

DAOPHOT INSTRUCTIONS

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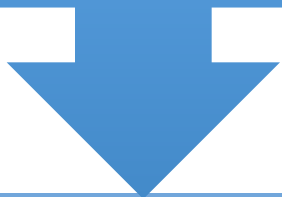
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change directories to
the location of login.cl
and open a xgterm



use command line in
xgterm to enter iraf



iraf welcome text

A terminal window titled "Terminal — xgterm — 80x24". The text inside shows a login session: "Last login: Tue May 31 13:44:45 on ttys001", followed by the prompt "kc-fh202lab-12:~% cd" and the command "kc-fh202lab-12:~% xgterm -sb". A cursor is visible on the line following the command.

```
Terminal — xgterm — 80x24
Last login: Tue May 31 13:44:45 on ttys001
kc-fh202lab-12:~% cd
kc-fh202lab-12:~% xgterm -sb
█
```

A terminal window titled "xgterm". The text inside shows the prompt "kc-fh202lab-12:~% cl" with a cursor at the end of the line.

```
xgterm
kc-fh202lab-12:~% cl█
```

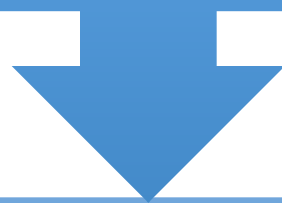
A terminal window titled "xgterm". The text inside shows the IRAF welcome message: "NOAO/IRAF PC-IRAF Revision 2.16 EXPORT Thu May 24 15:41:17 MST 2012", "This is the EXPORT version of IRAF V2.16 supporting PC systems.", and "Welcome to IRAF. To list the available commands, type ? or ??. To get detailed information about a command, type 'help <command>'. To run a command or load a package, type its name. Type 'bye' to exit a".

```
xgterm

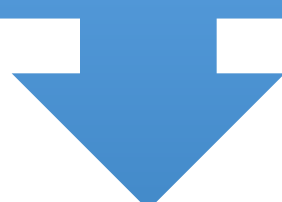
NOAO/IRAF PC-IRAF Revision 2.16 EXPORT Thu May 24 15:41:17 MST 2012
This is the EXPORT version of IRAF V2.16 supporting PC systems.

Welcome to IRAF. To list the available commands, type ? or ??. To get
detailed information about a command, type 'help <command>'. To run a
command or load a package, type its name. Type 'bye' to exit a
```

enter daophot
package



open the phot task
parameter file



edit the phot task

A screenshot of an xgterm window. The title bar says 'xgterm'. The command prompt shows 'ec1> daophot' with a cursor at the end of the line.

```
ec1> daophot
```

A screenshot of an xgterm window. The title bar says 'xgterm'. The command prompt shows 'daophot> epar phot' with a cursor at the end of the line.

```
daophot> epar phot
```

A screenshot of an xgterm window showing the IRAF (Image Reduction and Analysis Facility) interface. The title bar says 'xgterm'. The text 'I R A F' is displayed in a box, followed by 'Image Reduction and Analysis Facility'. Below this, the parameters for the 'daophot' task are listed:

```
PACKAGE = daophot
TASK = phot

image =      814.resampp  Input image(s)
coords = [] find_stars_daophot  Input coordinate list(s) (default: image.coo.?)
output =     814.resamp.mag.10  Output photometry file(s) (default: image.mag.?)
```

epar task # opens the task parameter file
ctrl d # close and save task parameter file
<http://iraf.noao.edu/tips/cl.html> # more iraf tips

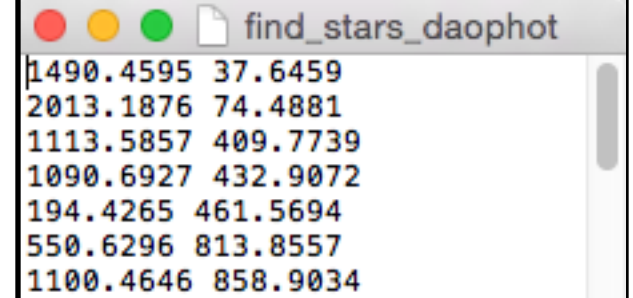
```
IRAF
Image Reduction and Analysis Facility

PACKAGE = daophot
TASK = phot

image = 814.resampp Input image(s)
coords = find_stars_daophot Input coordinate list(s) (default: image,coo,?)
output = 814.resamp,mag,10 Output photometry file(s) (default: image,mag,?)
skyfile = Input sky value file(s)
(plotfil= ) Output plot metacode file
(datapar= ) Data dependent parameters
(centerp= ) Centering parameters
(fitskyp= ) Sky fitting parameters
(photpar= ) Photometry parameters
(interac= no) Interactive mode?
(radplot= no) Plot the radial profiles?
(icomman= ) Image cursor: [x y wcs] key [cmd]
(gcomman= ) Graphics cursor: [x y wcs] key [cmd]
(wcsin = logical) The input coordinate system (logical,tv,physical)
(wcsout = logical) The output coordinate system (logical,tv,physical)
(cache = )_.cache) Cache the input image pixels in memory?
(verify = )_.verify) Verify critical phot parameters?
(update = )_.update) Update critical phot parameters?
(verbose= )_.verbose) Print phot messages?
(graphic= )_.graphics) Graphics device
(display= )_.display) Display device
(mode = ql)
```

daophot assumes the input image is a .fits

a two
column
text file of
star
centroids



1490.4595	37.6459
2013.1876	74.4881
1113.5857	409.7739
1090.6927	432.9072
194.4265	461.5694
550.6296	813.8557
1100.4646	858.9034

use epar to edit these daophot tasks
before running phot

iraf tasks are sensitive to coordinate type:
world = sky coordinates/radec
logical = pixel/image coordinates

<http://stdas.stsci.edu/cgi-bin/gethelp.cgi?phot>

edit the datapar task
with epar



edit the centerp task
with epar



edit the fitskyp task
with epar



edit the photpar task
with epar

```
daophot> epar datapar
IRAF
Image Reduction and Analysis Facility
PACKAGE = daophot
TASK = centerpars
(caloriz=  none) Centering algorithm
```

```
daophot> epar centerp
IRAF
Image Reduction and Analysis Facility
PACKAGE = daophot
TASK = centerpars
(caloriz=  none) Centering algorithm
```

```
daophot> epar fitskyp
IRAF
Image Reduction and Analysis Facility
PACKAGE = daophot
TASK = centerpars
(caloriz=  none) Centering algorithm
```

```
daophot> epar photpar
IRAF
Image Reduction and Analysis Facility
PACKAGE = daophot
TASK = centerpars
(caloriz=  none) Centering algorithm
```

ⓧ xgterm

IRAF

Image Reduction and Analysis Facility

PACKAGE = daophot
TASK = datapars

(scale = █
(fwhmpsf=
(emissio=
(sigma =
(datamin=
(datamax=
(noise =
(ccdread=
(gain =
(readnoi=
(epadu =
(exposur=
(airmass=
(filter =
(obstime=
(itime =
(xairmas=
(ifilter=
(otime =
(mode =

0.09)
1.378)
yes)
0.)
INDEF)
INDEF)
poisson)
)
)
0.)
2.)
EXPTIME)
)
)
)
)
12620.)
INDEF)
INDEF)
21:08:37)
ql)

Image scale in units per pixel
FWHM of the PSF in scale units
Features are positive?
Standard deviation of background in counts
Minimum good data value
Maximum good data value
Noise model
CCD readout noise image header keyword
CCD gain image header keyword
CCD readout noise in electrons
Gain in electrons per count
Exposure time image header keyword
Airmass image header keyword
Filter image header keyword
Time of observation image header keyword
Exposure time
Airmass
Filter
Time of observation

in arcseconds per pixel

in arcseconds

in seconds

not needed by phot, but stored for further calibration

<http://stsdas.stsci.edu/cgi-bin/gethelp.cgi?datapars>

```
xgterm
IRAF
Image Reduction and Analysis Facility
PACKAGE = daophot
TASK = centerpars

(calgori= none) Centering algorithm
(cbox = 0.9) Centering box width in scale units
(cthresh= 0.) Centering threshold in sigma above background
(minsnra= 1.) Minimum signal-to-noise ratio for centering algo
(cmaxite= 10) Maximum iterations for centering algorithm
(maxshif= 1.) Maximum center shift in scale units
(clean = no) Symmetry clean before centering
(rclean = 1.) Cleaning radius in scale units
(rclip = 2.) Clipping radius in scale units
(kclean = 3.) K-sigma rejection criterion in skysigma
(mkcente= no) Mark the computed center
(mode = ql)
```

Centering algorithm options:

none: uses initial centroids

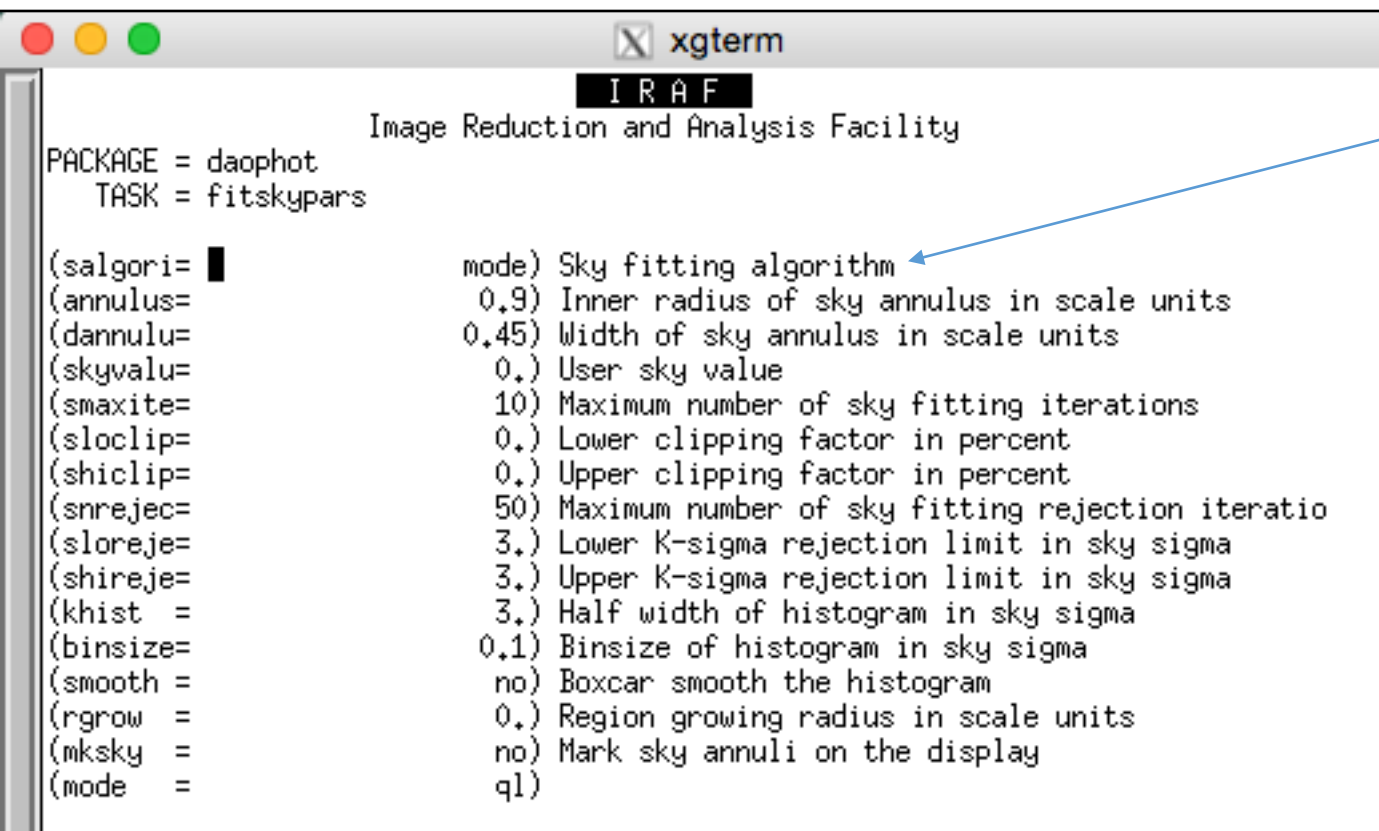
centroid: intensity weighted means

gauss: gaussian fitting

ofilter: triangular fitting

Defines the object pixels to be used in the fitting. Should be large enough to capture a majority of object's pixels, but small enough to avoid sky/noise. Recommend 2.4 to 4 times the FWHM of the PSF.

Defines the maximum distance the new center can be from the original center.



```
PACKAGE = daophot
TASK = fitskypars

(salgori=
(annulus=
(dannulu=
(skyvalu=
(smaxite=
(sloclip=
(shiclip=
(snrejec=
(sloreje=
(shireje=
(khist =
(binsize=
(smooth =
(rgrow =
(mksky =
(mode =

mode) Sky fitting algorithm
0.9) Inner radius of sky annulus in scale units
0.45) Width of sky annulus in scale units
0.) User sky value
10) Maximum number of sky fitting iterations
0.) Lower clipping factor in percent
0.) Upper clipping factor in percent
50) Maximum number of sky fitting rejection iteratio
3.) Lower K-sigma rejection limit in sky sigma
3.) Upper K-sigma rejection limit in sky sigma
3.) Half width of histogram in sky sigma
0.1) Binsize of histogram in sky sigma
no) Boxcar smooth the histogram
0.) Region growing radius in scale units
no) Mark sky annuli on the display
ql)
```

sky fitting algorithm options:

constant: users supplied skyvalue (large resolved objects on flat backgrounds)

file: sky values in a text file

mean: average of sky pixel distribution (regions with few background counts)

median: median of sky pixel distribution (for rapidly varying sky background)

mode: computes with mean and median (for stellar objects in crowded fields) (avoid if sky background is rapidly varying)

centroid: centroid of sky pixel histogram (for rapidly varying, crowed regions)

gauss: fits a single guassian to sky pixel histogram using non-linear least-squares

ofilter: uses optimal filtering algorithm, triangular weighting function, and histogram of the sky pixels.

crosscor: uses a cross-correlation function of sky pixel histogram and a Gaussian noise function

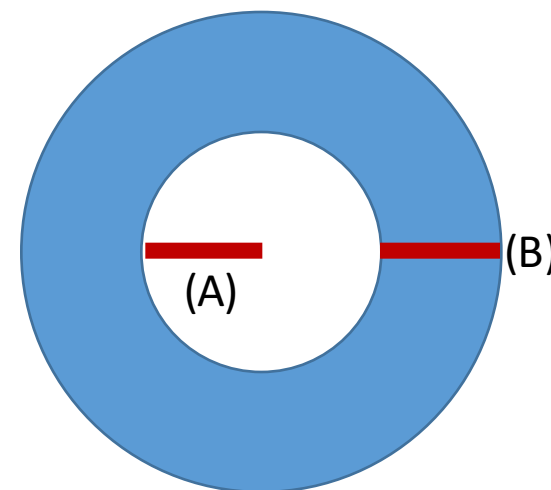

```
xgterm
IRAF
Image Reduction and Analysis Facility
PACKAGE = daophot
TASK = fitskypars

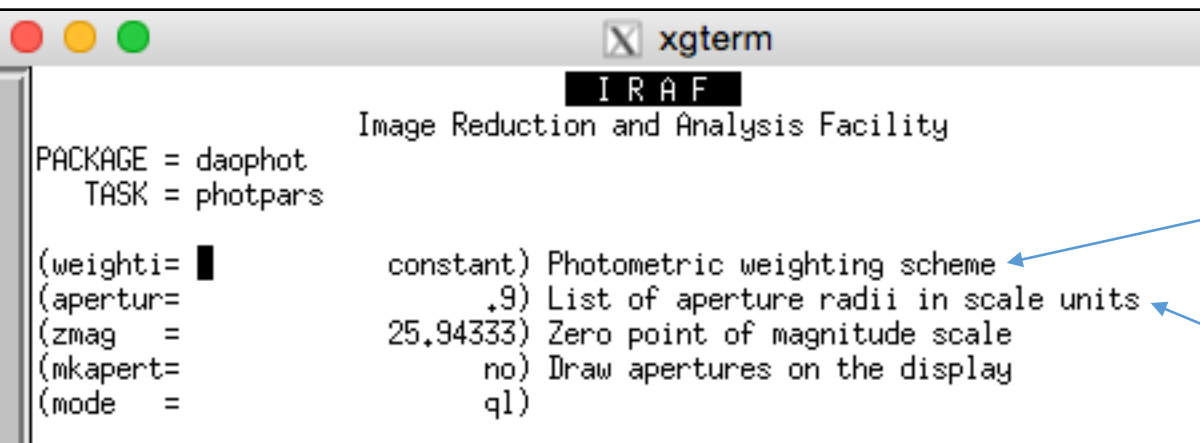
(salgori=
(annulus=
(dannulu=
(skyvalu=
(smaxite=
(sloclip=
(shiclip=
(snrejec=
(sloreje=
(shireje=
(khist =
(binsize=
(smooth =
(rgrow =
(mksky =
(mode =

mode) Sky fitting algorithm
0.9) Inner radius of sky annulus in scale units
0.45) Width of sky annulus in scale units
0.) User sky value
10) Maximum number of sky fitting iterations
0.) Lower clipping factor in percent
0.) Upper clipping factor in percent
50) Maximum number of sky fitting rejection iteratio
3.) Lower K-sigma rejection limit in sky sigma
3.) Upper K-sigma rejection limit in sky sigma
3.) Half width of histogram in sky sigma
0.1) Binsize of histogram in sky sigma
no) Boxcar smooth the histogram
0.) Region growing radius in scale units
no) Mark sky annuli on the display
ql)
```

Inner radius of sky annulus in arcsec. (A)

Width of the sky annulus in arcsec. (B)





The screenshot shows an xgterm window with the title 'xgterm'. Inside, the IRAF logo is displayed above the text 'Image Reduction and Analysis Facility'. The command prompt shows 'PACKAGE = daophot' and 'TASK = photpars'. The user has entered '(weighti= ' and the system has responded with a list of options: 'constant) Photometric weighting scheme', '.9) List of aperture radii in scale units', '25.94333) Zero point of magnitude scale', 'no) Draw apertures on the display', and 'ql)'. The cursor is positioned at the end of the first option.

```
xgterm
IRAF
Image Reduction and Analysis Facility
PACKAGE = daophot
TASK = photpars
(weighti=  constant) Photometric weighting scheme
(apertur=  .9) List of aperture radii in scale units
(zmag    = 25.94333) Zero point of magnitude scale
(mkapert= no) Draw apertures on the display
(mode    = ql)
```

weight options:

constant: uniform weights for each pixel

cone: conical weighting function

gauss: gaussian weighting function

aperture radius in arcsec

run phot

press enter until it
runs (check inputs)

Output has one line per star.
Columns are the new
centroid, sky estimate, mag
and ok/error

```
xgterm
daophot> phot
Input image(s) (814.resampp):
Input coordinate list(s) (default: image.coo.?) (find_stars_daophot):
Output photometry file(s) (default: image.mag.?) (814.resampp.mag):

Centering algorithm (centroid) (CR or value):
  New centering algorithm: centroid
Centering box width in scale units (0.9) (CR or value):
  New centering box width: 0.9 scale units 9.999999 pixels
Sky fitting algorithm (centroid) (CR or value):
  Sky fitting algorithm: centroid
Inner radius of sky annulus in scale units (0.9) (CR or value):
  New inner radius of sky annulus: 0.9 scale units 9.999999 pixels
Width of the sky annulus in scale units (0.45) (CR or value):
  New width of the sky annulus: 0.45 scale units 5. pixels
File/list of aperture radii in scale units (.9) (CR or value):
  Aperture radius 1: 0.9 scale units 9.999999 pixels
Standard deviation of background in counts (0.) (CR or value):
  New standard deviation of background: 0. counts
Minimum good data value (INDEF) (CR or value):
  New minimum good data value: INDEF counts
Maximum good data value (INDEF) (CR or value):
  New maximum good data value: INDEF counts

814.resampp 1490.55 37.56 -7.55E-4 32.712 ok
814.resampp 2013.11 74.48 0.004487 31.710 ok
814.resampp 1113.56 409.76 0.002176 31.144 ok
814.resampp 1090.70 432.88 -6.30E-4 32.376 ok
814.resampp 194.50 461.55 -9.67E-4 33.683 ok
814.resampp 550.64 813.84 -8.25E-4 33.243 ok
814.resampp 1100.53 858.88 0.007736 30.457 ok
814.resampp 1099.18 904.82 0.009639 30.141 ok
814.resampp 323.46 890.17 0.002116 31.219 ok
814.resampp 387.66 884.53 1.256E-4 32.089 ok
814.resampp 301.54 1012.22 0.003556 31.173 ok
814.resampp 211.63 1722.45 8.296E-4 31.842 ok
814.resampp 1169.44 1133.46 -0.00387 33.162 ok
814.resampp 1677.05 1959.78 -1.75E-4 33.806 ok
daophot>
```

```
xterm
IRAF
Image Reduction and Analysis Facility
PACKAGE = daophot
TASK = pstselect

image = 814.resamp Image for which to build psf star list
photfile= 814.resamp.mag.10 Photometry file (default: image.mag.?)
pstfile = 814.resamp.pst.10 Output psf star list file (default: image.pst.?)
maxnpsf = 20 Maximum number of psf stars
(mkstars= yes) Mark deleted and accepted psf stars
(plotfil= 814.resamp.metcode.10) Output plot metacode file
(datapar= ) Data dependent parameters
(daopars= ) Psf fitting parameters
(interac= no) Select psf stars interactively?
(plottyp= mesh) Default plot type (mesh|contour|radial)
(icomman= ) Image cursor: [x y wcs] key [cmd]
(gcomman= ) Graphics cursor: [x y wcs] key [cmd]
(wcsin = logical) The input coordinate system (logical,tv,physical)
(wcsout = logical) The output coordinate system (logical,tv,physical)
(cache = )_.cache) Cache the input image pixels in memory?
(verify = )_.verify) Verify critical pstselect parameters?
(update = )_.update) Update critical pstselect parameters?
(verbose= )_.verbose) Print pstselect messages?
(graphic= )_.graphics) Graphics device
(display= )_.display) Image display device
(mode = ql)
```

output of phot task

output of pstselect

```
xgterm
IRAF
Image Reduction and Analysis Facility
PACKAGE = daophot
TASK = daopars

(function= gauss) Form of analytic component of psf model
(varorde= 0) Order of empirical component of psf model
(nclean = 0) Number of cleaning iterations for computing psf
(saturat= no) Use wings of saturated stars in psf model comput
(matchra= 0.9) Object matching radius in scale units
(psfrad = 0.9) Radius of psf model in scale units
(fitrad = 0.9) Fitting radius in scale units
(recente= yes) Recenter stars during fit?
(fitsky = no) Recompute group sky value during fit?
(groupsk= yes) Use group rather than individual sky values?
(sannulu= 0.9) Inner radius of sky fitting annulus in scale uni
(wsannul= 0.45) Width of sky fitting annulus in scale units
(flaterr= 0.75) Flat field error in percent
(proferr= 1.) Profile error in percent
(maxiter= 50) Maximum number of fitting iterations
(clipexp= 6) Bad data clipping exponent
(clipran= 2.5) Bad data clipping range in sigma
(mergera= INDEF) Critical object merging radius in scale units
(critsnr= 1.) Critical S/N ratio for group membership
(maxnsta= 10000) Maximum number of stars to fit
(maxgrou= 60) Maximum number of stars to fit per group
(mode = ql)
```

Functional form of analytic component of PSF:

gauss: elliptical Gaussian

moffat15: Moffat with beta = 1.5

moffat25: Moffat with beta = 2.5

lorentz: elliptical Lorentzian

penny1: Gaussian core with Lorentzian wings

penny2: Gaussian core with Lorentzian wings

auto: runs all six models and selects the smallest standard deviation

run pstselect

press enter until it
runs (check inputs)

Output has one line per star.

```
daophot> pstselect
Image for which to build psf star list (814.resampp):
Photometry file (default: image.mag.?) (814.resampp.mag):
Output psf star list file (default: image.pst.?) (814.resampp.pst):
Maximum number of psf stars (1:) (20):

Psf radius in scale units (0.9):
    New psf radius: 0.9 scale units 9.999999 pixels
Fitting radius in scale units (0.9):
    New fitting radius: 0.9 scale units 9.999999 pixels
Minimum good data value (INDEF) (CR or value):
    New minimum good data value: INDEF counts
Maximum good data value (INDEF) (CR or value):
    New maximum good data value: INDEF counts

Selecting PSF stars for image 814.resampp
    14 stars read from file 814.resampp.mag

Star 8 has been added to the PSF star list
    X: 1099.18 Y: 904.82 Mag: 30.141 Dmin: 0.01028112 Dmax: 71.346
Star 7 has been added to the PSF star list
    X: 1100.53 Y: 858.88 Mag: 30.457 Dmin: 0.007874878 Dmax: 41.09107
Star 3 has been added to the PSF star list
    X: 1113.56 Y: 409.76 Mag: 31.144 Dmin: -0.006318776 Dmax: 18.91815
Star 11 has been added to the PSF star list
    X: 301.54 Y: 1012.22 Mag: 31.173 Dmin: -0.005247901 Dmax: 18.05007
Star 9 has been added to the PSF star list
    X: 323.46 Y: 890.17 Mag: 31.219 Dmin: -0.004779264 Dmax: 21.36712
Star 2 has been added to the PSF star list
    X: 2013.11 Y: 74.48 Mag: 31.710 Dmin: -0.007373618 Dmax: 10.52026
Star 12 has been added to the PSF star list
    X: 211.63 Y: 1722.45 Mag: 31.842 Dmin: -0.006468476 Dmax: 11.36785
Star 10 has been added to the PSF star list
    X: 387.67 Y: 884.53 Mag: 32.089 Dmin: -0.009229764 Dmax: 7.273537
Star 4 has been added to the PSF star list
    X: 1090.70 Y: 432.88 Mag: 32.376 Dmin: -0.01426809 Dmax: 9.059976
Star 1 has been added to the PSF star list
    X: 1490.56 Y: 37.56 Mag: 32.712 Dmin: -0.01233304 Dmax: 4.315488
Star 13 has been added to the PSF star list
    X: 1169.44 Y: 1133.46 Mag: 33.162 Dmin: -0.01483157 Dmax: 2.736014
Star 6 has been added to the PSF star list
    X: 550.64 Y: 813.84 Mag: 33.243 Dmin: -0.01032176 Dmax: 3.57773
Star 5 has been added to the PSF star list
    X: 194.49 Y: 461.55 Mag: 33.683 Dmin: -0.0102323 Dmax: 1.685082

Star 14 has been added to the PSF star list
    X: 1677.06 Y: 1959.78 Mag: 33.806 Dmin: -0.01127388 Dmax: 2.786294

Total of 14 PSF stars selected
```

```
xterm
IRAF
Image Reduction and Analysis Facility
PACKAGE = daophot
TASK = psf

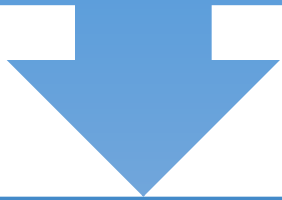
image = 814.resampp Input image(s) for which to build PSF
photfile= 814.resamp.mag.10 Input photometry file(s) (default: image.mag.?)
pstfile = 814.resamp.pst.10 Input psf star list(s) (default: image.pst.?)
psfimage= 814.resamp.psf.10 Output PSF image(s) (default: image.psf.?)
opstfile= 814.resamp.output.pst.10 Output PSF star list(s) (default: image.pst.
groupfil= 814.resamp.ps.10 Output PSF star group file(s) (default: image.ps
(plotfil= 814.resamp.metcaode.10) Output plot metacode file
(datapar= ) Data dependent parameters
(daopars= ) Psf fitting parameters
(matchby= yes) Match psf star list to photometry file(s) by id
(interac= yes) Compute the psf interactively?
(mkstars= yes) Mark deleted and accepted psf stars?
(showplo= yes) Show plots of PSF stars?
(plottyp= mesh) Default plot type (mesh|contour|radial)
(iconman= ) Image cursor: [x y wcs] key [cmd]
(gcomman= ) Graphics cursor: [x y wcs] key [cmd]
(wcsin = logical) The input coordinate system (logical,tv,physical
(wcsout = logical) The output coordinate system (logical,tv,physica
(cache = )_.cache) Cache the input image pixels in memory?
(verify = )_.verify) Verify critical psf parameters?
(update = )_.update) Update critical psf parameters?
(verbose= )_.verbose) Print psf messages?
(graphic= )_.graphics) Graphics device
(display= )_.display) Display device
(mode = ql)
```

output of phot task

output of pstselect

use interactive mode to select stars

Open the input
image in ds9



Run psf. Press
enter until it runs
(check inputs)



Apply keystrokes to the new
window containing the
surface plot of the stars psf.

```
xgterm
daophot> psf
Input image(s) for which to build PSF (814.resampp):
Input photometry file(s) (default: image.mag.?) (814.resampp.mag):
Input psf star list(s) (default: image.pst.?) (814.resampp.pst):
Output PSF image(s) (default: image.psf.?) (814.resampp.psf):
Output PSF star list(s) (default: image.pst.?) (814.resampp.output.pst):
Output PSF star group file(s) (default: image.psg.?) (814.resampp.ps):

Analytic psf function(s) (gauss):
    Analytic psf function(s): gauss
Order of variable psf (0):
    Order of variable psf: 0
Psf radius in scale units (0.9):
    New psf radius: 0.9 scale units 9.999999 pixels
Fitting radius in scale units (0.9):
    New fitting radius: 0.9 scale units 9.999999 pixels
Minimum good data value (INDEF) (CR or value):
    New minimum good data value: INDEF counts
Maximum good data value (INDEF) (CR or value):
    New maximum good data value: INDEF counts

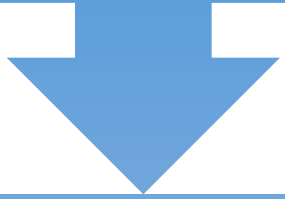
Warning: Graphics overlay not available for display device.

Computing PSF for image: 814.resampp
14 stars read from 814.resampp.mag
```

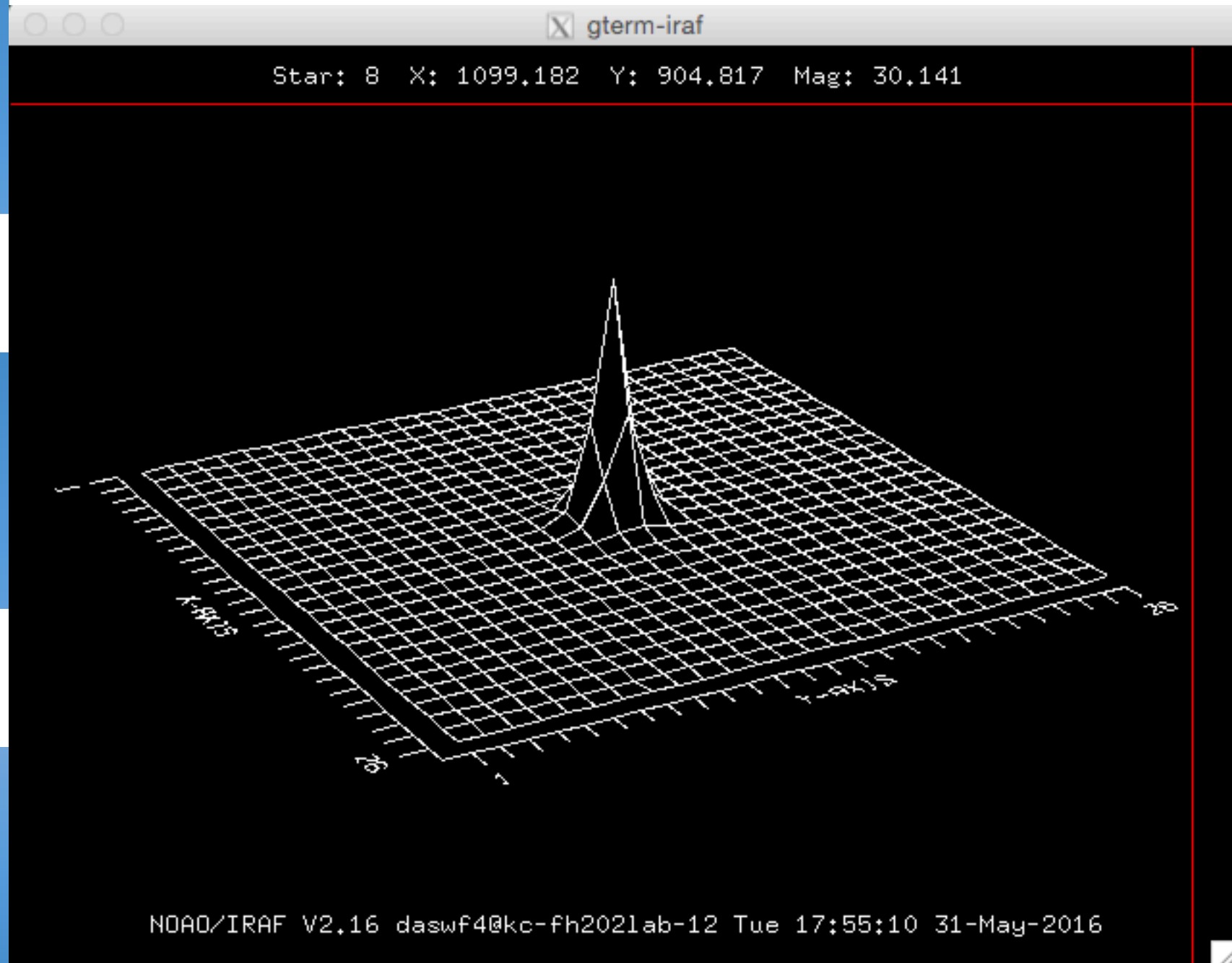

psf interactive
mode



Select new window. Use
key strokes to accept or
decline stars



a = accept
d = decline



After accepting or declining the stars, select ds9 window

Hit f to fit. Output in xgterm should appear.

Hit w in ds9 window in write the .psf

Hit q in the ds9 window, and then xgterm, to quit

```
xgterm
Computing PSF for image: 814.resampp
14 stars read from 814.resampp.mag

Star 8 has been added to the PSF star list
  X: 1099.18 Y: 904.82 Mag: 30.141 Dmin: 0.01028112 Dmax: 71.346
Star 7 has been added to the PSF star list
  X: 1100.53 Y: 858.88 Mag: 30.457 Dmin: 0.007874878 Dmax: 41.09107
Star 3 has been added to the PSF star list
  X: 1113.56 Y: 409.76 Mag: 31.144 Dmin: -0.006318776 Dmax: 18.91815
Star 11 has been added to the PSF star list
  X: 301.54 Y: 1012.22 Mag: 31.173 Dmin: -0.005247901 Dmax: 18.05007
Star 9 has been added to the PSF star list
  X: 323.46 Y: 890.17 Mag: 31.219 Dmin: -0.004779264 Dmax: 21.36712
Star 2 has been added to the PSF star list
  X: 2013.11 Y: 74.48 Mag: 31.710 Dmin: -0.007373618 Dmax: 10.52026
Star 12 has been added to the PSF star list
  X: 211.63 Y: 1722.45 Mag: 31.842 Dmin: -0.006468476 Dmax: 11.36785
Star 10 has been added to the PSF star list
  X: 387.67 Y: 884.53 Mag: 32.089 Dmin: -0.009229764 Dmax: 7.273537
Star 4 has been added to the PSF star list
  X: 1090.70 Y: 432.88 Mag: 32.376 Dmin: -0.01426809 Dmax: 9.059976
Star 1 has been added to the PSF star list
  X: 1490.56 Y: 37.56 Mag: 32.712 Dmin: -0.01233304 Dmax: 4.315488
Star 13 has been added to the PSF star list
  X: 1169.44 Y: 1133.46 Mag: 33.162 Dmin: -0.01483157 Dmax: 2.736014
Star 6 has been added to the PSF star list
  X: 550.64 Y: 813.84 Mag: 33.243 Dmin: -0.01032176 Dmax: 3.57773
Star 5 has been added to the PSF star list
  X: 194.49 Y: 461.55 Mag: 33.683 Dmin: -0.0102323 Dmax: 1.685082
Star 14 has been added to the PSF star list
  X: 1677.06 Y: 1959.78 Mag: 33.806 Dmin: -0.01127388 Dmax: 2.786294

14 PSF stars read from 814.resampp.pst

Fitting function gauss norm scatter: 0.01051149

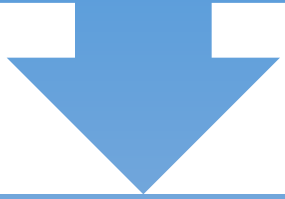
Analytic PSF fit
  Function: gauss X: 1049.5 Y: 1049.5 Height: 50.53757 Psfmag: 30.141
  Par1: 0.8059195 Par2: 0.7441577

Computed 1 lookup table(s)
```

Save the output
psf as .fits



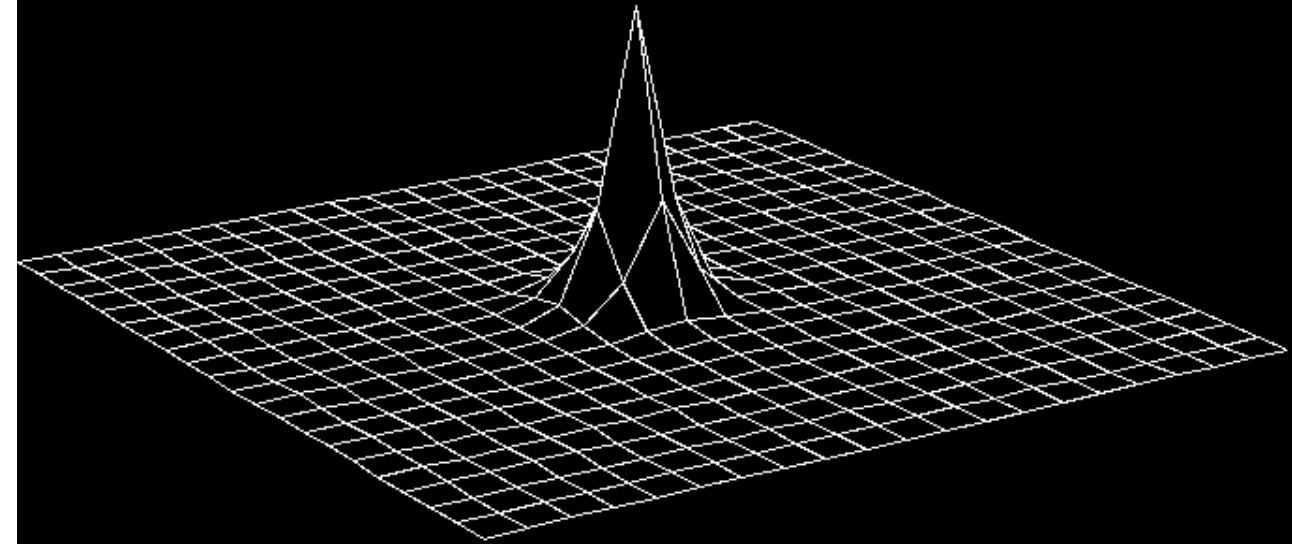
Give a visual check to
the psf.fits



Run Allstar to check psf fit and
residual

```
|daophot> seepsf 814.resampp.psf.fits[1] 814.resampp.053116.fits
```

```
814.resampp.053116.fits: PSF evaluated at X: 1049.50 Y: 1049.50 Mag: 30.14
```



PACKAGE = daophot

TASK = allstar

```

image =      814.resampp.fits  Image corresponding to photometry
photfile=    814.resampp.mag   Input photometry file (default: image.mag.?)
psfimage= 814.resampp.053116.fits PSF image (default: image.psf.?)
allstarf=    814.allstar      Output photometry file (default: image.als.?)
rejfile =    814.rejects      Output rejections file (default: image.arj.?)
subimage=    814.subtracted    Subtracted image (default: image.sub.?)
(datapar=    ) Data dependent parameters
(daopars=    ) Psf fitting parameters
(wcsin =     logical) The input coordinate system (logical,tv,physical)
(wcsout =    logical) The output coordinate system (logical,tv,physical)
(wcspsf =    )_.wcspsf) The psf coordinate system (logical,tv,physical)
(cache =     yes) Cache the data in memory?
(verify =    )_.verify) Verify critical allstar parameters?
(update =    )_.update) Update critical allstar parameters?
(verbose=    )_.verbose) Print allstar messages?
(version=    2) Version
(mode =      ql)

```

daophot> allstar

```

Image corresponding to photometry (814.resampp.fits):
Input photometry file (default: image.mag.?) (814.resampp.mag):
PSF image (default: image.psf.?) (814.resampp.053116.fits):
Output photometry file (default: image.als.?) (814.allstar):
Subtracted image (default: image.sub.?) (814.subtracted):
Output rejections file (default: image.arj.?) (814.rejects):

```

Recenter the stars (yes):

Recenter the stars: yes

Use group sky values (yes):

Use group sky values: yes

Refit the sky (no):

Refit the sky: no

Psf radius in scale units (0.9):

New psf radius: 0.9 scale units 9.999999 pixels

Fitting radius in scale units (0.9):

New fitting radius: 0.9 scale units 9.999999 pixels

Maximum group size in number of stars (60):

New maximum group size: 60 stars

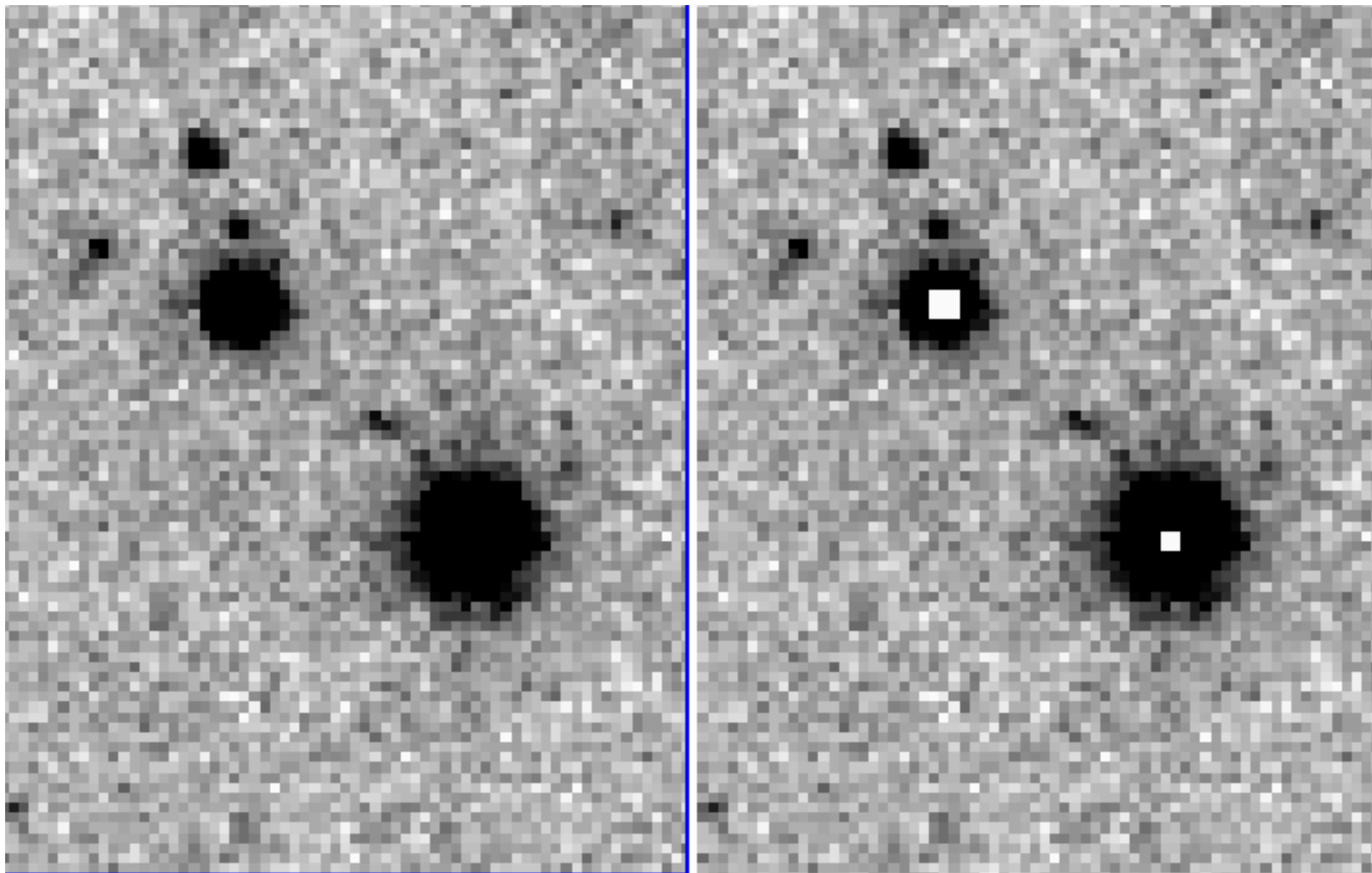
Minimum good data value (INDEF) (CR or value):

New minimum good data value: INDEF counts

Maximum good data value (INDEF) (CR or value):

New maximum good data value: INDEF counts

```
NITER = 1
NITER = 2
FITTING: ID: 3 XCEN: 1113.56 YCEN: 409.76 MAG: 31.15
NITER = 3
NITER = 4
NITER = 5
FITTING: ID: 14 XCEN: 1677.06 YCEN: 1959.78 MAG: 33.73
NITER = 6
NITER = 7
NITER = 8
NITER = 9
NITER = 10
NITER = 11
NITER = 12
NITER = 13
NITER = 14
NITER = 15
NITER = 16
NITER = 17
NITER = 18
NITER = 19
NITER = 20
NITER = 21
NITER = 22
NITER = 23
NITER = 24
NITER = 25
NITER = 26
REJECTING: Star ID: 5 is too faint
NITER = 27
NITER = 28
NITER = 29
NITER = 30
NITER = 31
NITER = 32
NITER = 33
NITER = 34
NITER = 35
NITER = 36
NITER = 37
NITER = 38
NITER = 39
NITER = 40
NITER = 41
NITER = 42
NITER = 43
NITER = 44
NITER = 45
NITER = 46
NITER = 47
NITER = 48
NITER = 49
NITER = 50
FITTING: ID: 1 XCEN: 1490.56 YCEN: 37.56 MAG: 33.62
FITTING: ID: 2 XCEN: 2013.11 YCEN: 74.48 MAG: 31.45
FITTING: ID: 4 XCEN: 1090.70 YCEN: 432.88 MAG: 32.27
FITTING: ID: 6 XCEN: 550.64 YCEN: 813.84 MAG: 32.77
FITTING: ID: 7 XCEN: 1100.53 YCEN: 858.88 MAG: 29.85
FITTING: ID: 10 XCEN: 387.67 YCEN: 884.53 MAG: 31.64
FITTING: ID: 9 XCEN: 323.46 YCEN: 890.17 MAG: 31.01
FITTING: ID: 8 XCEN: 1099.18 YCEN: 904.82 MAG: 30.02
FITTING: ID: 11 XCEN: 301.54 YCEN: 1012.22 MAG: 30.35
FITTING: ID: 13 XCEN: 1169.44 YCEN: 1133.46 MAG: 34.03
FITTING: ID: 12 XCEN: 211.63 YCEN: 1722.45 MAG: 31.55
```



A bad fit because the magnitudes were too faint. Fix magnitudes, repeat process, and check subtracted residuals again.