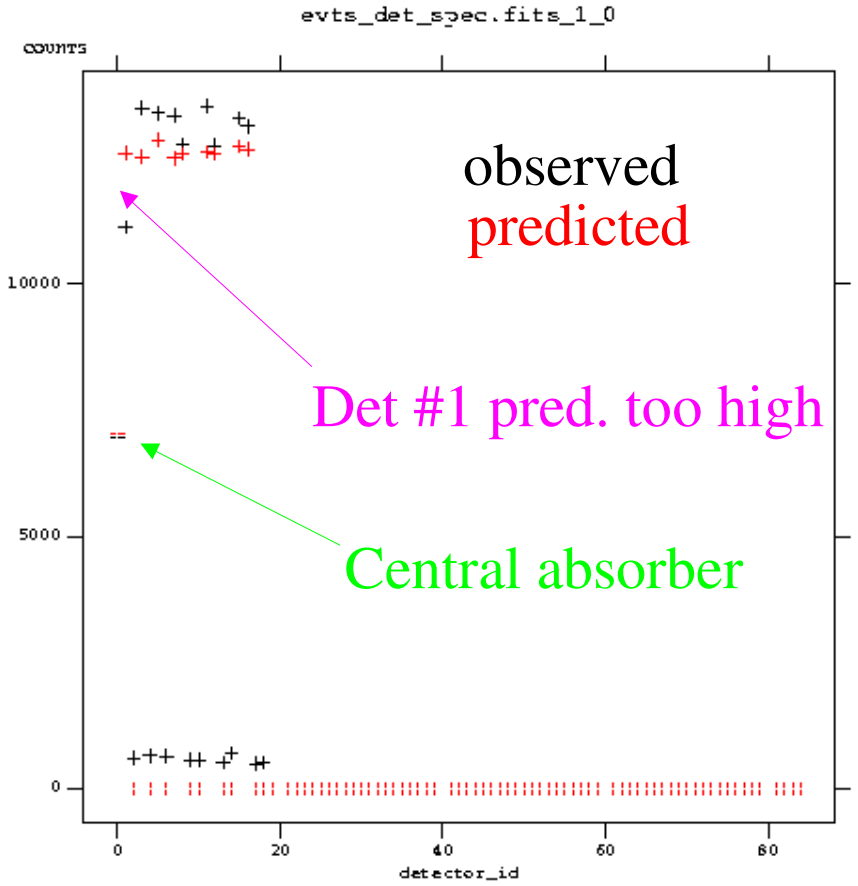
Comparison of observed and predicted counts
^{137}Cs 125m using GSFC IRFs.

BLC Run 66 2°



Doubles underpredicted !

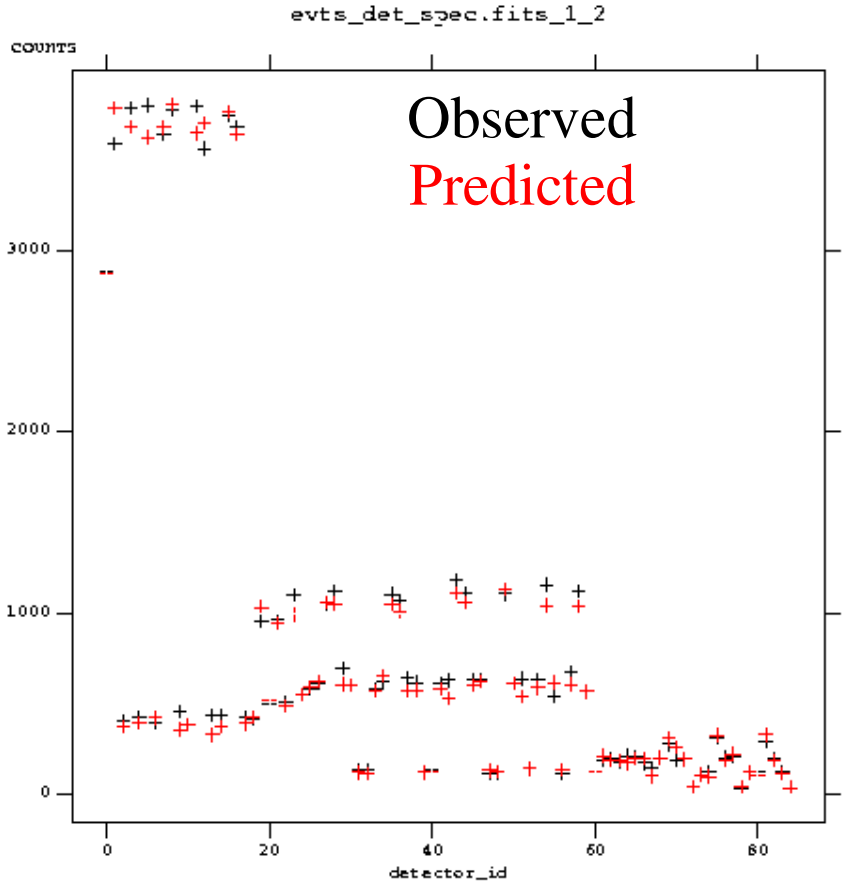
^{241}Am 59.5 keV BLC run 134 on–axis



NB prediction *without* background

^{24} Na 2754 keV BLC run 329 on–axis

on–axis, spihist 2.1.2
multiples livetime factor 0.98 for consistency with singles



Absolute source fluxes

Using new GSFC response, fitting single + PSD events

^{60}Co 1173 keV

BLC 125m run 31 fitted flux = 1.75 [**1.57**]cm^{-2} s^{-1}

Nominal value from „list of high activity sources“:
0.25 Ci, 125m, air trans=37.34% –> 1.76, monitor–> 1.95 cm^{-2} s^{-1}

^{137}Cs 661 keV

BLC 125m run 65 fitted flux = 1.47 cm^{-2} s^{-1}

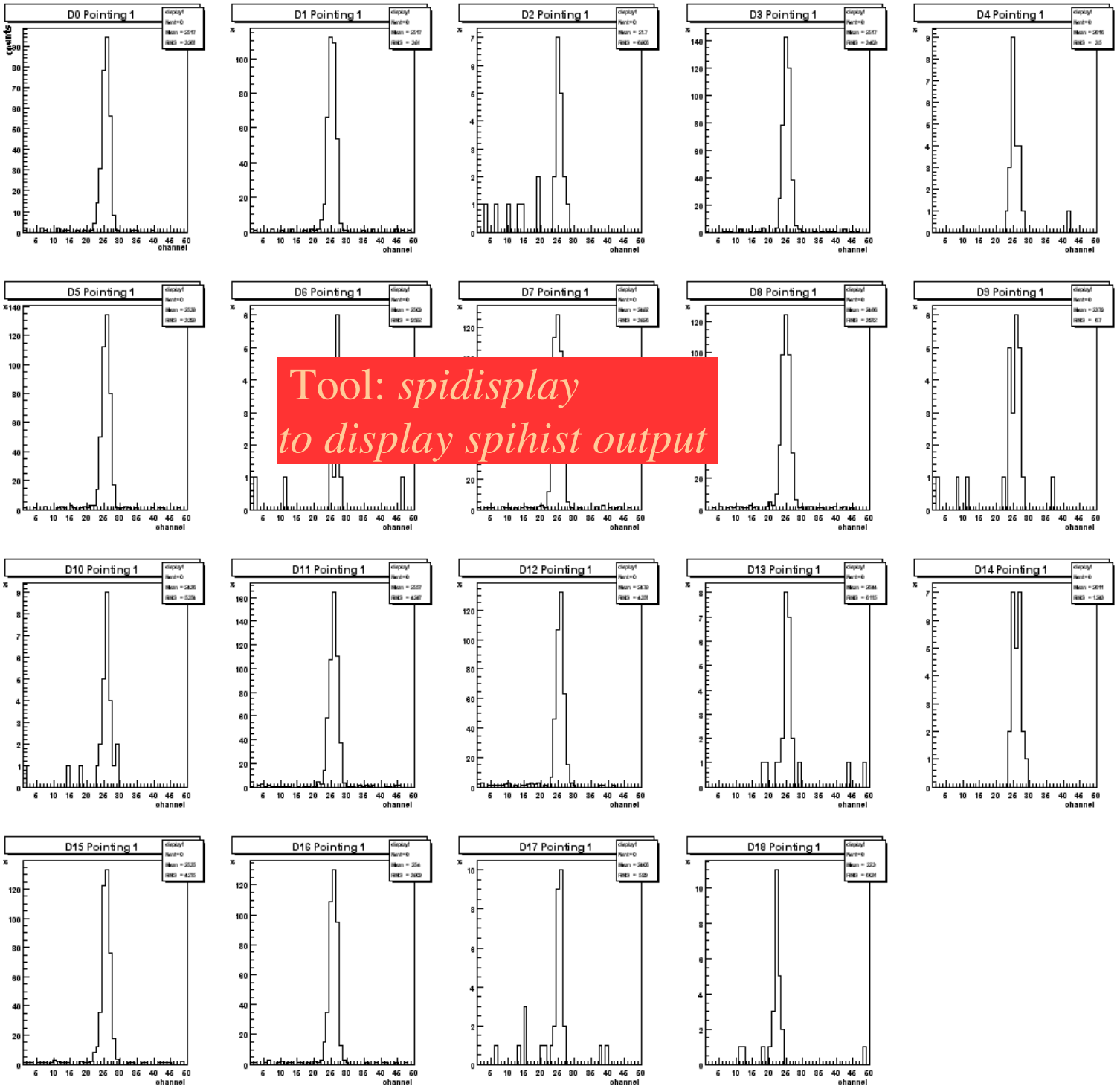
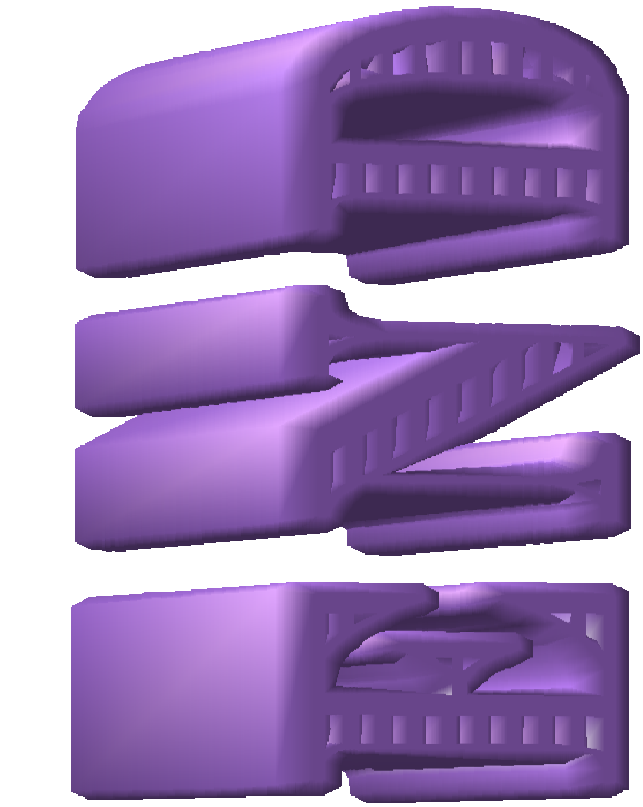
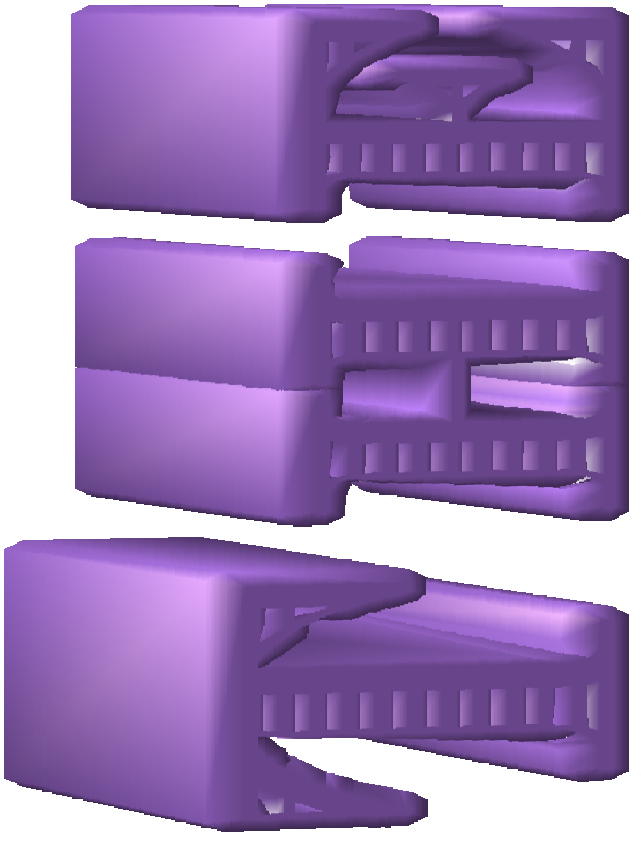
Nominal value from „list of high activity sources“:
0.5 Ci, R=85.4%,125m, air trans=29.74% –> 2.39, monitor–>1.74 cm^{-2} s^{-1}

^{241}Am 59.5 keV

BLC 125m run 134 fitted flux = 0.75 cm^{-2} s^{-1}

Nominal value from „list of high activity sources“:
3 Ci, R=35.9%,125m, air trans=5.72% –> 1.16, monitor–> 0.92 cm^{-2} s^{-1}

Monitor values from B. Teegarden, preliminary


D0 Pointing 1
D1 Pointing 1
D2 Pointing 1
D3 Pointing 1
D4 Pointing 1
D5 Pointing 1
D6 Pointing 1
D7 Pointing 1
D8 Pointing 1
D9 Pointing 1
D10 Pointing 1
D11 Pointing 1
D12 Pointing 1
D13 Pointing 1
D14 Pointing 1
D15 Pointing 1
D16 Pointing 1
D17 Pointing 1
D18 Pointing 1
counts
channel
Tool: spidisplay
to display spihist output