

The SExtractor++^{*} package

Emmanuel Bertin and the SE++ development team

* Working title



My Computer



Network
Neighborhood



Inbox



Recycle Bin



The Microsoft
Network



My Briefcase

SExtractor has been around for too long!

Welcome

Welcome to Windows 95

Did you know...
To open a program, click the button, and then click the button.

What's New

File Edit View Go Bookmarks Options Directory Window Help

Back Forward Home Reload Images Open Print Find Stop

Location: about:

What's New! What's Cool! Handbook Net Search Net Directory Software

Netscape Navigator™ Version 2.02

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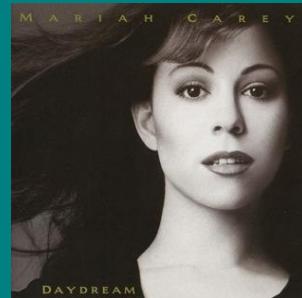
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JAVA COMPATIBLE

RSA PUBLIC KEY CRYPTO SYSTEM

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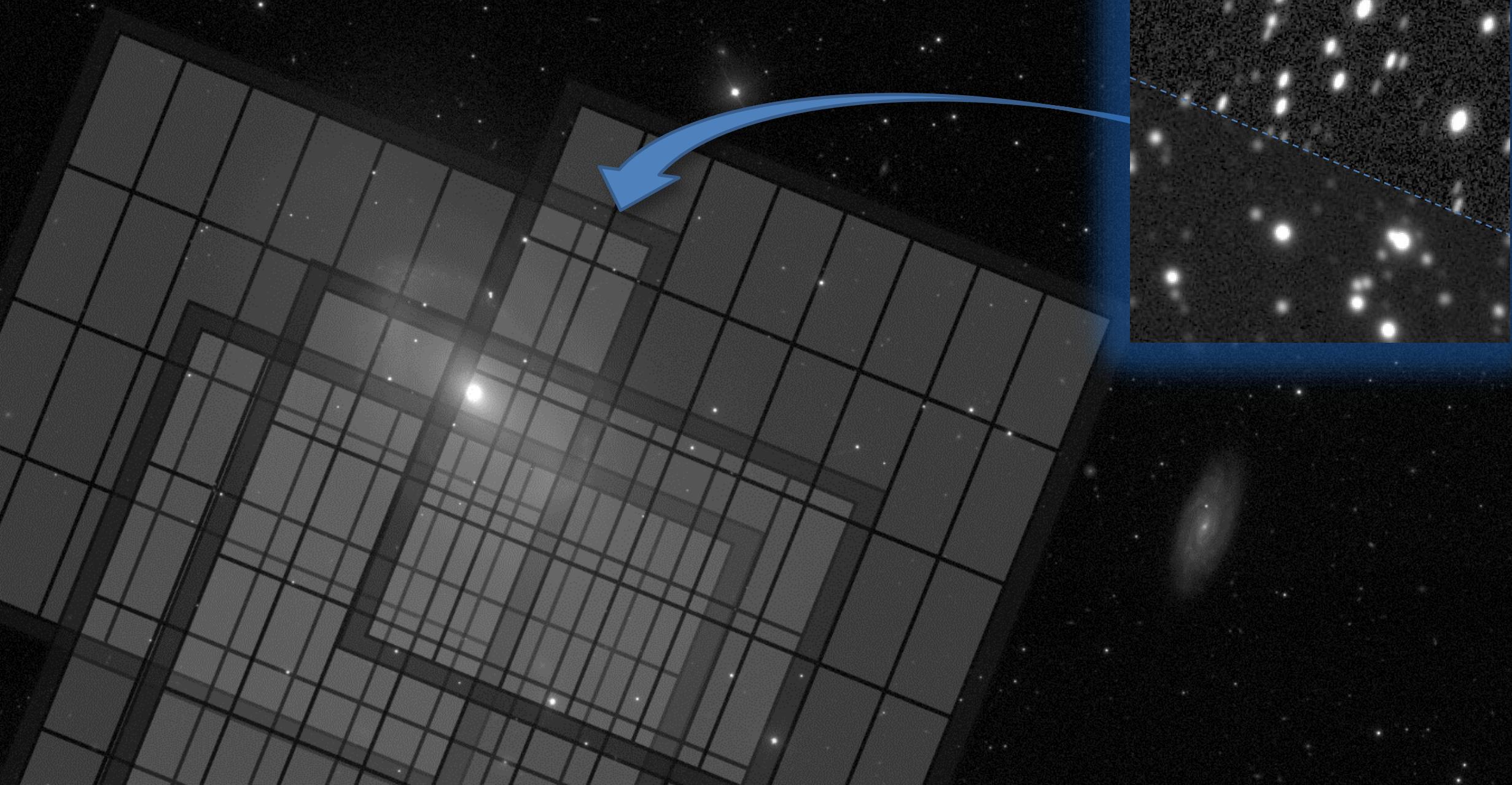


Welcome

ADASS XXIX

6:18 PM

Dealing with large ditherings



Development team



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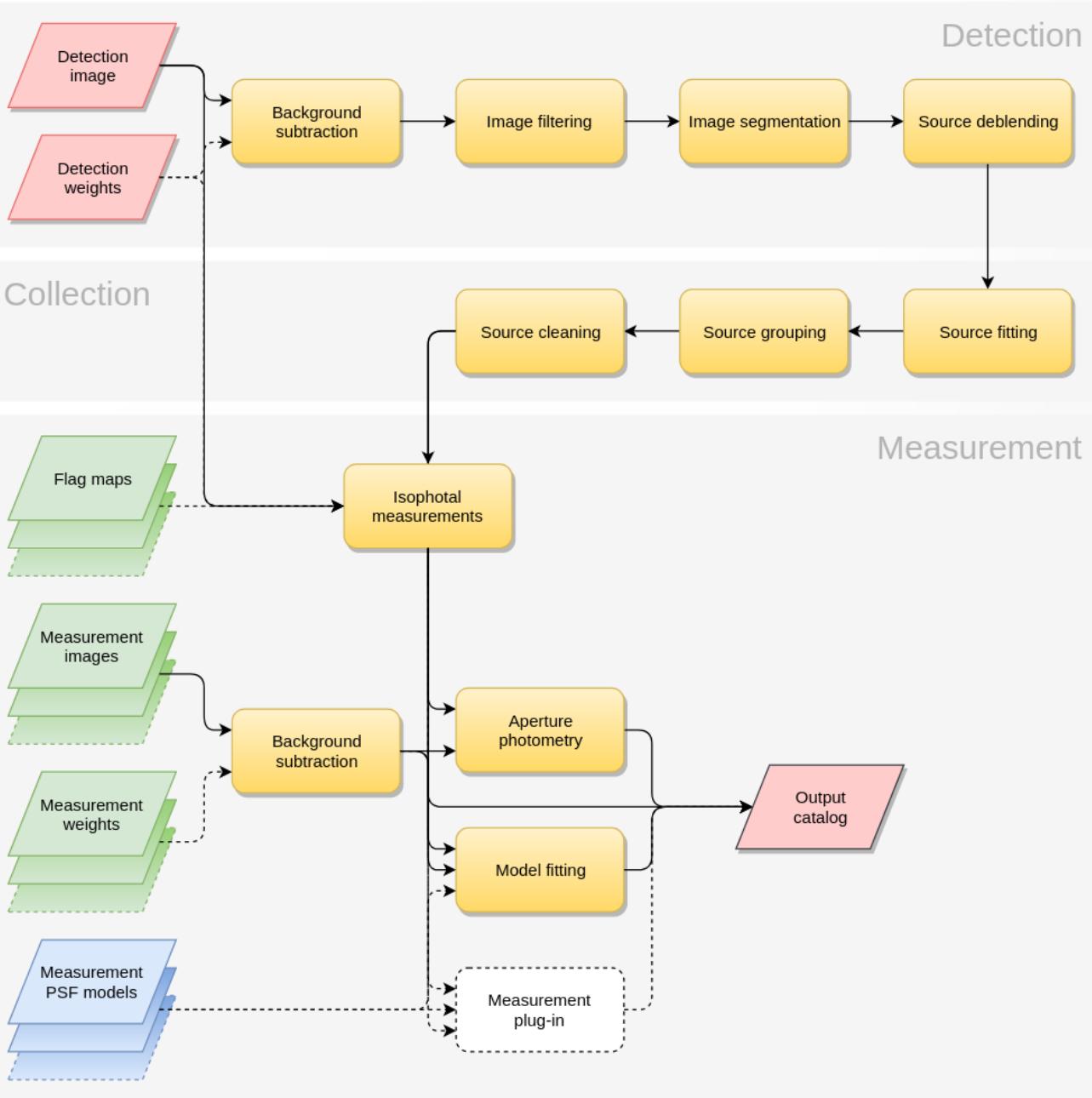


- Alejandro Álvarez Ayllón
- Nikolaos Apostolakos
- Pierre Dubath
- Marc Schefer

- Martin Kümmel

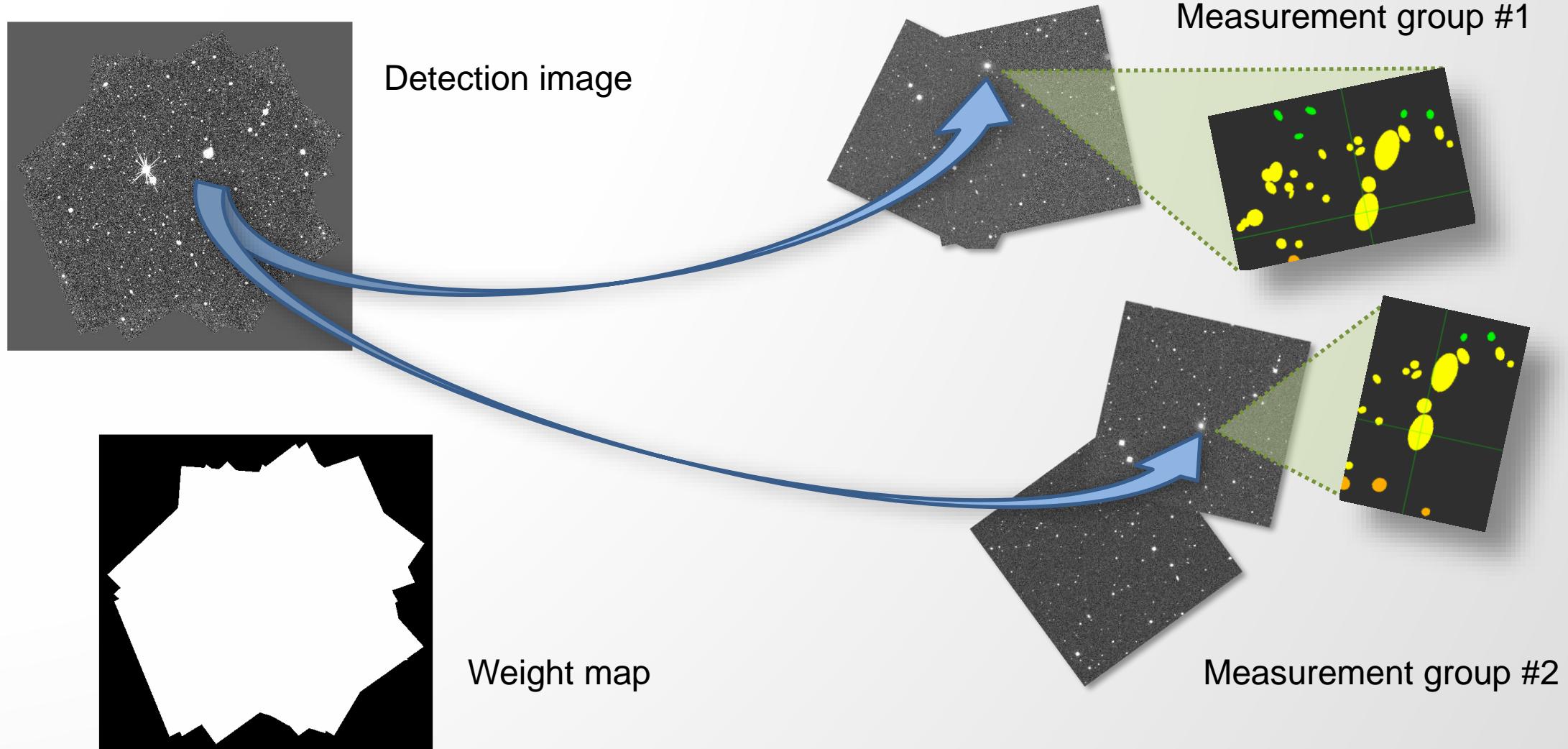


- Emmanuel Bertin

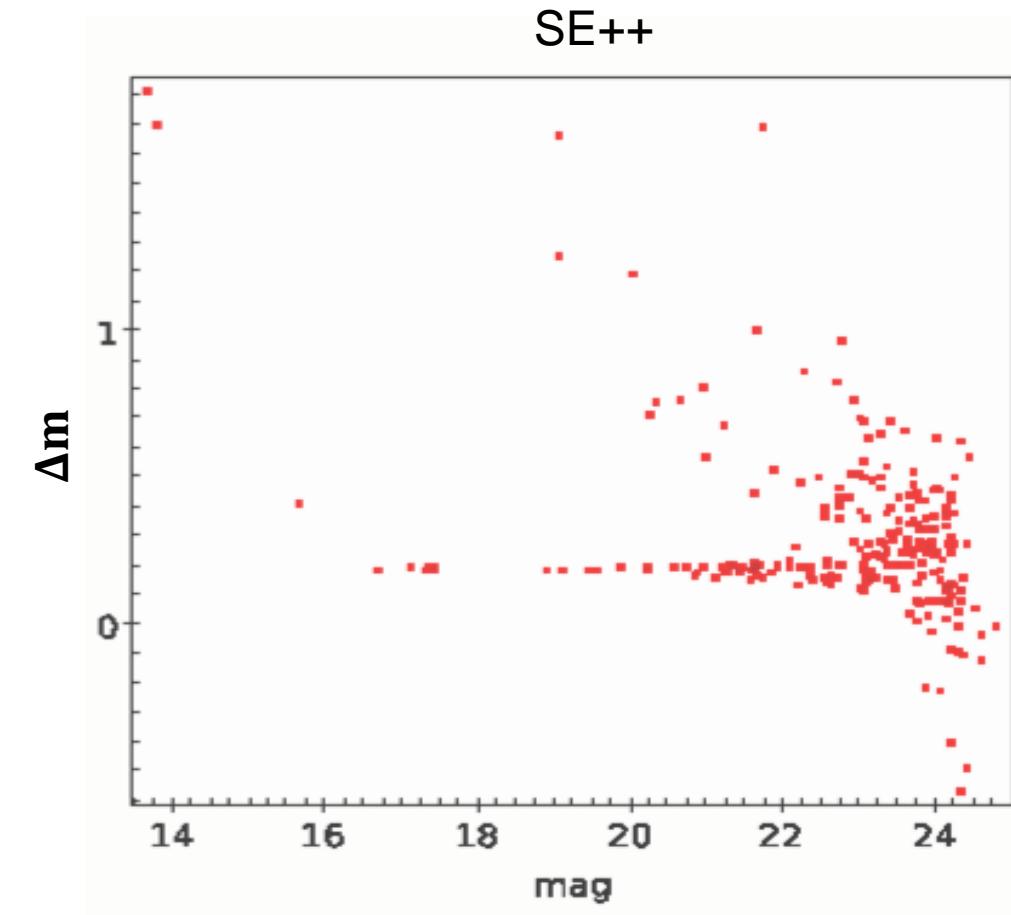
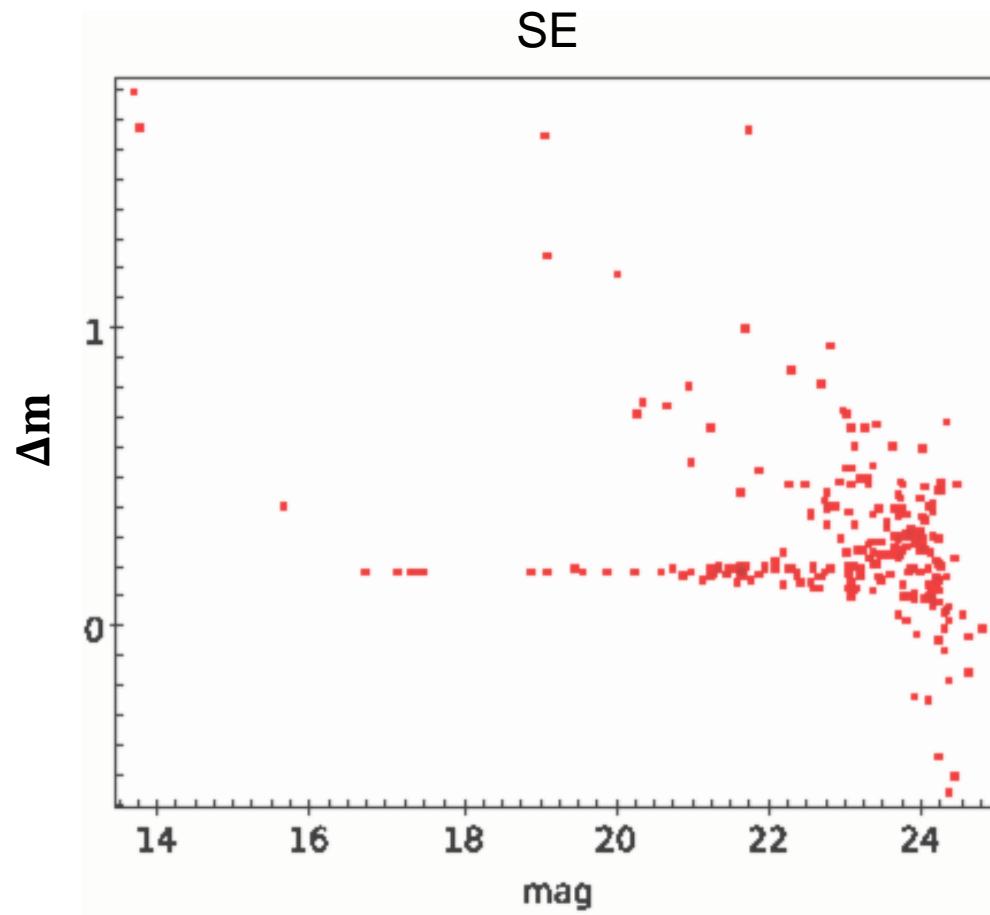


- C++ code
 - Efficiency + abstraction
- Multi-exposure
 - Rely on WCS
- Multi-object
 - Simultaneous model-fitting
- Multichannel
 - Define groups
- Multithreaded
 - One instance per node
- Modular
 - « Property » scheme
 - Plug-ins

Multiframe measurements

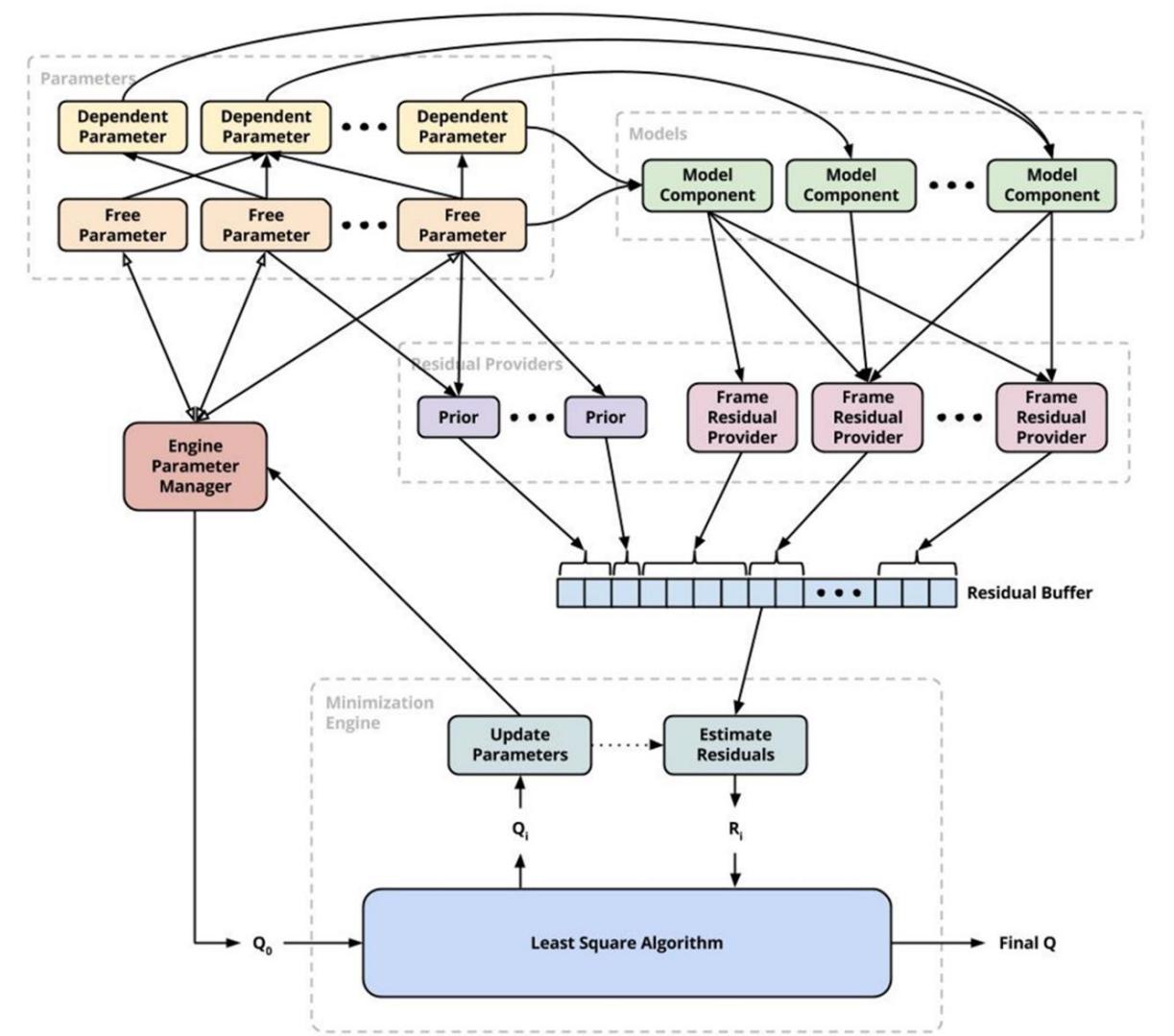


Photometry comparison with the original SExtractor



Flexible model-fitting engine

- Multiple models in one run
- Can combine models
- Can create custom catalog columns
- Uncertainties automatically computed and propagated (from the approximate Hessian of the fit)
- $\chi^2 +$ priors (MAP estimator in the Gaussian case)



Proper motions from pixels

```
from glob import glob
import numpy as np
from.sextractorxx.config import *

top = load_fits_images(
    sorted(glob('im_???.fits')),
    sorted(glob('im_???.psf')),
)

top.split(ByKeyword('FILTER'))

# Split each band by image filename (one image per subgroup)
for n, filter in top:
    filter.split(ByKeyword('IMAGE_FILENAME'))

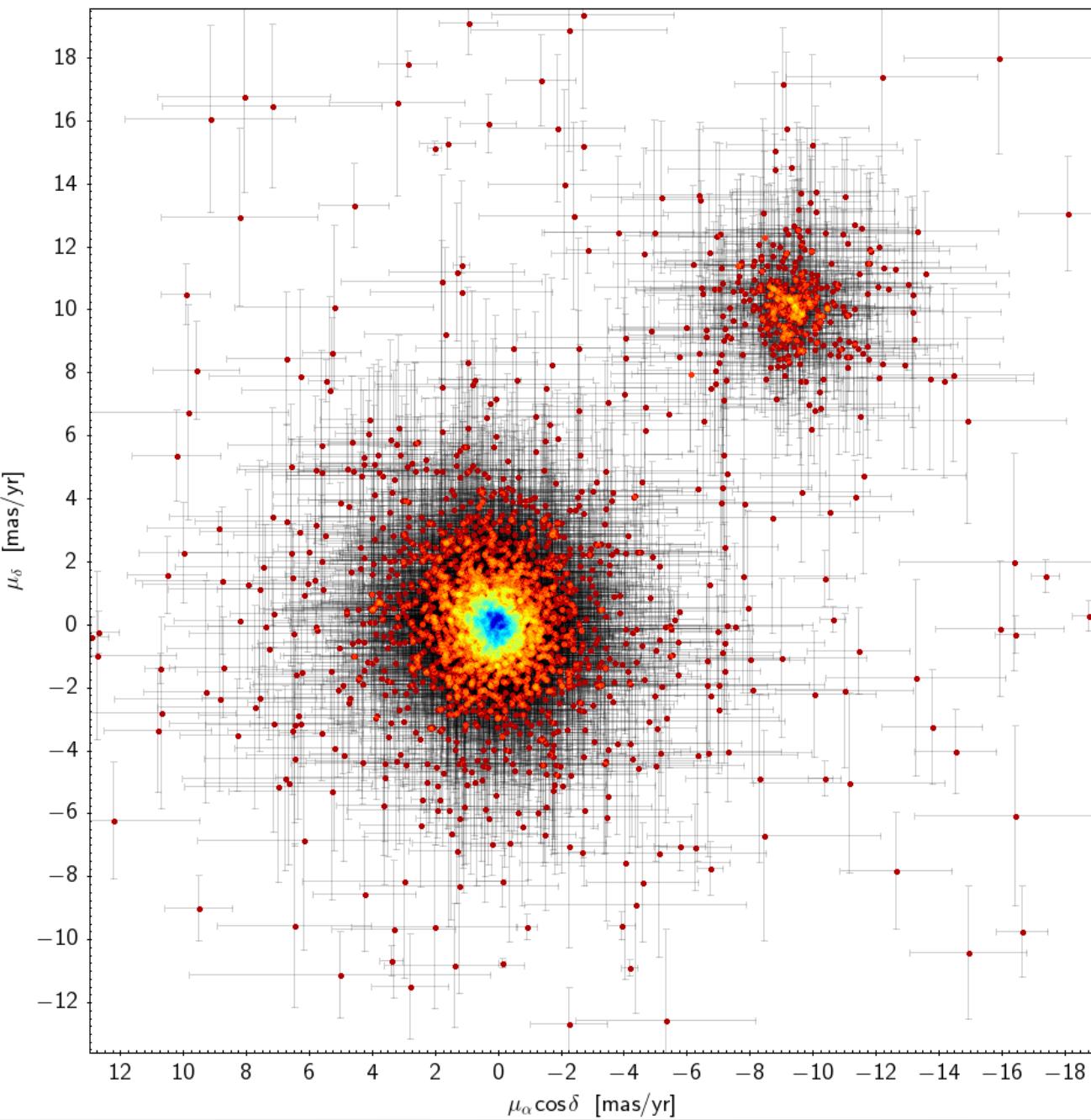
mesgroup = MeasurementGroup(top)

pmx = FreeParameter(0.0, Range((-100.0,100.0), RangeType.LINEAR))
pmy = FreeParameter(0.0, Range((-100.0,100.0), RangeType.LINEAR))
add_output_column('pmx', pmx)
add_output_column('pmy', pmy)

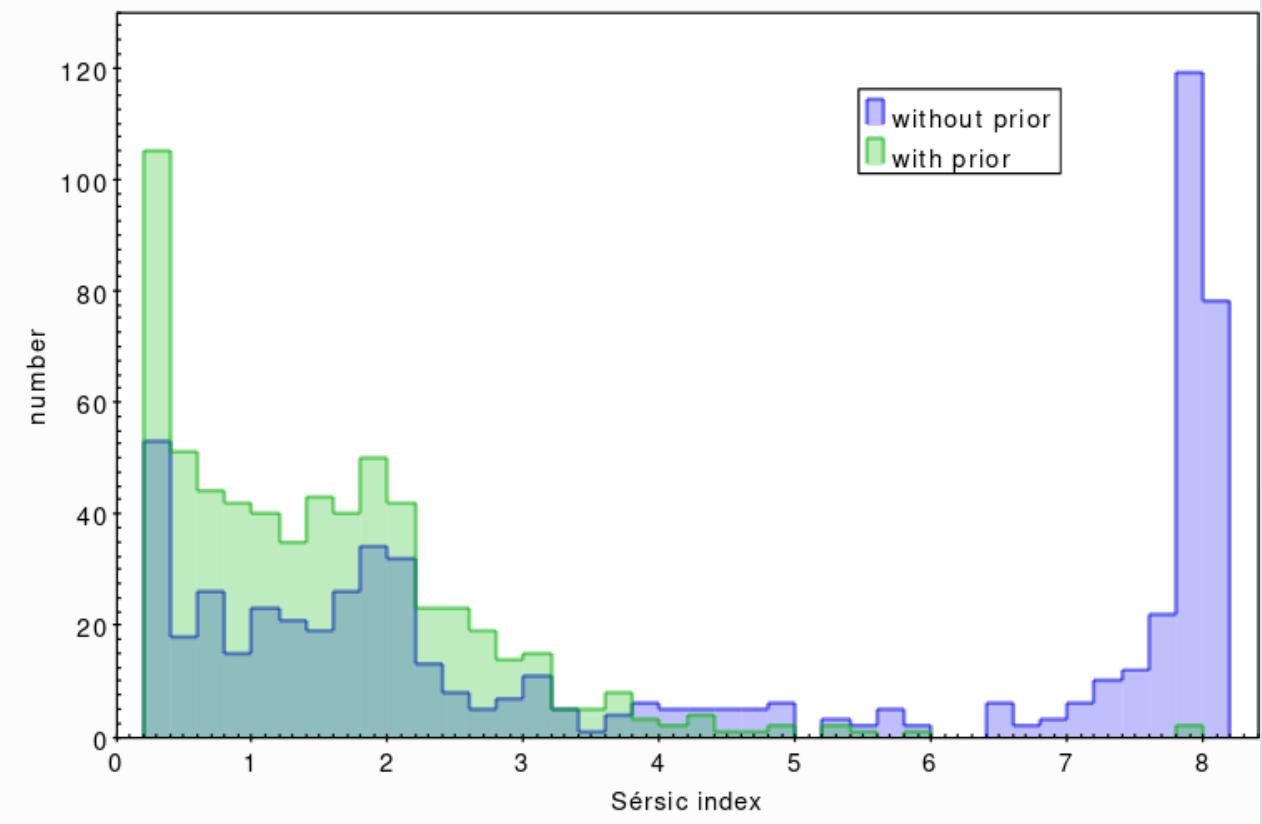
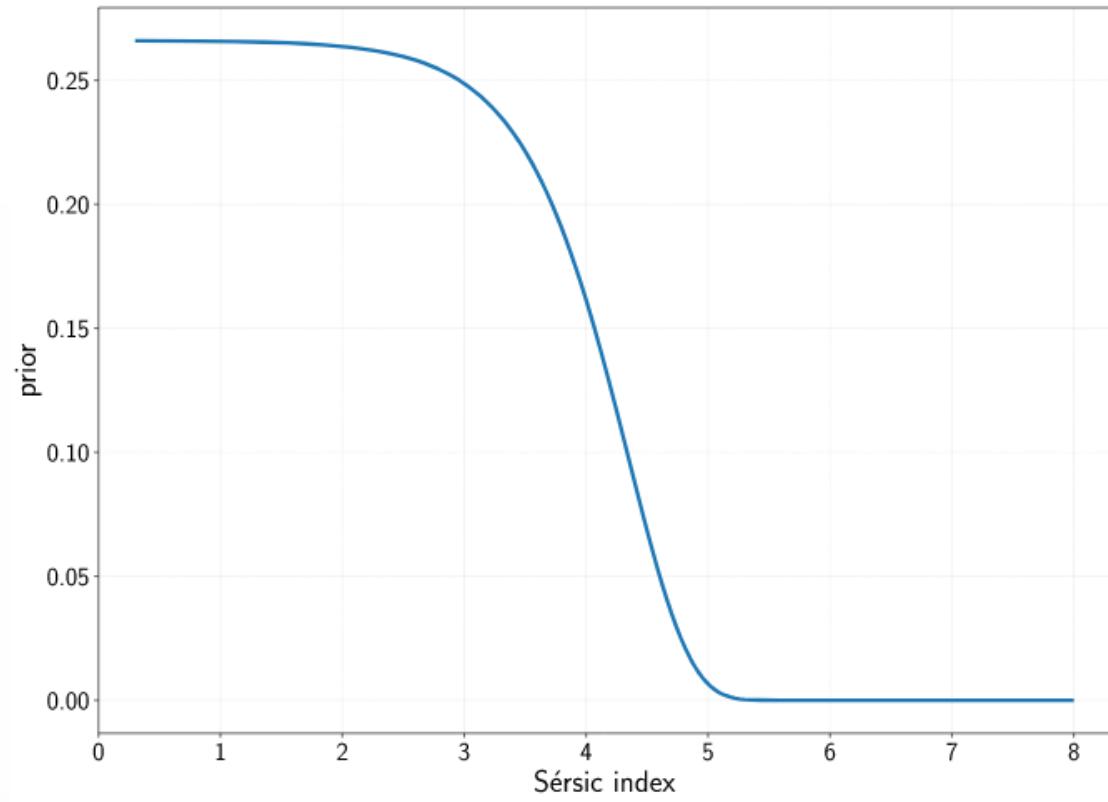
x,y = get_pos_parameters()

# Loop over filters
for filter, group in mesgroup:
    flux = get_flux_parameter()
    # Loop over exposures
    for filename, subgroup in group:
        t = (float(subgroup[0].meta["MJD-OBS"]) - 6000.0) / 365.25
        tp = ConstantParameter(t)
        xr = DependentParameter(lambda x, dx, tp: x + tp*dx, x, pmx, tp)
        yr = DependentParameter(lambda y, dy, tp: y + tp*dy, y, pmy, tp)

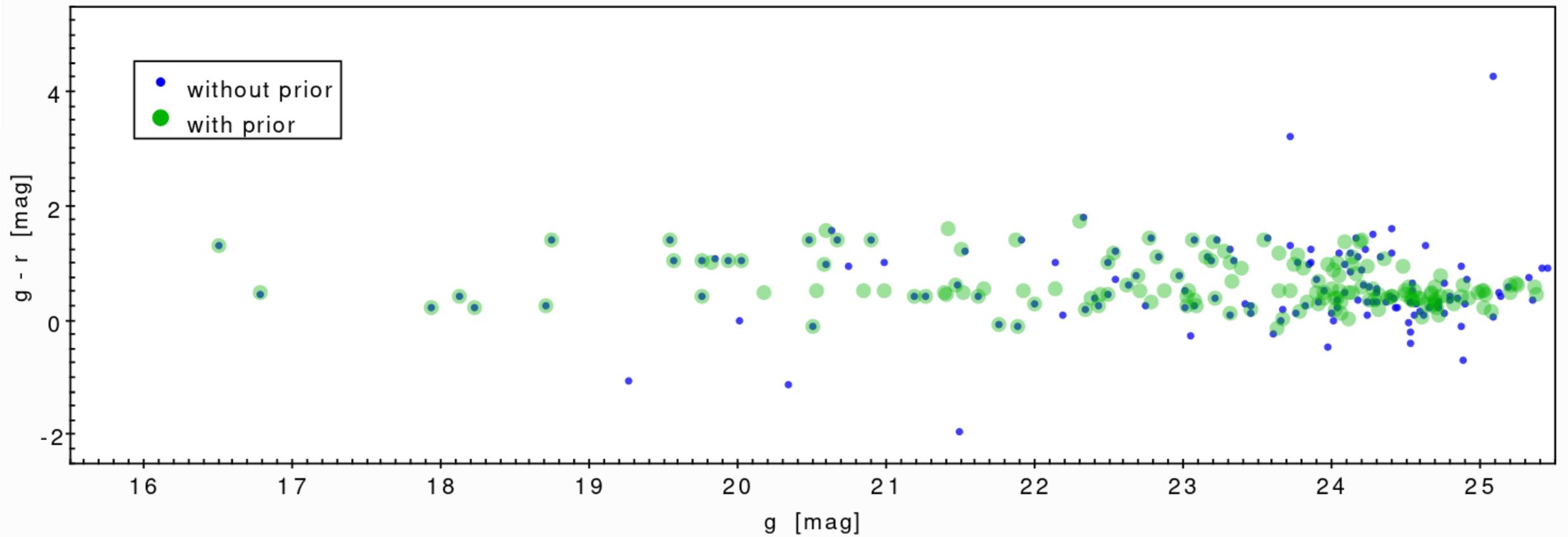
        add_model(subgroup, PointSourceModel(xr, yr, flux))
```



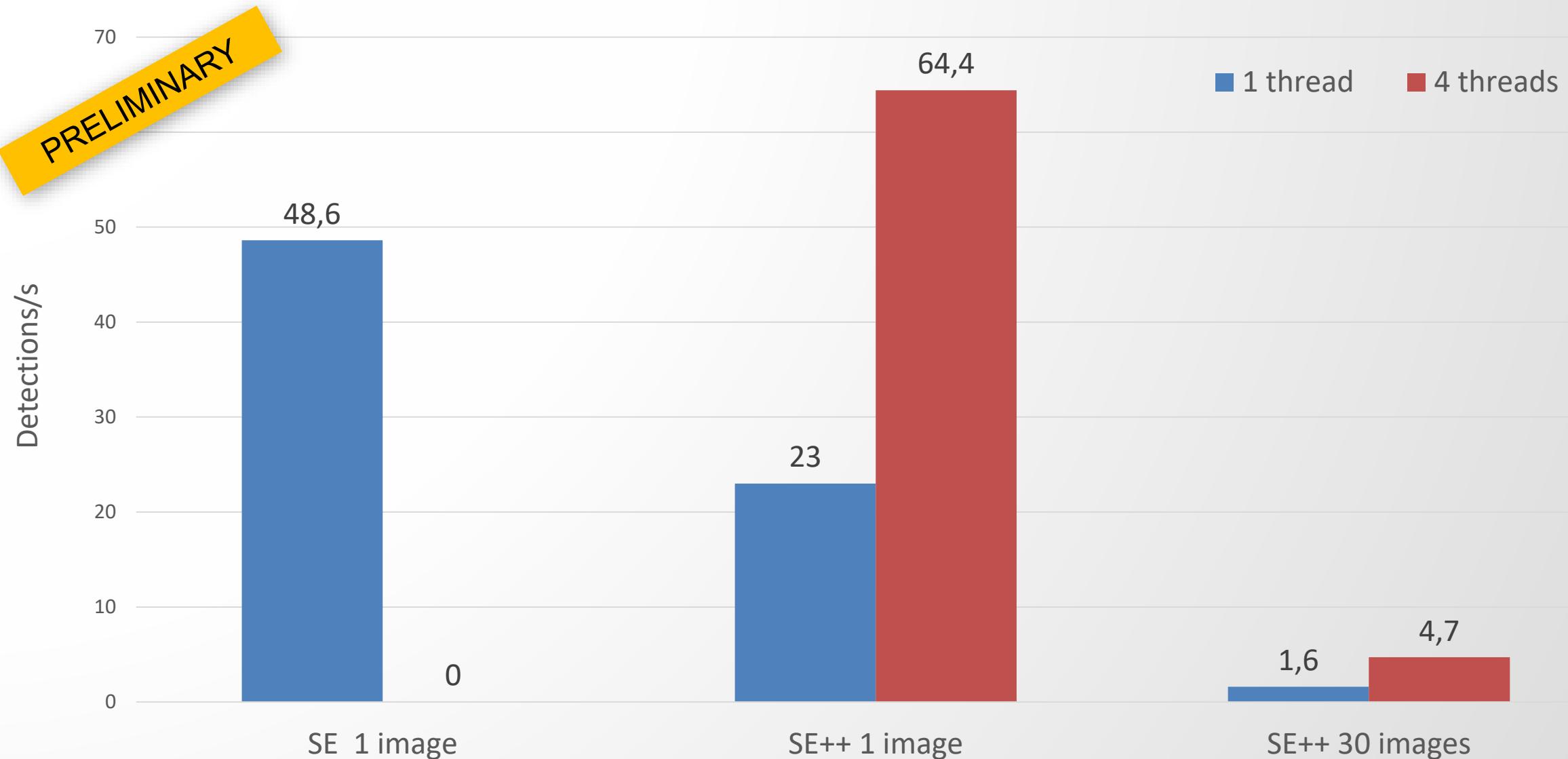
Shape priors



Photometric priors



Performance (pure Sersic fits)



The road ahead

- Early alpha release at <https://github.com/astrorama/sextorxx>
- Feedback from users
 - Fix the naming issue
 - Tune behavior
- Improve performance
- Compatibility with existing companion packages
- Improve documentation
- High level Python interface
- New detection/deblending module
- More modules
 - Check out Martin's poster at this conference