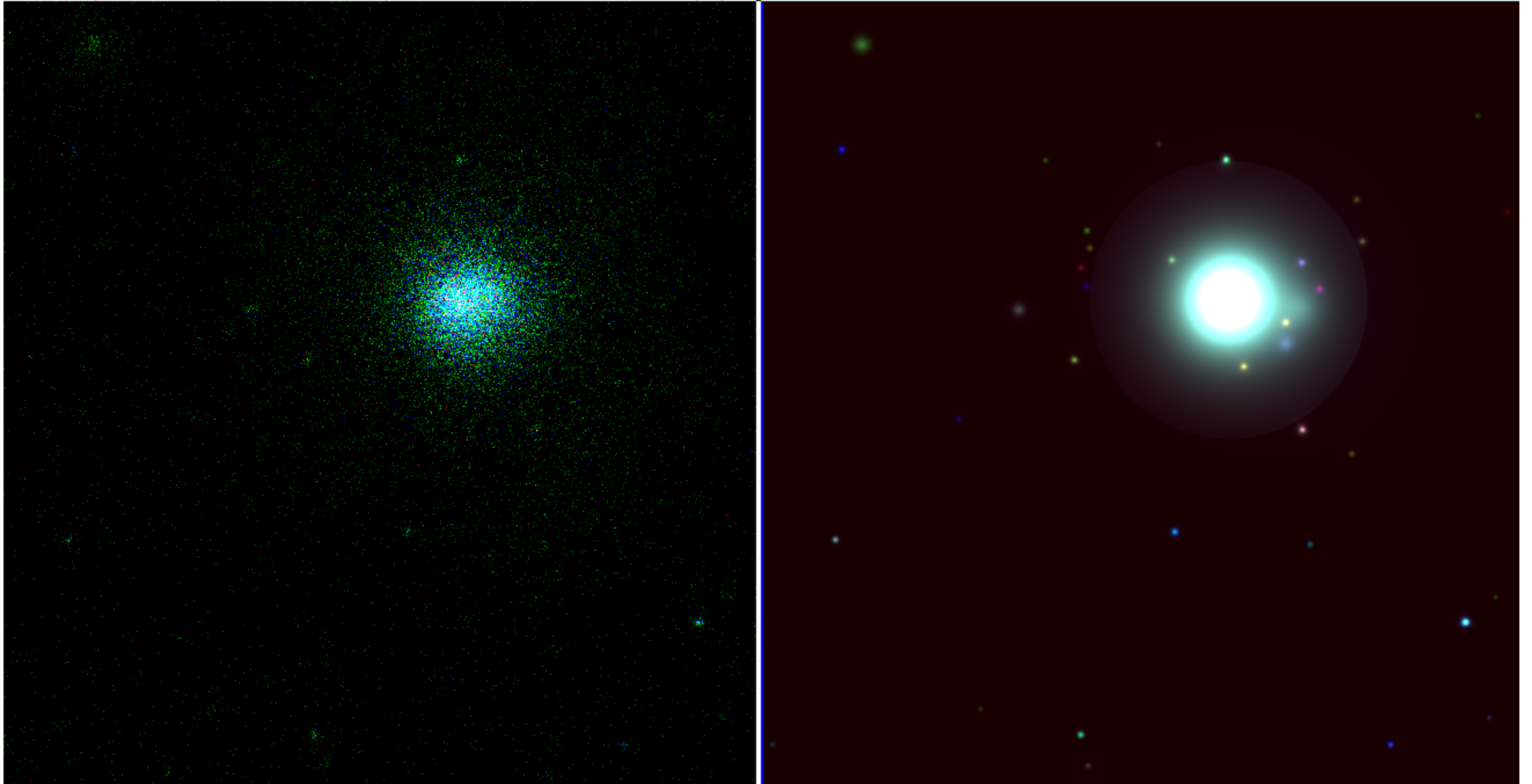


Detection chain parameters



G. Lamer, AIP

erbox local mode

- Initial source finding
- Input to erbackmap

```
erbox images="$images" \  
      boxlist="$lboxlist" \  
      expimages="$expimages" \  
      detmasks="$masks" \  
      emin="$emins" \  
      emax="$emaxs" \  
      hrdef=" " \  
      ecf="$ecfs" \  
      nruns=3 \  
      likemin=6. \  
      boxsize=4 \  
      compress_flag="N" \  
      bkgima_flag="N" \  
      expima_flag="Y" \  
      detmask_flag="Y"
```



local mode

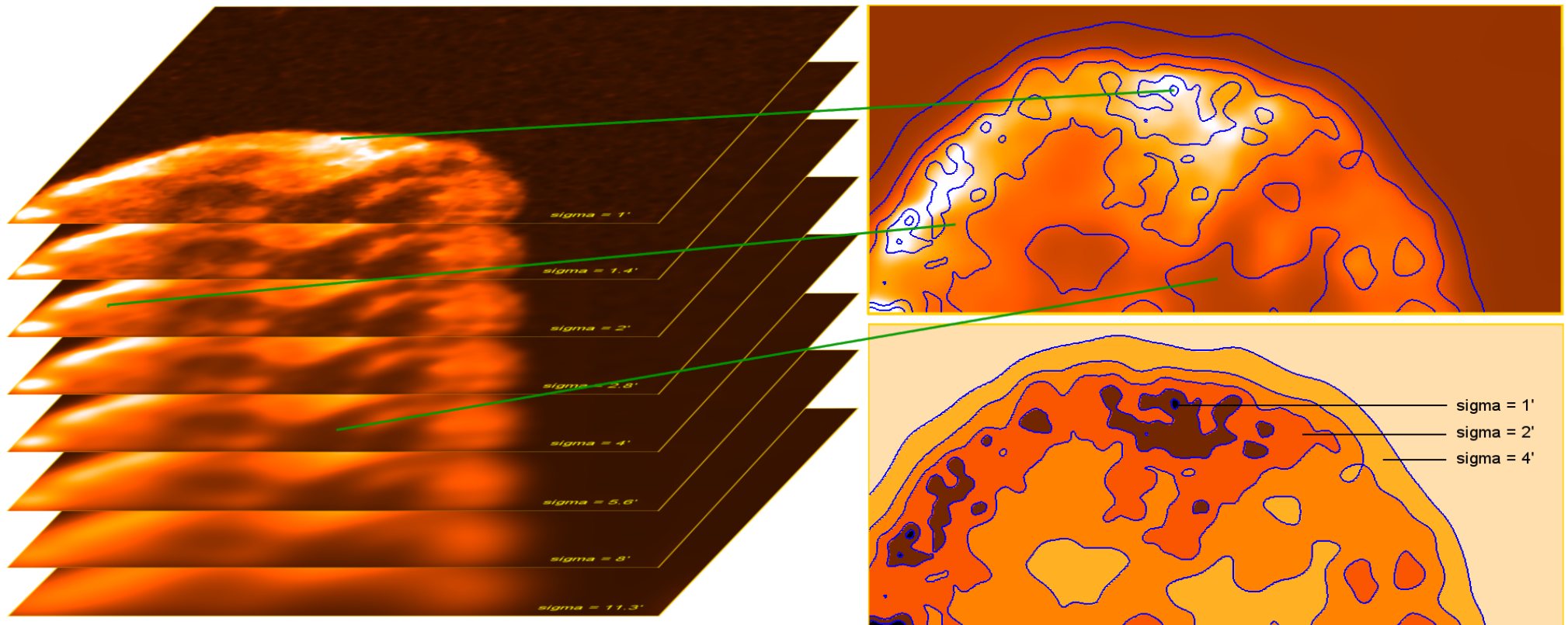
Erbackmap

- Mask input using erbox list
- Adaptive smoothing
- Works on one image at a time

```
erbackmap image="${image_arr[$i]}" \
expimage="${exp_arr[$i]}" \
boxlist="${lboxlist}" \
detmask="${mask_arr[$i]}" \
cheesemask="${cheese_arr[i]}" \
bkgimage=${bkg_arr[$i]} \
idband=${idband[$i]} \
scut=0.0001 \
mlmin=0 \
maxcut=0.5 \
fitmethod=smooth \
snr=40. \
cheesemaskflag='N'
```

← Always use “smooth”

Erbackmap: Stack of smoothed maps



- Calculate stack of smoothed images and SNR maps
- $\sigma = 1.0, \dots, 11.3$ arcmin
- pick map matching the desired SNR
- combine final smoothed image from stack

erbox map mode

- Source finding using the backgrounds map
- Input to erldet

```
erbox images="$images" \  
      boxlist="$mboxlist" \  
      expimages="$expimages" \  
      detmasks="$masks" \  
      bkgimages="$bkgimages" \  
      emin="$emins" \  
      emax="$emaxs" \  
      hrdef="1 2 2 3 3 4" \  
      ecf="$ecfs" \  
      nruns=3 \  
      likemin=4 \  
      boxsize=4 \  
      compress_flag="N" \  
      bkgima_flag="Y" \  
      expima_flag="Y" \  
      detmask_flag="Y"
```

← Repeat detection with 2x2 and 4x4 rebinning

← Map mode

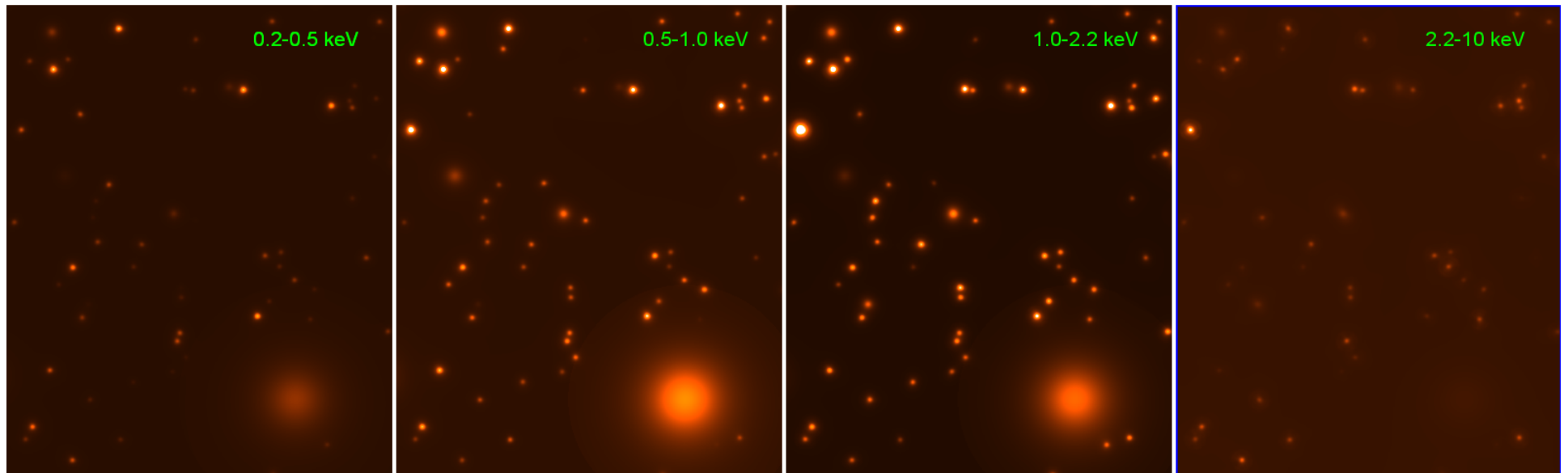
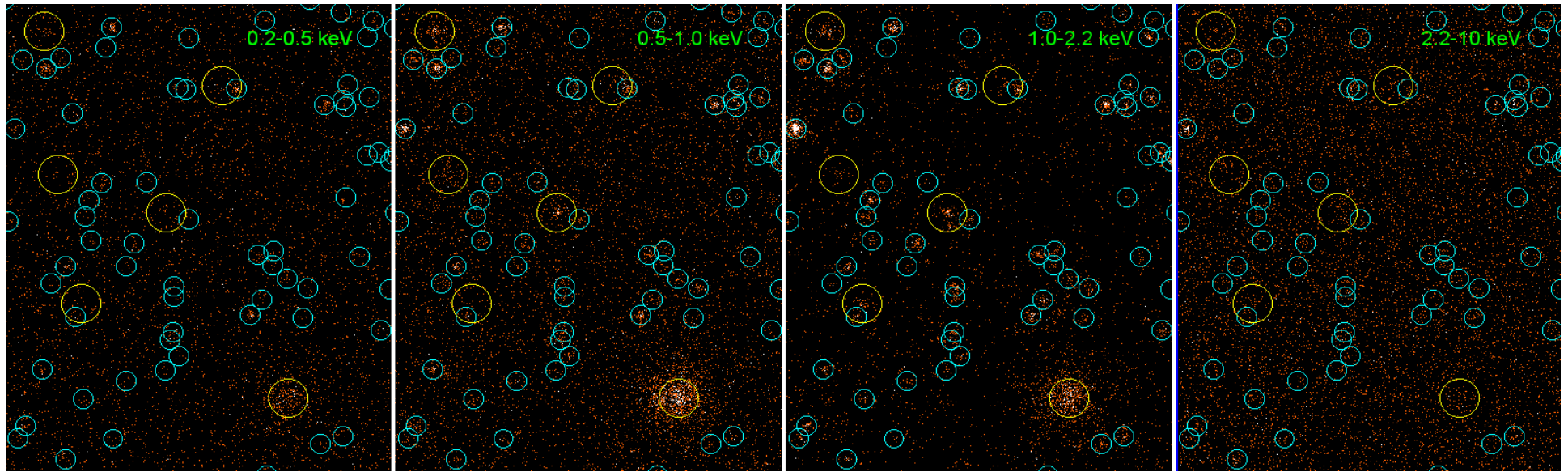
ermldet

- Maximum likelihood PSF fitting

```
ermldet mllist=$mllist_shape \  
        boxlist=$mboxlist \  
        images="$images" \  
        expimages="$expimages" \  
        detmasks="$masks" \  
        bkgimages="$bkgimages" \  
        emin="$emins" \  
        emax="$emaxs" \  
        hrdef="1 2 2 3 3 4" \  
        ecf="$ecfs" \  
        likemin=5. \  
        extlikemin=3. \  
        cutrad=15. \  
        multrad=15. \  
        extmin=1.5 \  
        extmax=30.0 \  
        bkgima_flag="Y" \  
        expima_flag="Y" \  
        detmask_flag="Y" \  
        extentmodel="beta" \  
        thres_flag="N" \  
        thres_col="like" \  
        thres_val=30. \  
        nmaxfit=3 \  
        twostage_flag=Y \  
        nmulsou=2 \  
        fitext_flag=yes \  
        srcima_flag=yes \  
        srcimages="$srcmaps_shape" \  
        shapelet_flag=yes \  
        photon_flag=no
```

ermdet remarks

- *ecfs*: don't use defaults, for meaningful fluxes work out ECFs with XSPEC ($flux=rate/ecf$)
- *cutrad*: radius of sub-region used for fitting
- *multrad*: radius to select input sources for simultaneous fitting
- *nmaxfit*: maximum number of sources simultaneously fitted
- *nmulsou*: split up input sources in max. nmulsou sources.
- *twostage_flag*: only split up sources which were detected as extended in the first stage.
- *shapelet_flag*: create source specific PSF using shaplet library (recommended).
- *photon_flag*: event based fitting with PSF assigned to each photon.



ersensmap

```
ersensmap expimages="$expimages" \  
          bkgimages="$bkgimages" \  
          emin="$emins" \  
          emax="$emaxs" \  
          likemin=5. \  
          extlikemin=3. \  
          method=aper \  
          aper_type=circle \  
          aper_size=6. \  
          ext=10. \  
          extentmodel=beta \  
          photon_flag=N \  
          ext_flag=N \  
          area_flag=Y \  
          area_table=area_vs_sens.fits
```

apetool

```
apetool mllist="$mllist_shape"
        apelist=apelist.fits \
        apelistout=apelistout.fits \
        images="$images" \
        expimages="$expimages" \
        detmasks="$masks" \
        bkgimages="$bkgimages" \
        srcimages="$srcmaps_shape" \
        psfmapflag=Y \
        apesenseflag=Y \
        psfmaps="$psfmaps.fits" \
        apesenseimages="apesensimages" \
        emin="200. 500. 1000. 2200." \
        emax="500. 1000. 2200. 10000." \
        eefextract=0.75 \
        apexflag=Y \
        shapepsf=Y
```

Source detection wishlist

- Core excised fitting
 - Could be realized in 2nd fit run with mask and fixed source position
- Larger fitting radius (several arcmin)
 - Needs 2nd run with point source map as background
- Variable beta (as task parameter)
- Region file output