X-ray characterization
of
X-ray undetected sources

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FEASIBILITY PROGRESS REPORT

OLF's hint:
Given a *class* of sources (e.g. type, z interval)
work out mean X-ray properties (flux, luminosity, hardness ratio)

“high z sample” as a testing case

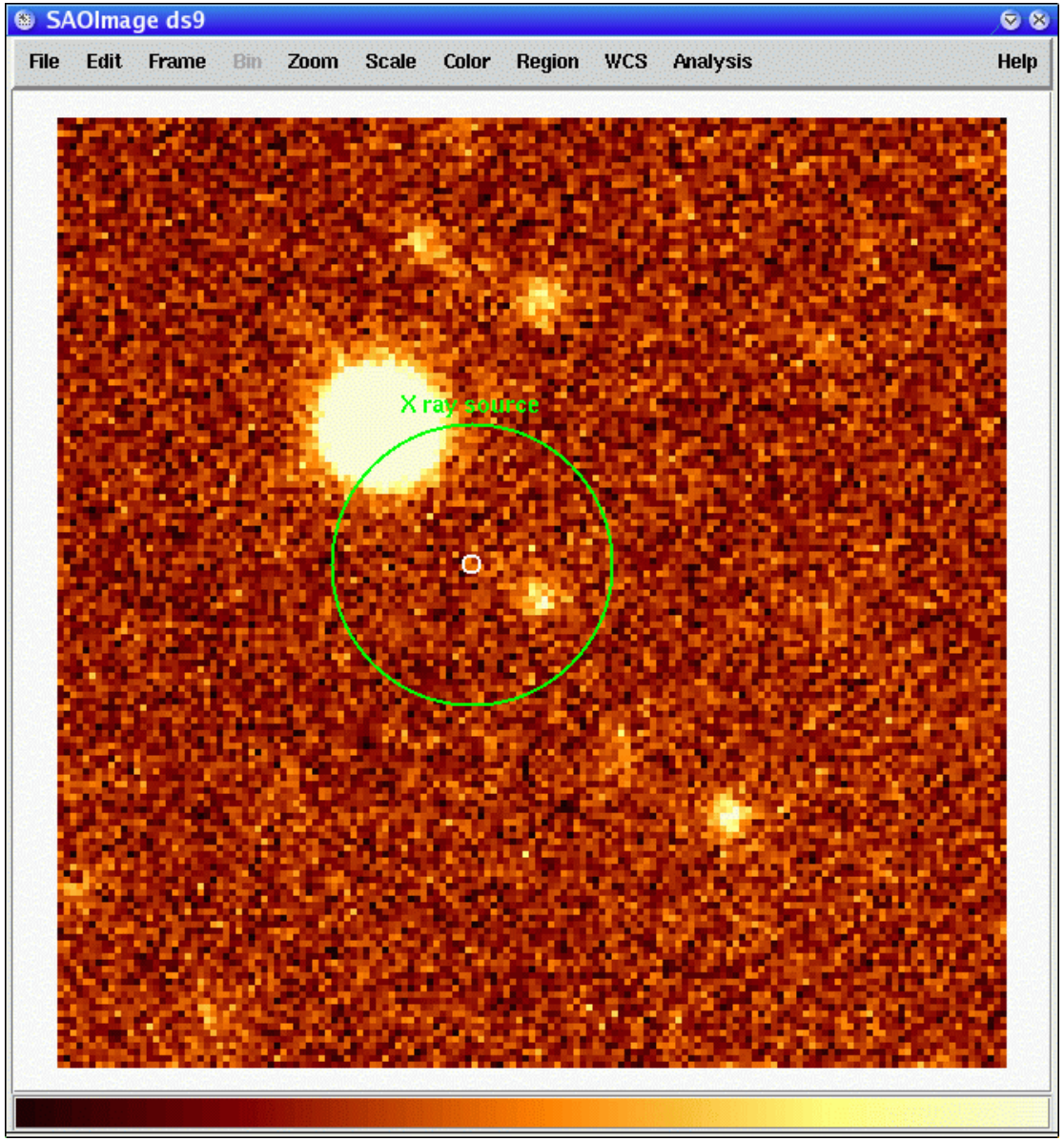
z between 1.4 and 2.5 =====> 276 objects
z between 2.5 and 3.5 =====> 101 objects
z between 3.5 and 5 =====> 70 objects

Step one:
check for detections below the “canonical” 4 level. (Easy, fast)

1 source found:

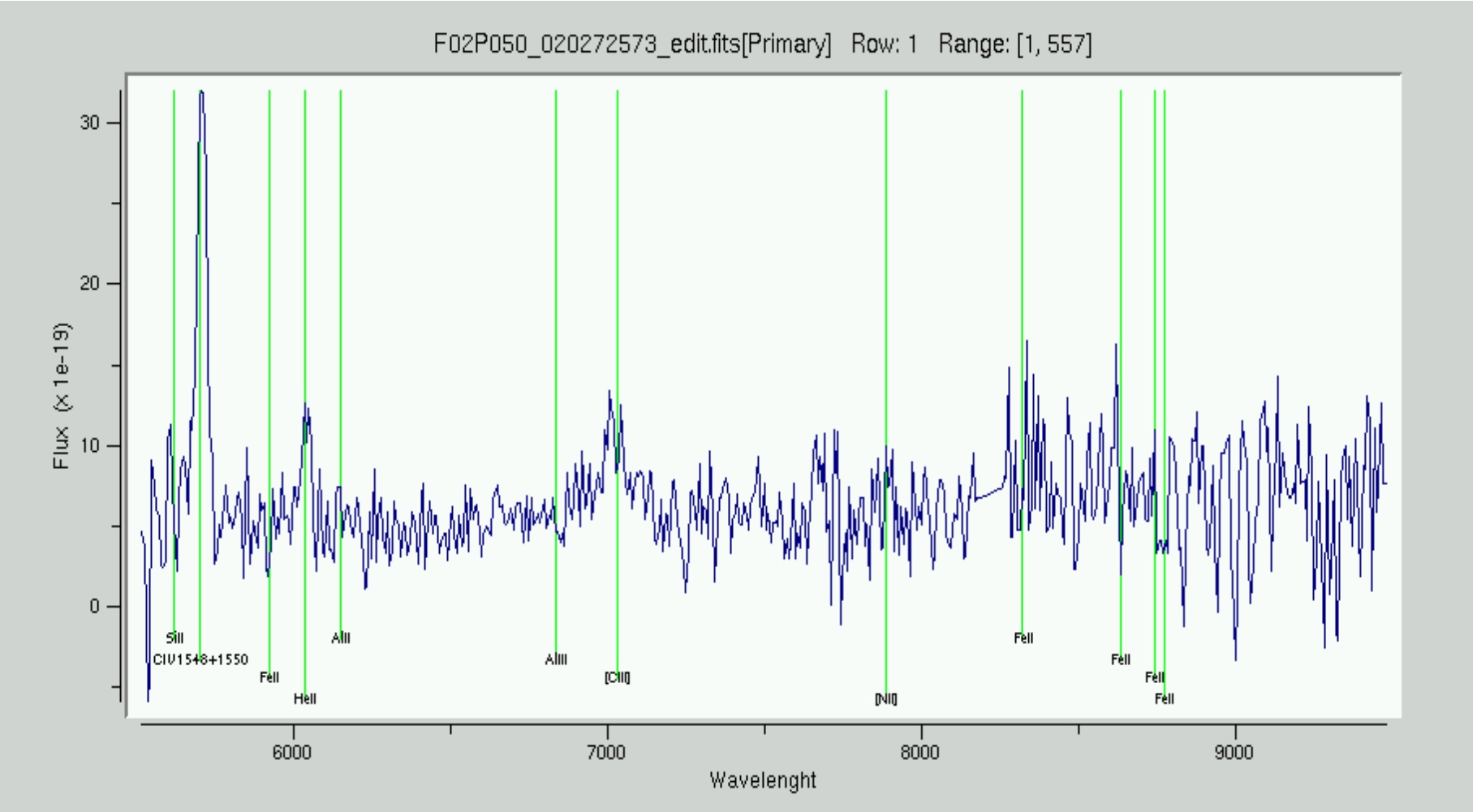
0.5-2.0 keV, 2.3

18.7556 counts 3.1531e-15 erg/cm2/s



020272573 (2.120 arcsec)

I= 23.62



Narrow line AGN

repeat the exercise on the complete catalog .....

Step 2: circle-detect -> circle-stack

modify the "x-ray characterization program" so that

a) takes a **list of positions** in input

b) **extracts a sub-image per position**,

c) **stacks** the sub images

(and background maps and exposure maps)

c) re-do the **characterization** on the sub-image

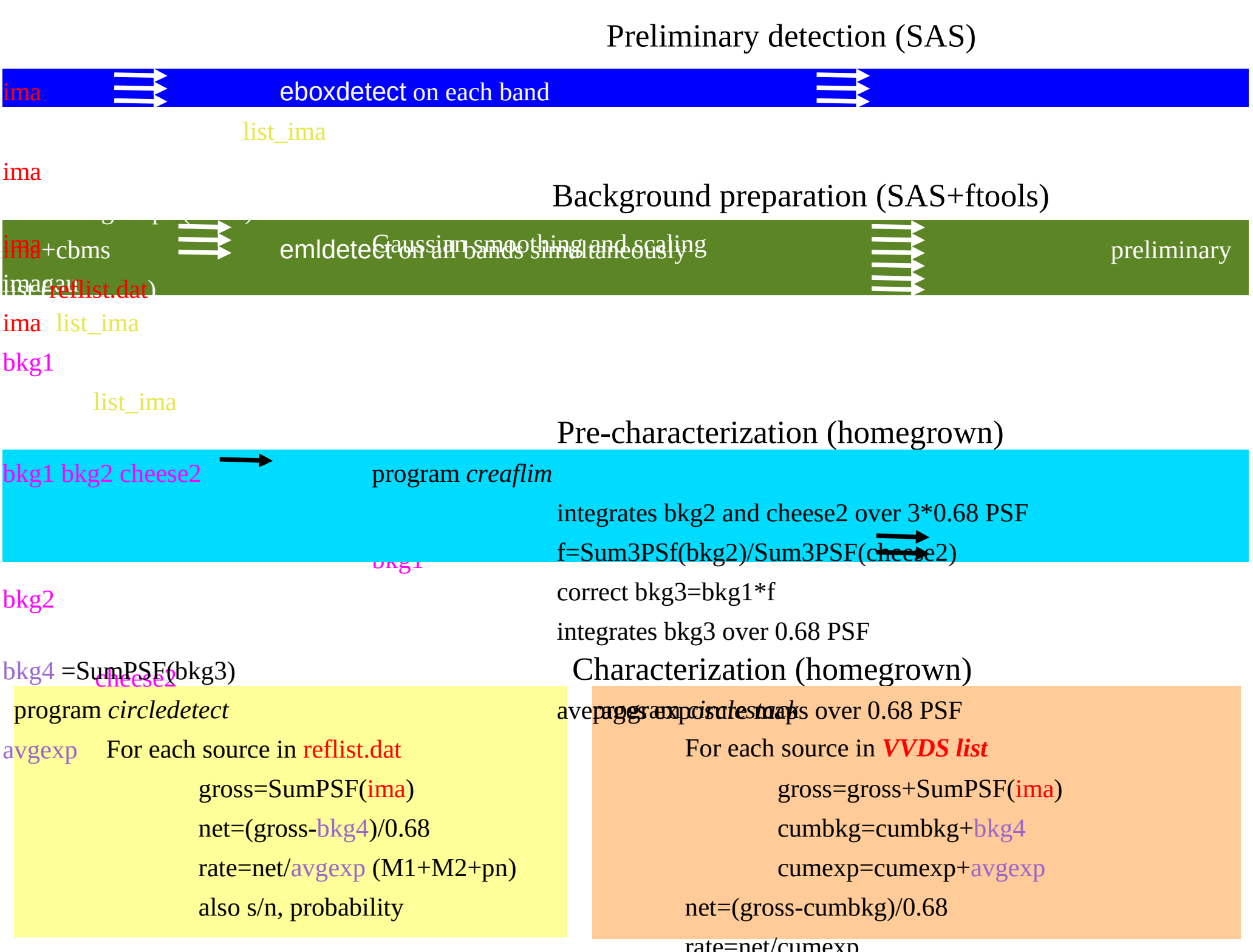
circle-stack tested on obvious cases

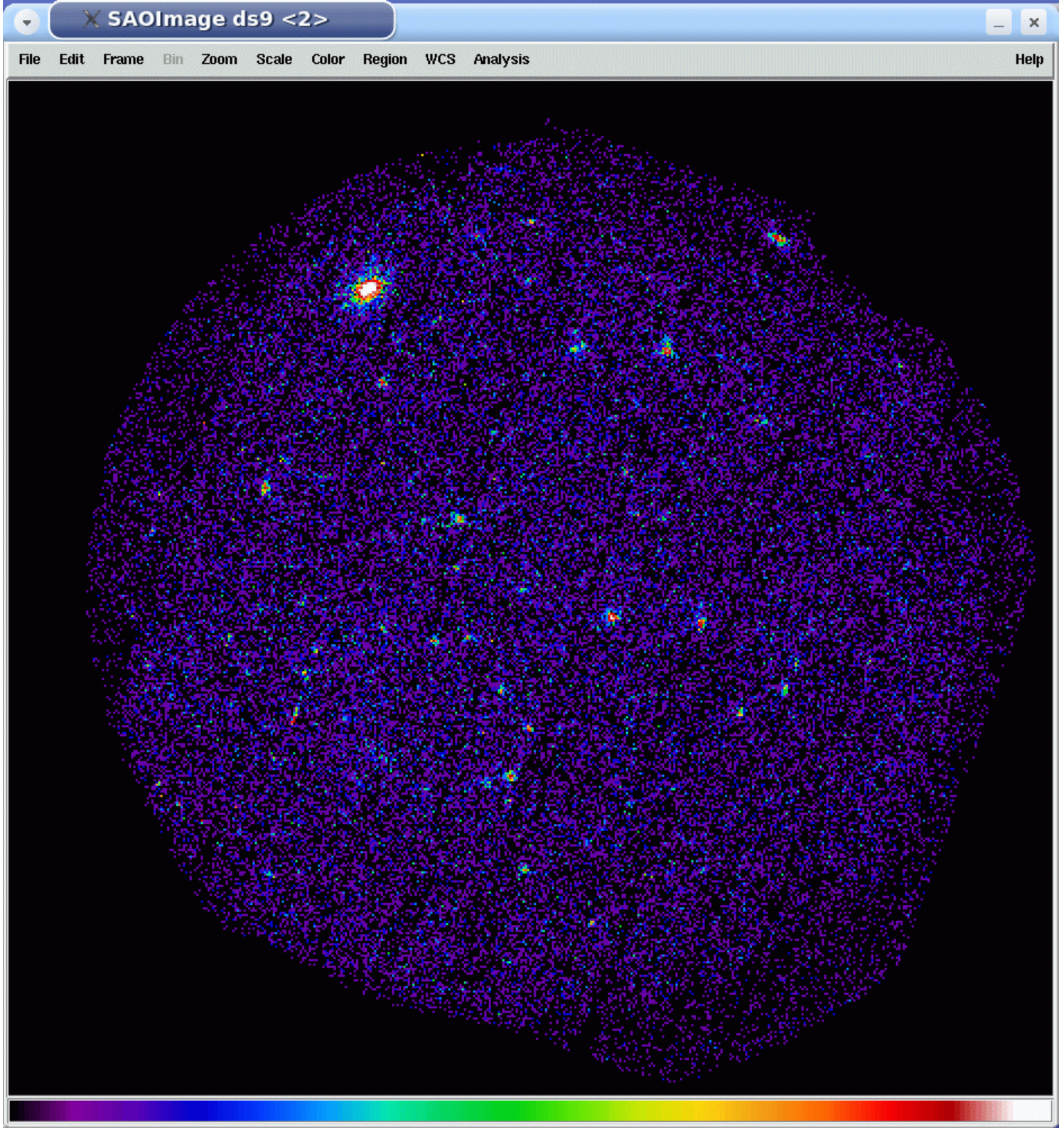
test1) input list of N REAL sources; output countrate

and error scales with N OK

test2) same using sources of similar characteristics (hardness ratio)

output hardness ration scales as N


Preliminary detection (SAS)
ima
eboxdetect on each band
list_ima
ima
Background preparation (SAS+ftools)
ima
ima+cbms
emldetect on all bands simultaneously
Gaussian smoothing and scaling
preliminary
reflist.dat)
ima list_ima
bkg1
list_ima
Pre-characterization (homegrown)
bkg1 bkg2 cheese2
program creaflim
integrates bkg2 and cheese2 over 3*0.68 PSF
f=Sum3PSF(bkg2)/Sum3PSF(cheese2)
correct bkg3=bkg1*f
integrates bkg3 over 0.68 PSF
bkg2
bkg4 =SumPSF(bkg3)
Characterization (homegrown)
program circledetect
avgexp
For each source in reflist.dat
gross=SumPSF(ima)
net=(gross-bkg4)/0.68
rate=net/avgexp (M1+M2+pn)
also s/n, probability
For each source in VVDS list
gross=gross+SumPSF(ima)
cumbkg=cumbkg+bkg4
cumexp=cumexp+avgexp
net=(gross-cumbkg)/0.68
rate=net/cumexp


SAOImage ds9 <2>
File
Edit
Frame
Bin
Zoom
Scale
Color
Region
WCS
Analysis
Help

Not totally automatic procedure

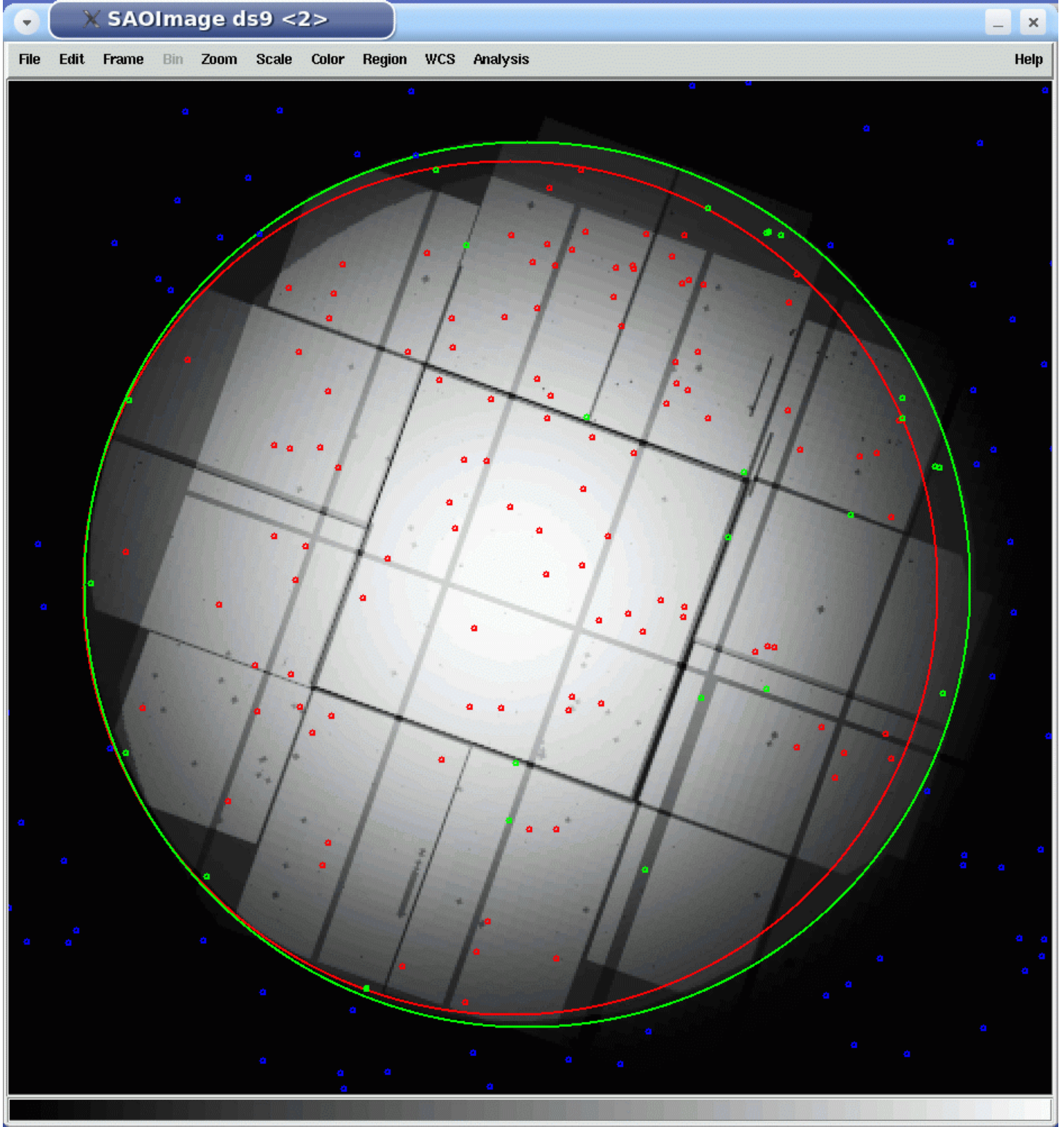
1) extract list of sources

2a) recoordinate into “XMM astrometry” (shift)

2b) compute distance from center of field

2c) discard objects out of FOV, flag objects on borders

3) MANUAL: Visually check objects on underexposed regions


SAOImage ds9 <2>
File
Edit
Frame
Bin
Zoom
Scale
Color
Region
WCS
Analysis
Help

2 lists per pointing per source class: **total** and **clean**
4) run stackdetect

high z, lowest bin galaxies (**z between 1.4 and 2.5**)
1 X-ray pointing=> **143 galaxies , 117 *clean***

detection at 2.4

detection at 2.4
(adding noise does not improve...)

5 positions give c/rate > 2 bkg
Using only these, detection at 4.6 in the 0.5-2.0 keV
(OII Emission Line objects at z ~1.5)

Promising, although not conclusive, results

NEXT STEPS

1) computational problem on probability (Overflow)
2) Are the already available background maps appropriate? Probably yes
3) Flux conversion
4) VVDS sources spread over 3 (+5) X-ray pointings, used only one. Use "*multistack*"

NEXT SCIENCE MEETING, STAY TUNED!