



photutils

An Astropy Package for Photometry



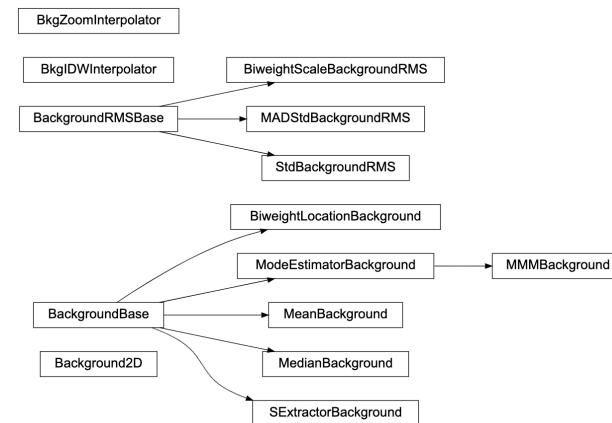
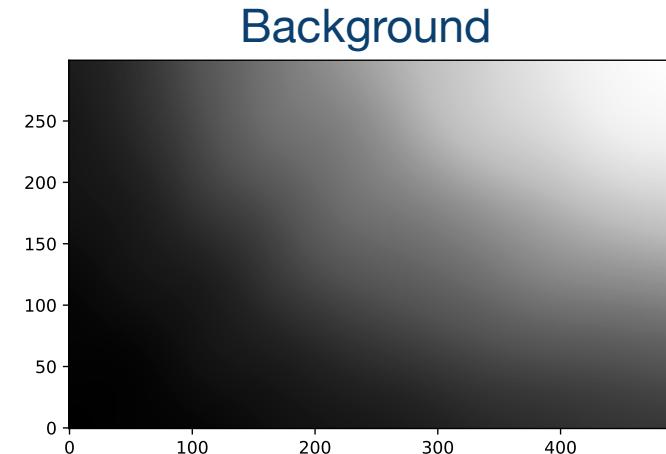
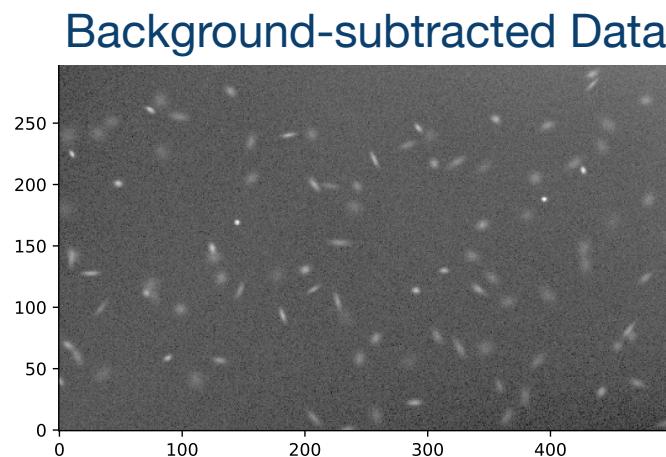
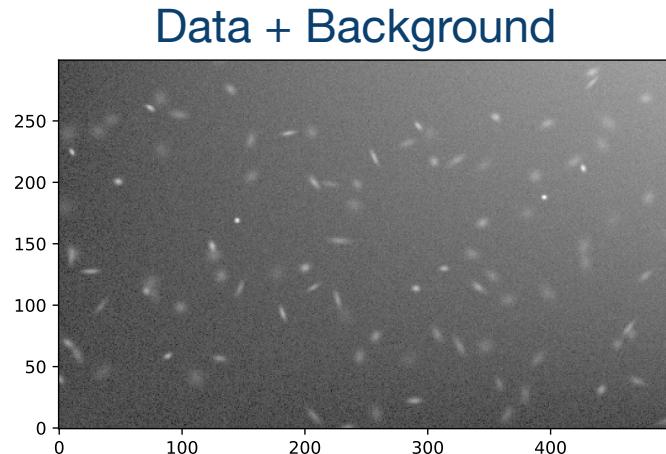
Photutils is an Astropy coordinated package for source detection and photometry (and related tools).

It provides flexible/modular tools for:

- 2D Background (and RMS) Estimation
- Source Detection/Extraction
- Aperture Photometry
- Image Segmentation (incl. Isophotal and Kron photometry)
- PSF Photometry
- Building an effective PSF (ePSF)
- PSF Matching
- Radial Profiles
- Elliptical Isophotal Fitting and Analysis
- Centroids

2D Background Estimation

photutils.background



Source Detection/Extraction

Star Finders (photutils.detection)

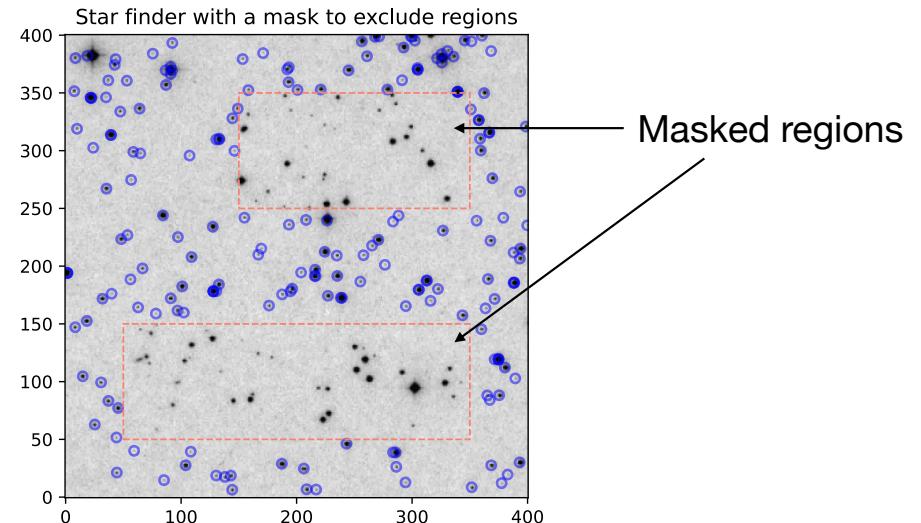
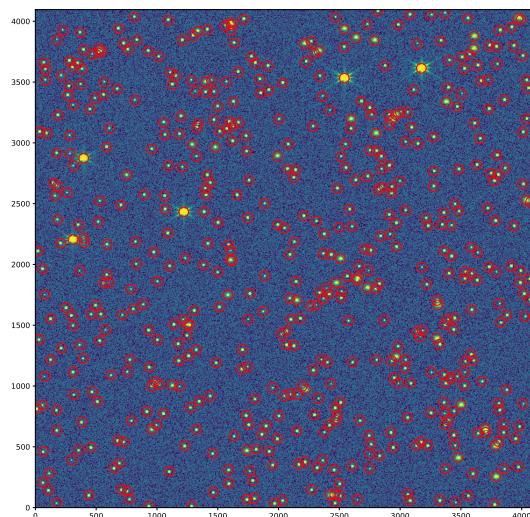


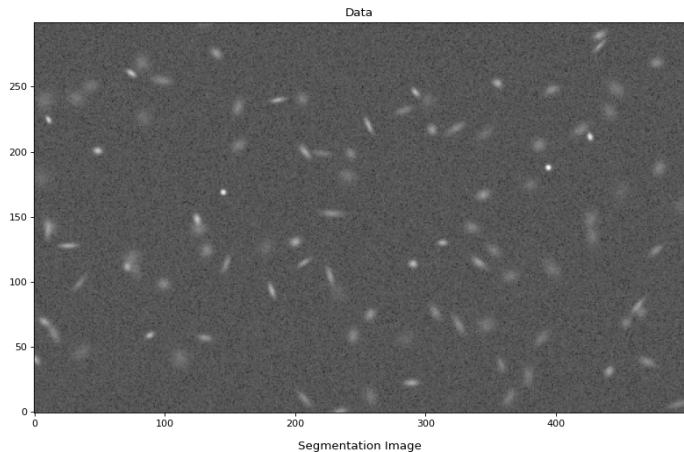
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1	144.24757	6.3797904	0.58156257	0.20351244	-0.0082188029	25	0	6903	5.6976747	-1.8892441
2	208.66907	6.8205805	0.48348966	-0.12585138	-0.030811133	25	0	7896	6.7186388	-2.0682032
3	216.92614	6.5775933	0.69359525	-0.70664632	-0.096088688	25	0	2195	1.6662764	-0.55436758
4	351.62519	8.5459013	0.48577834	-0.3415136	0.015124942	25	0	6977	5.8970385	-1.9265849
5	377.51991	12.065501	0.52038488	0.36971562	-0.06508248	25	0	1260	1.1178252	-0.12093477
6	294.27284	12.737191	0.68021892	0.10631228	-0.3445009	25	0	2059	1.4809613	-0.42635928

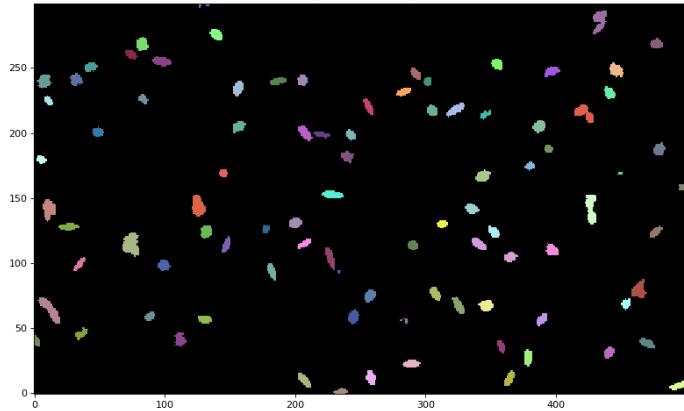
Source Detection/Extraction

photutils.segmentation

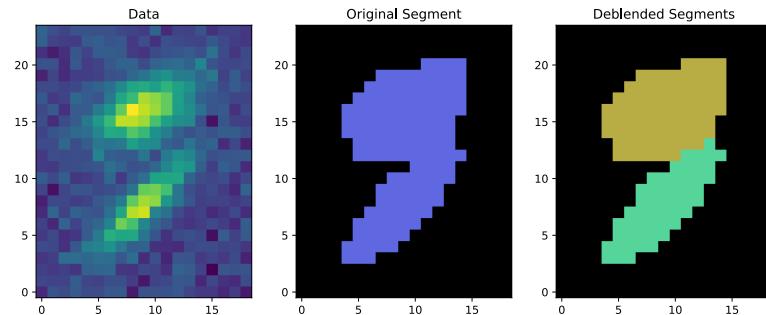
Image Segmentation



Isophotal
footprints

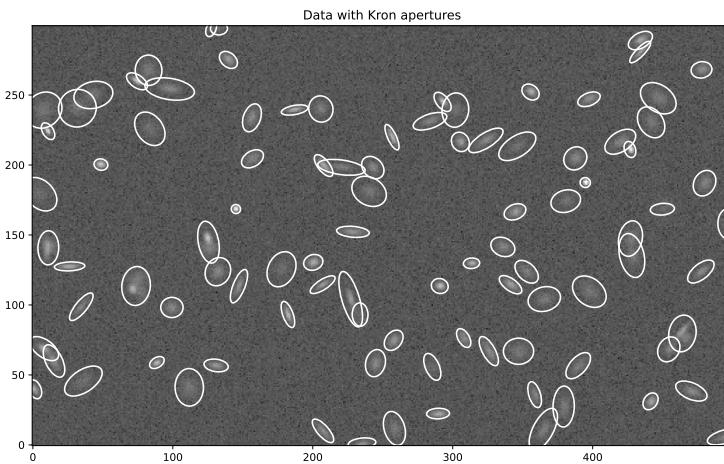


Source Deblending

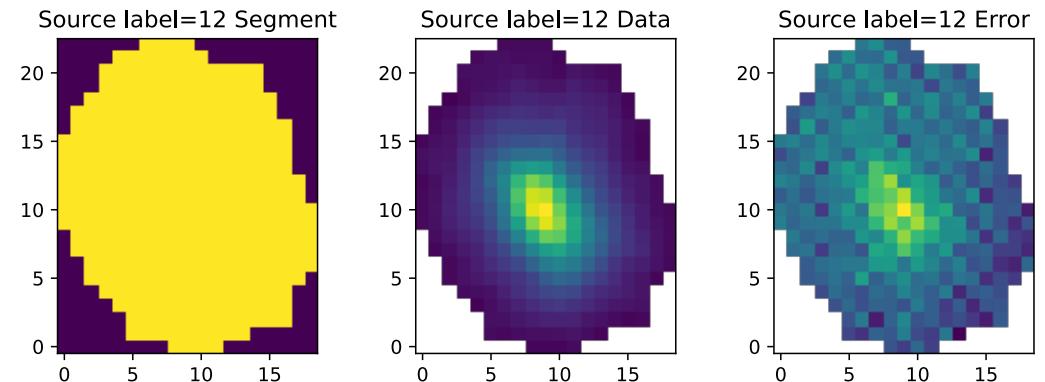
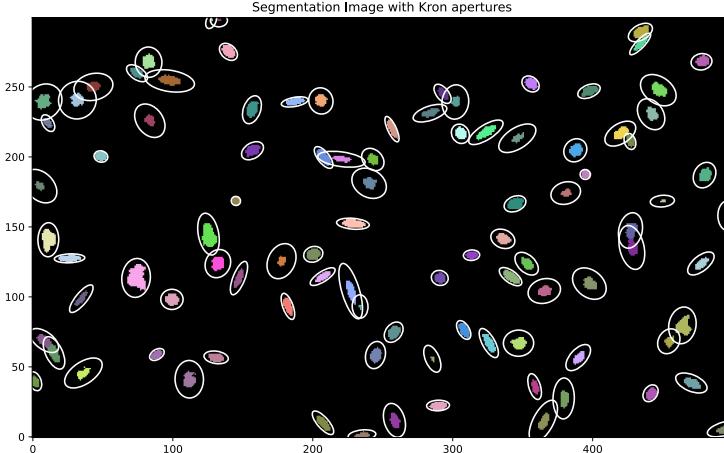


Segmentation Source Properties

photutils.segmentation

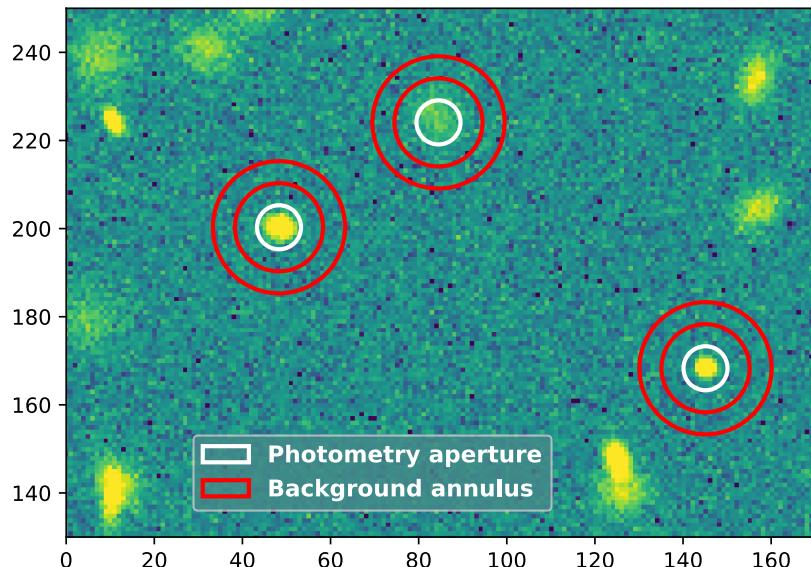


label	xcentroid	ycentroid	sky_centroid	bbox_xmin	bbox_xmax	bbox_ymin	bbox_ymax	area	pix
	deg,deg		deg						
1	208.159945495948	1.101930631570293	197.9891233099060						
2	494.1644999473206	5.019559551598995	197.8566448214844						
3	307.0920037145485	10.0435017337201124	197.8897357404712						
4	364.7347070404815	11.1209966565653	197.8871742030530	2.506627850170783	0.969092065545705	6.091873782119838	0.28265320041199	3.645391508711617	22.
5	258.3583096771747	11.743481115254212	197.8890083204803	3.080250532446603	1.176574232511513	15.9890788289711838	0.24161684281563	1.312581866278477	15.51
6	288.5077691706926	22.3878940245232	197.8888050519203	3.347948649014686	1.22785320021052	24.8597484100864194	0.0527842942731824	2.4757594584890190	19.0
7	379.2646932860133	27.43040173031350	197.8875691700727	3.11898114239003	1.37106539911214	61.92659409391747	0.081744875292	1.386027089549675	13.70
8	441.3504724152744	31.13417943040304	197.88899149637	2.61950134290003	1.5583191743704727	-73.7084034552388	0.03089061645628	0.47710015387844	12.25
9	354.5234401517173	35.89894374498677	197.888256082808	2.737735314200774	1.26757907359119	2.01844740408207	0.086319475598807	1.615983850337524	30.4
...
87	127.36793895905949	297.22705846048	197.89775667020	2.0623179823964	0.10529945903014	55.2223213506704	0.085464442453375	1.439615173814	2.5
88	132.94871949802	297.481478030870	197.8978623891	2.515353302302493	0.056988177749598	-72.9670202425258	0.00102654709683	0.958837195053993	1.45
89	15.12540606207289	59.96340200937348	197.89366973382	0.717910605441285	0.425814392782013	66.9394340245599	3.87621457436978	0.58	...
90	8.12810900993007	68.8166446880853	197.89291692014	0.7169868055453	0.677720320200013	6.0015662059583	0.0001265473286	0.53	...
91	427.972251836964	135.3225243030939	197.8986447706	0.7169868055453	0.499578920343557	1.1318301361920972	2.68411050023286	339.2450056427170	11.62277651991256
92	427.00401800064	147.45628179369307	197.89989143434	0.7169868055453	1.52020775776287	-64.155981761926	0.077874502853017	474.4097602627637	21.20330717097182
93	426.6286959708967	211.0885261716032	197.9030991071	0.7169868055453	2.9428222399197314	1.37420130688379	0.074782136672309	20.82422562570731	13.399971723886133
94	419.7345034811678	216.63063952150304	197.90112605429	0.7169868055453	3.216195522301795	1.50170775776287	0.077874502853017	120.16126172314896	13.051372220027
95	453.94757379705	268.711180791519	197.9030991071	2.89398815614202	1.88797993393462	0.7587829951787779	1.1364154028271	1.408	...
96	434.0866034040102	288.9265040241102	197.9030991071	1.817554942759956	0.8020909820993	-70.8706003122828	0.073329749532484	0.57640414719399	7.12
97	2.3884659547854868	1.656226420277118	32.79827233430475	0.19293980957417	1.735299618155733	14.28
98	3.141742851448803	0.93530996116134	46.010775947167296	0.95435750663320	2.271204201069240	5.91
99	2.8651749729202	1.53937389988098	29.2321570653300	0.16329017554513	0.82349918348892	28.51
100	1.216843837711	15.98193834570834	99.0099516810620	28.2323370774707	464.544468992497	17.0618479871911	0.2299445673814	41.51045628710864	...
101	53.300323057550	17.8889406505905	940.03458142978	688.258246940001	10.4267544981224	622.79169014636	13.55679909712845
102	603.05050911234	19.07754293639	87.426504787103	33.99471304819805	17.05495864641564	15.7019143672497	10.20330717097182
103	506.450130398596	13.00844180340753	644.182074715303	22.363362211922	13.4990512098932	13.4990512098932	13.4990512098932	13.4990512098932	13.4990512098932
104	831.506120828711	13.4990512098932	22.363362211922	13.4990512098932	13.4990512098932	13.4990512098932	13.4990512098932	13.4990512098932	13.4990512098932



Aperture Photometry

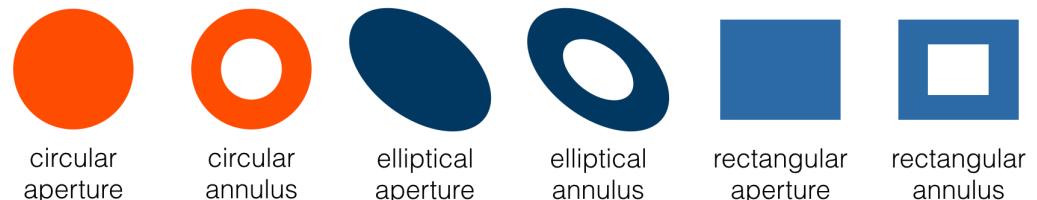
photutils.aperture



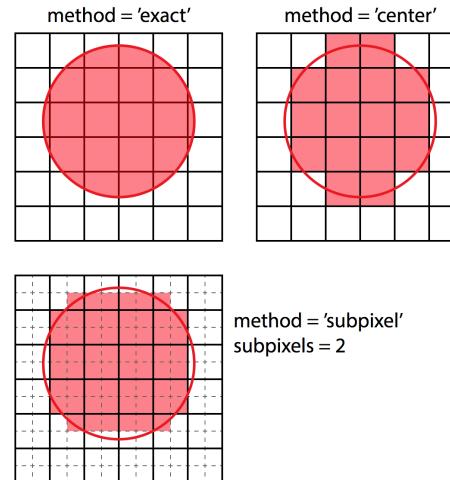
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	pix	pix				
int64	float64	float64	float64	float64	float64	float64
1	145.1	168.3	1131.5794219396346	23.35849263294723	1950.1741825747145	47.225615152137244
2	84.5	224.1	746.160643858321	20.999164191036634	2004.473120746215	51.63625874462207
3	48.3	200.3	1250.2185660077996	22.122686708826034	1947.6843963275142	50.422058132736446

Aperture Shapes



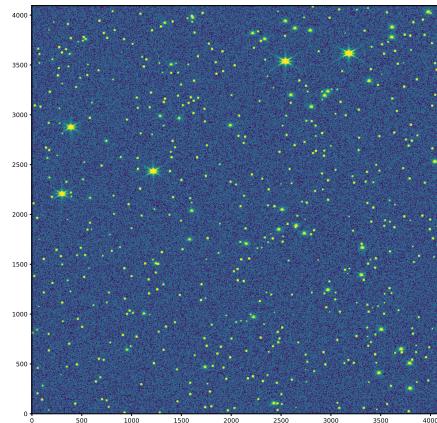
Aperture/Pixel Overlap Methods



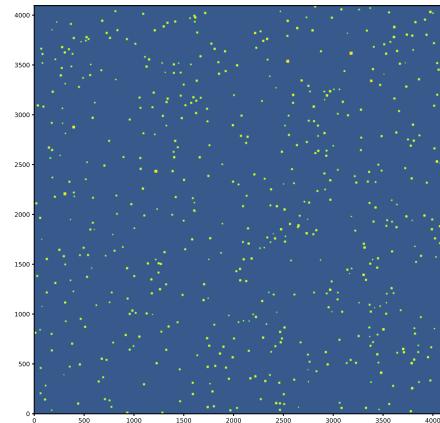
PSF Photometry

photutils.psf

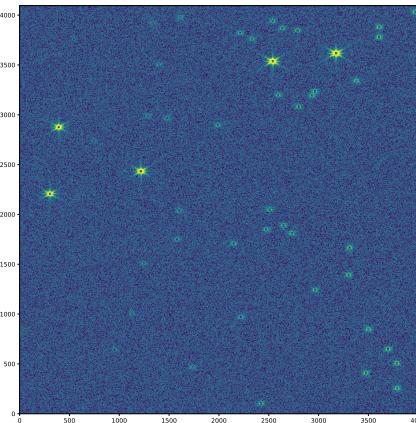
Data



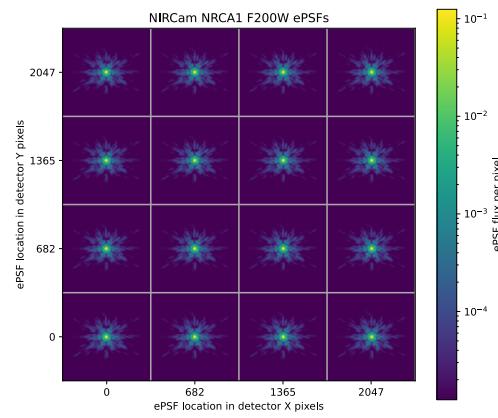
PSF Model



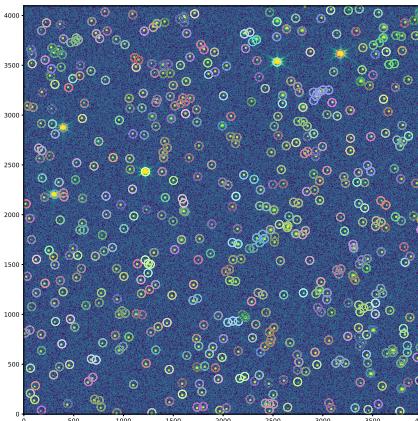
Residual



GriddedPSFModel



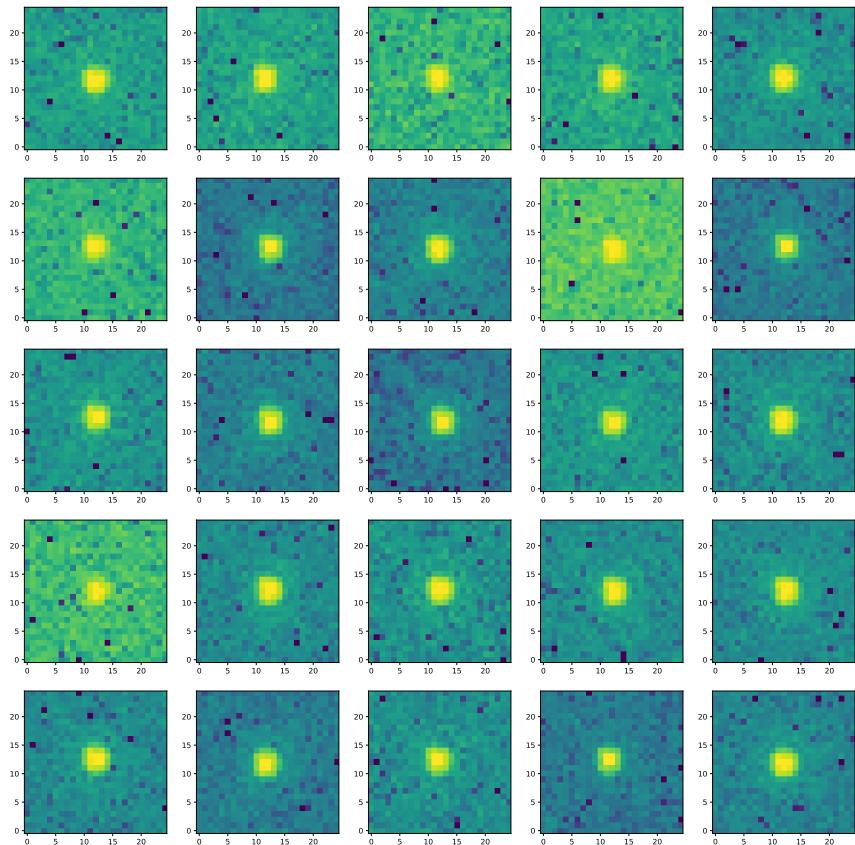
SourceGrouper



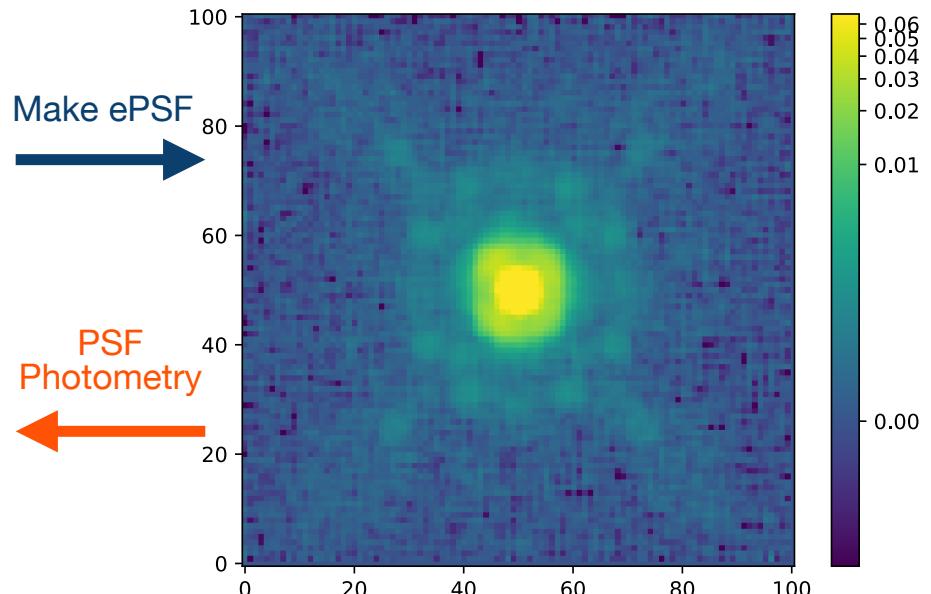
Effective PSF (ePSF) Building

photutils.psf (EPSFBuilder)

Extracted Stars



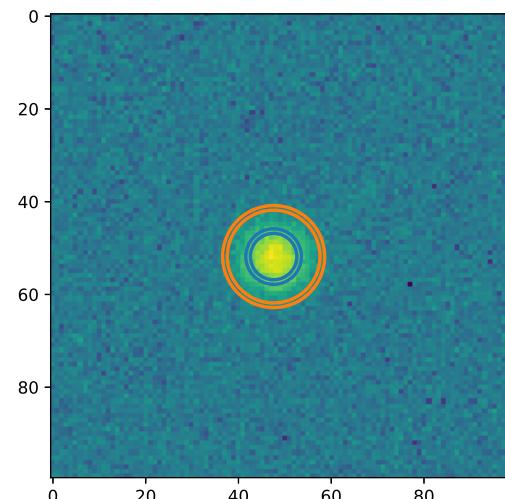
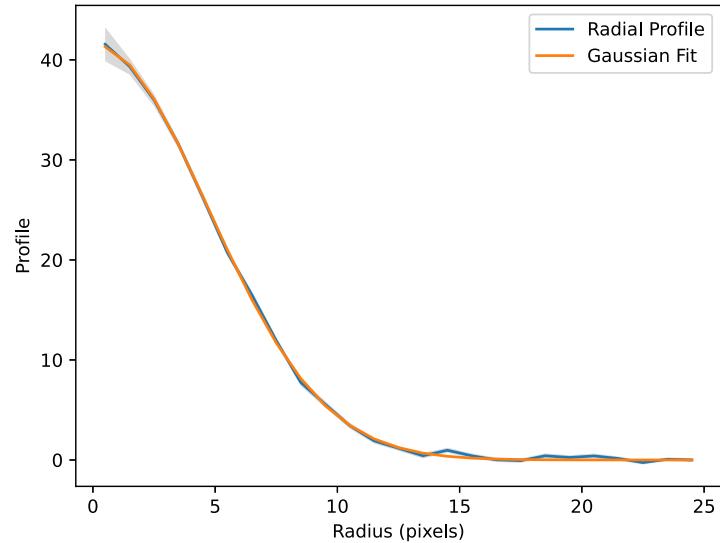
ePSF
(4x oversampled)



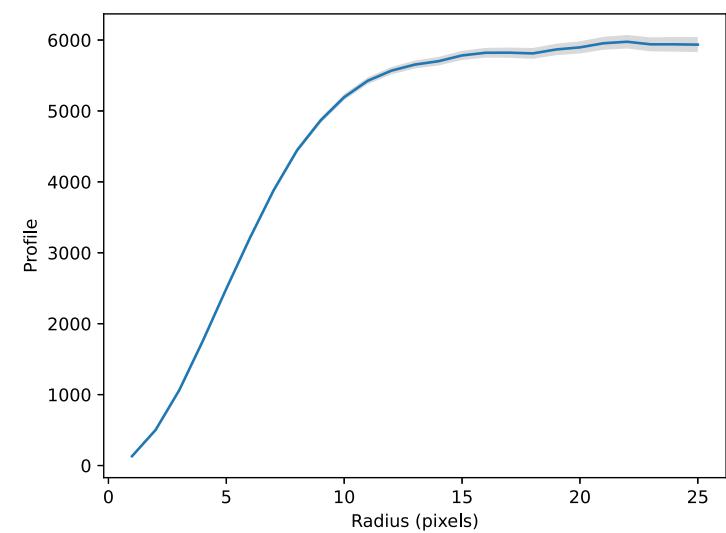
Radial Profiles

photutils.profiles

Radial Profile
(with Gaussian Fit)

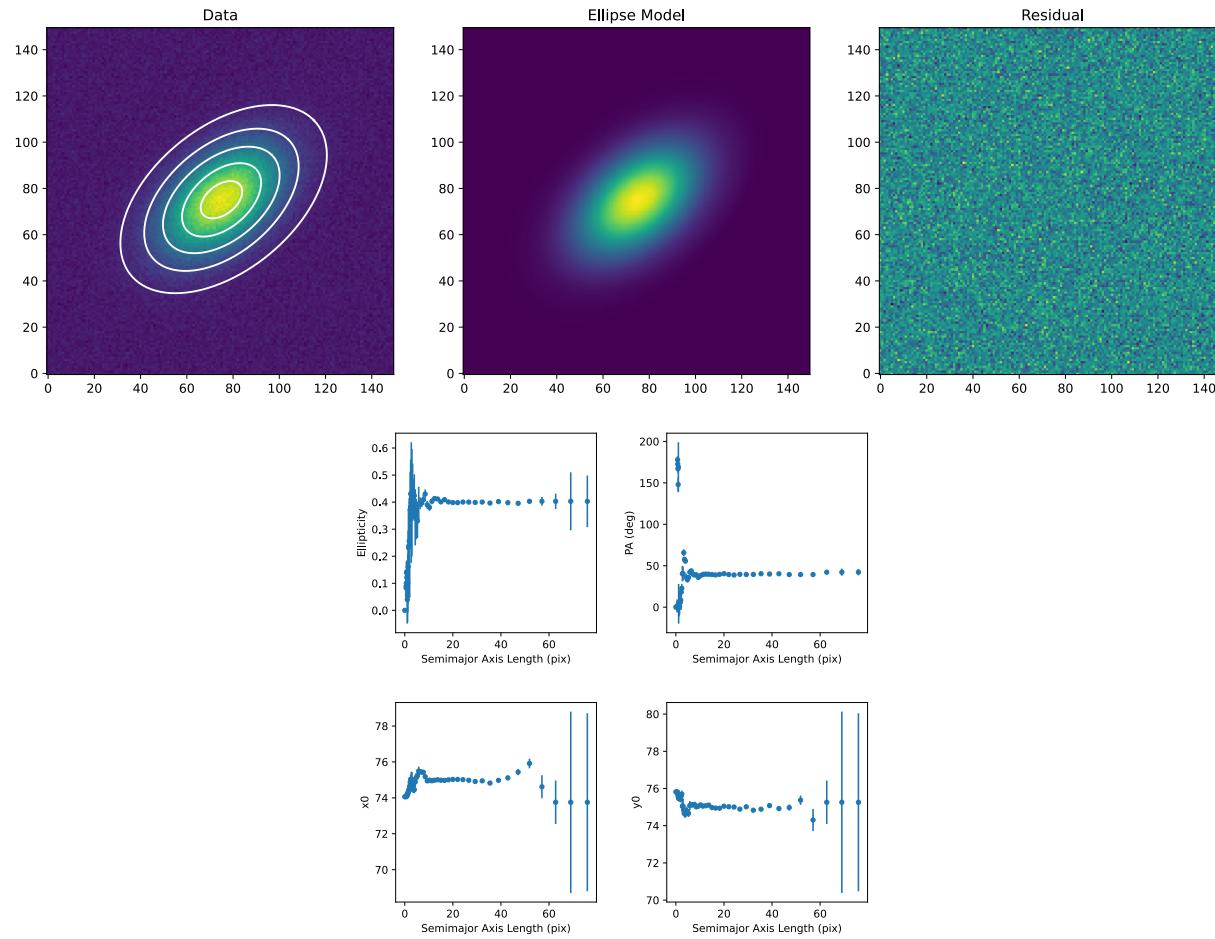


Curve of Growth



Elliptical Isophote Fitting/Analysis

photutils.isophote





Code: <https://github.com/astropy/photutils>



Docs: <https://photutils.readthedocs.io>

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An Astropy Package for Photometry

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An Astropy Package for Photometry

Photutils

Version: 2.0.1 – Date: Oct 16, 2024

Useful links: [Installation](#) | [What's New in Photutils 2.0?](#)

Photutils is a Python library that provides commonly-used tools and key functionality for detecting and performing photometry of astronomical sources. Tools are provided for background estimation, star finding, source detection and extraction, aperture photometry, PSF photometry, image segmentation, centroids, radial profiles, and elliptical isophote fitting. It is an a [coordinated package](#) of [Astropy](#) and integrates well with other Astropy packages, making it a powerful tool for astronomical image analysis.

Important

If you use Photutils for a project that leads to a publication, whether directly or as a dependency of another package, please include an [acknowledgment and/or citation](#).

Getting Started New to Photutils? Check out the getting started guides. They contain an introduction to Photutils's main concepts and links to additional tutorials. To the getting started guides	User Guide The user guide provides in-depth information on the key concepts of Photutils with useful background information and explanation. To the user guide	API Reference The reference guide contains a detailed description of the functions, modules, and objects included in Photutils. It assumes that you have an understanding of the key concepts. To the reference guide
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[Getting Started](#)