



BHTOM: DATA REDUCTION

HOW DOES IT WORK & HOW TO UPLOAD YOUR OWN DATA?



PRZEMEK MIKOŁAJCZYK

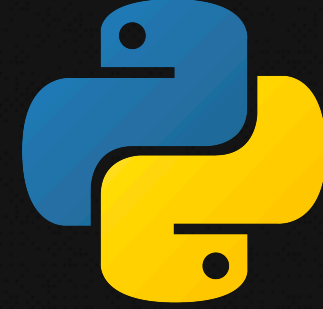
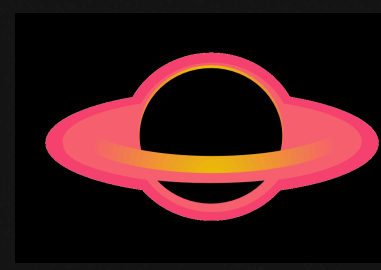
Astronomical Observatory, University of Warsaw
Astronomical Institute, University of Wrocław

 mikolajczyk@astrouw.edu.pl

 [@AstroMikiPL](https://twitter.com/AstroMikiPL)

- + ŁUKASZ WYRZYKOWSKI
(WOO-CASH VI-SHI-KOV-SKI)
- + KRZYSZTOF KOTYSZ
- + PAWEŁ ZIELIŃSKI

What is CCDPhot and how does it work?

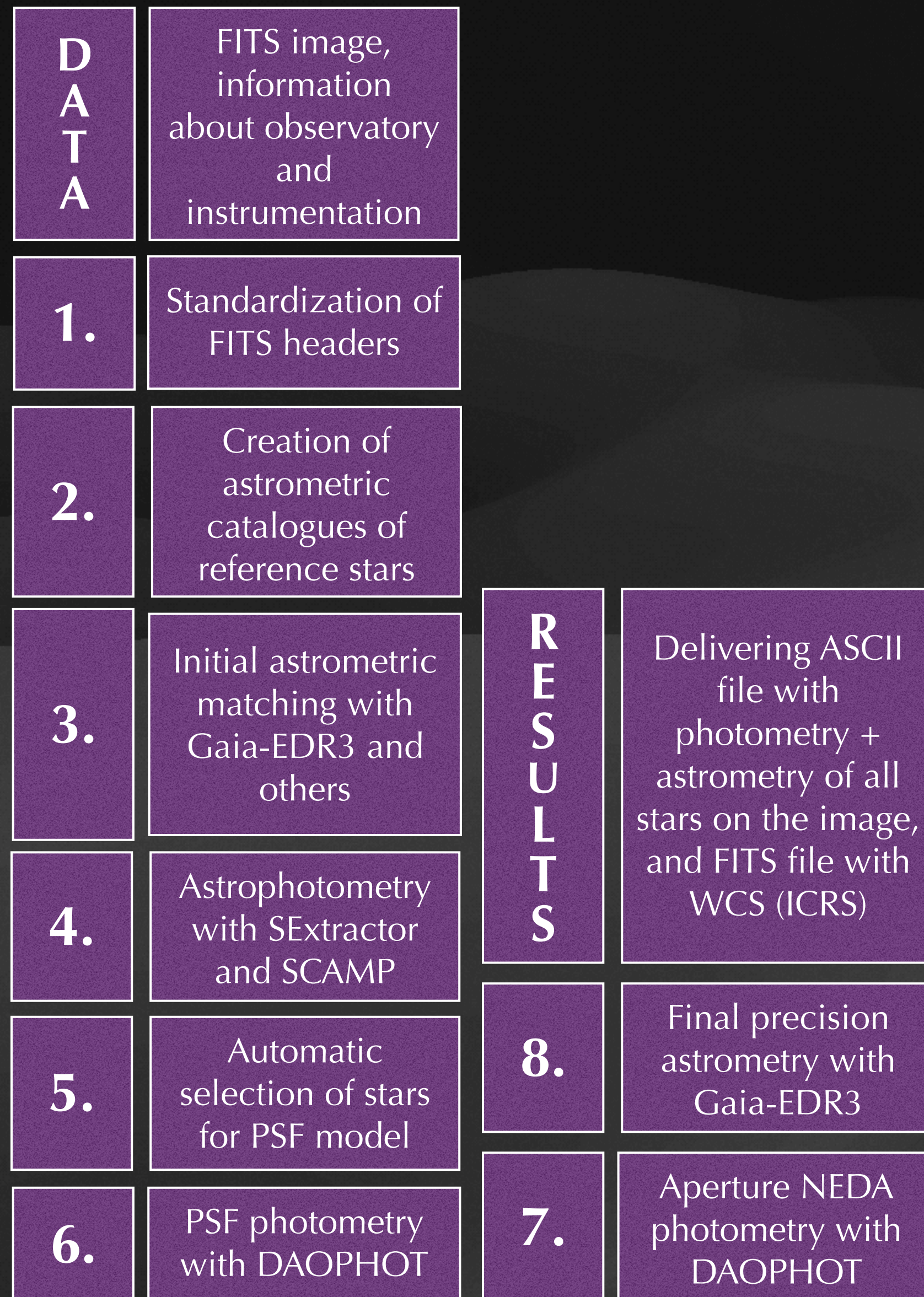
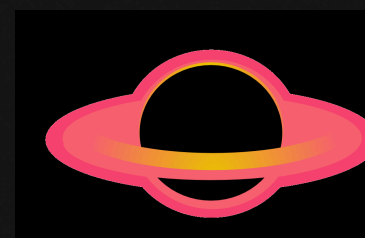


CCDPhot

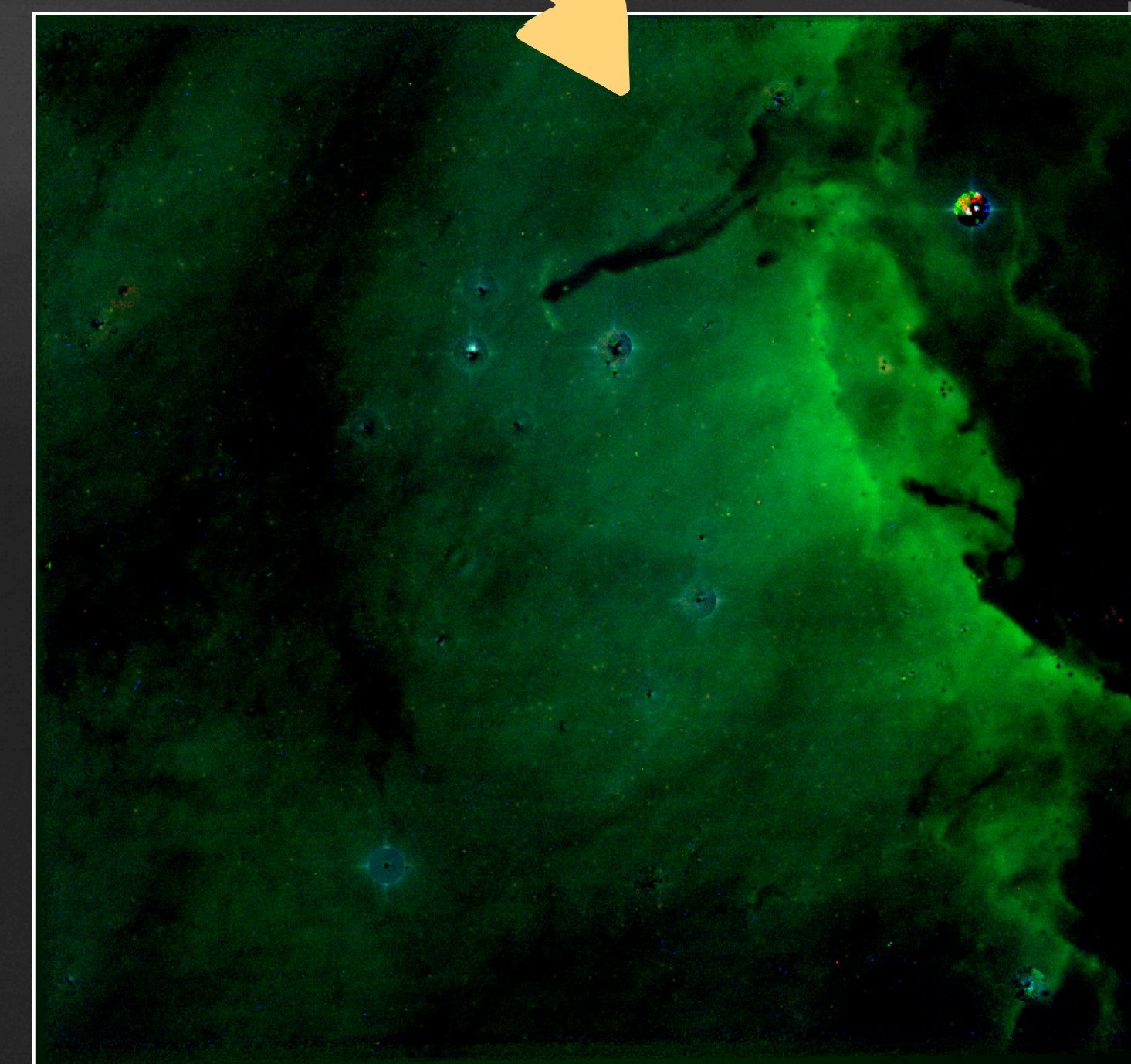
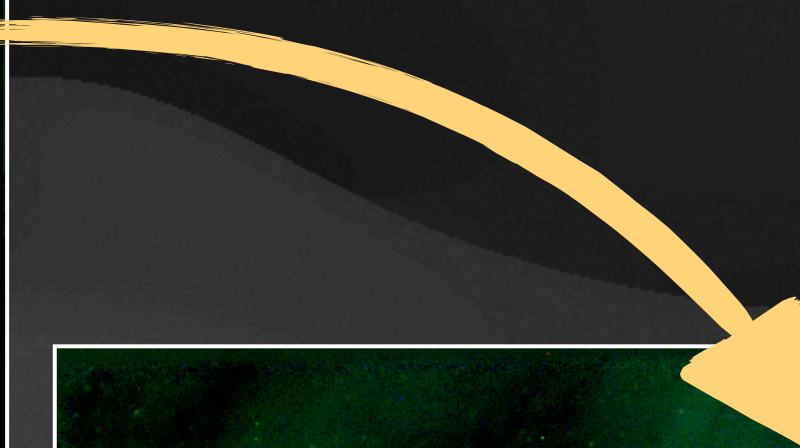
RELIABLE
OUTDATED
FUTURE

- ★ **SEXTRACTOR** (BERTIN & ARNOUITS 1996, *A&AS* v.117, p.393-404)
- ★ **SCAMP** (BERTIN 2006, *2006ASPC*..351..112B)
- ★ **DAOPHOT** (STETSON 1987, *PUBLICATIONS OF THE ASTRONOMICAL SOCIETY OF THE PACIFIC*, v.99, p.191)
- ★ **IRAF/PYRAF** (TODY 1986, *1986SPIE*..627..733T, STSci 2012)
- ★ **WCS TOOLS** (MINK 1997, 2002, *2002ASPC*..281..169M)
- ★ **ESO ECLIPSE** (DEVILLARD 1997, "THE ECLIPSE SOFTWARE", *THE MESSENGER* No 87)
- ★ **JDAY, SWARP, CDS CLIENT, PSFEX** AND MANY MORE

What is CCDPhot and how does it work?

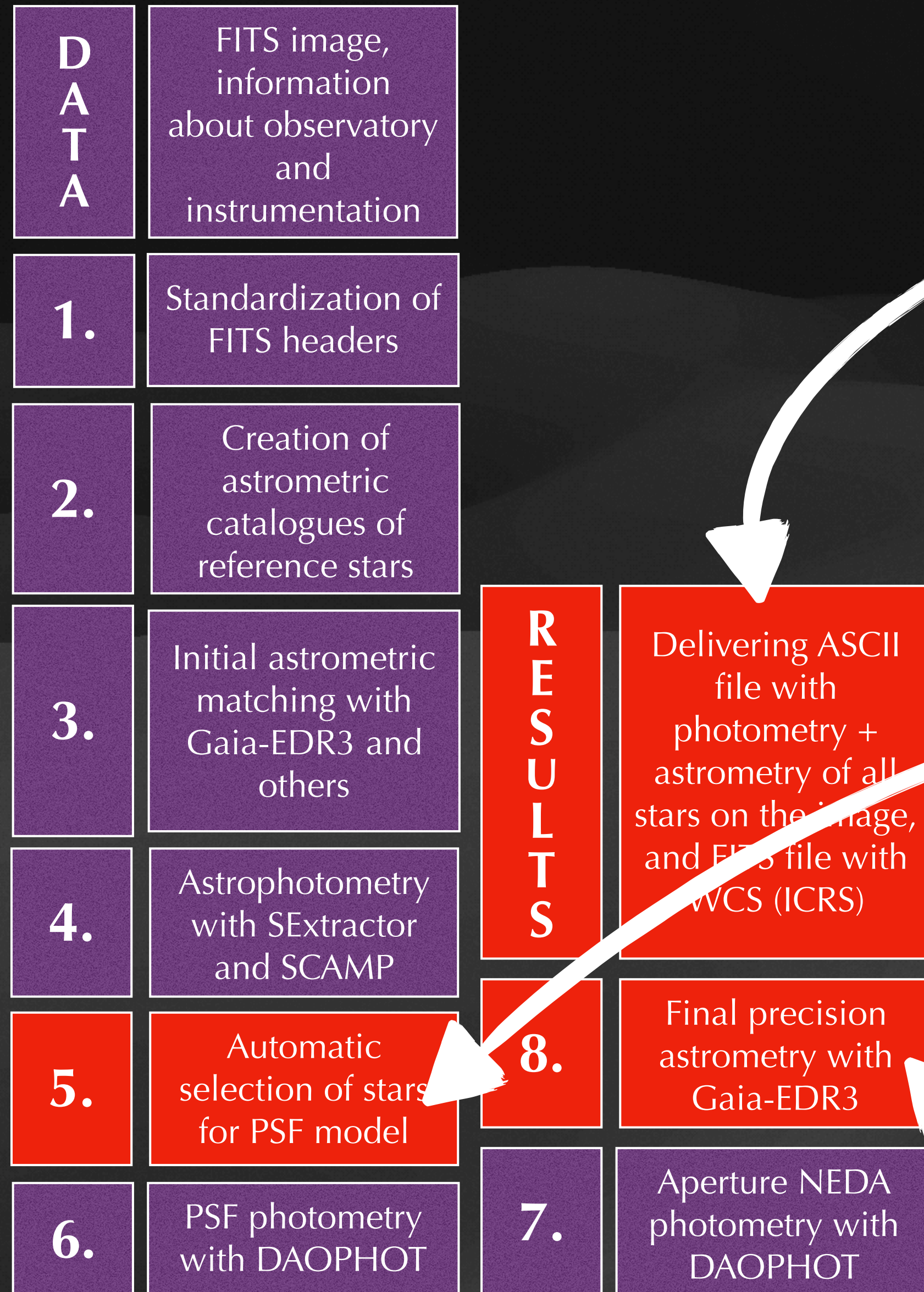
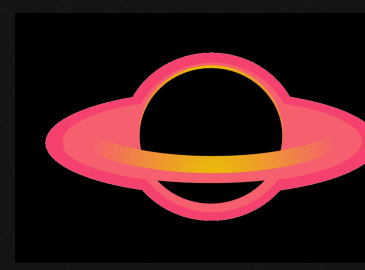


V1490 Cyg, Białków Observatory, 60-cm Cassegrain Telescope, Andor DW432BV, filters: V(RI)_c (100x5,100x5,90x5), FoV: 12x12 min



The same field but after CCDPhot astrometric and photometric processing with stars subtracted

What is CCDPhot and how does it work?

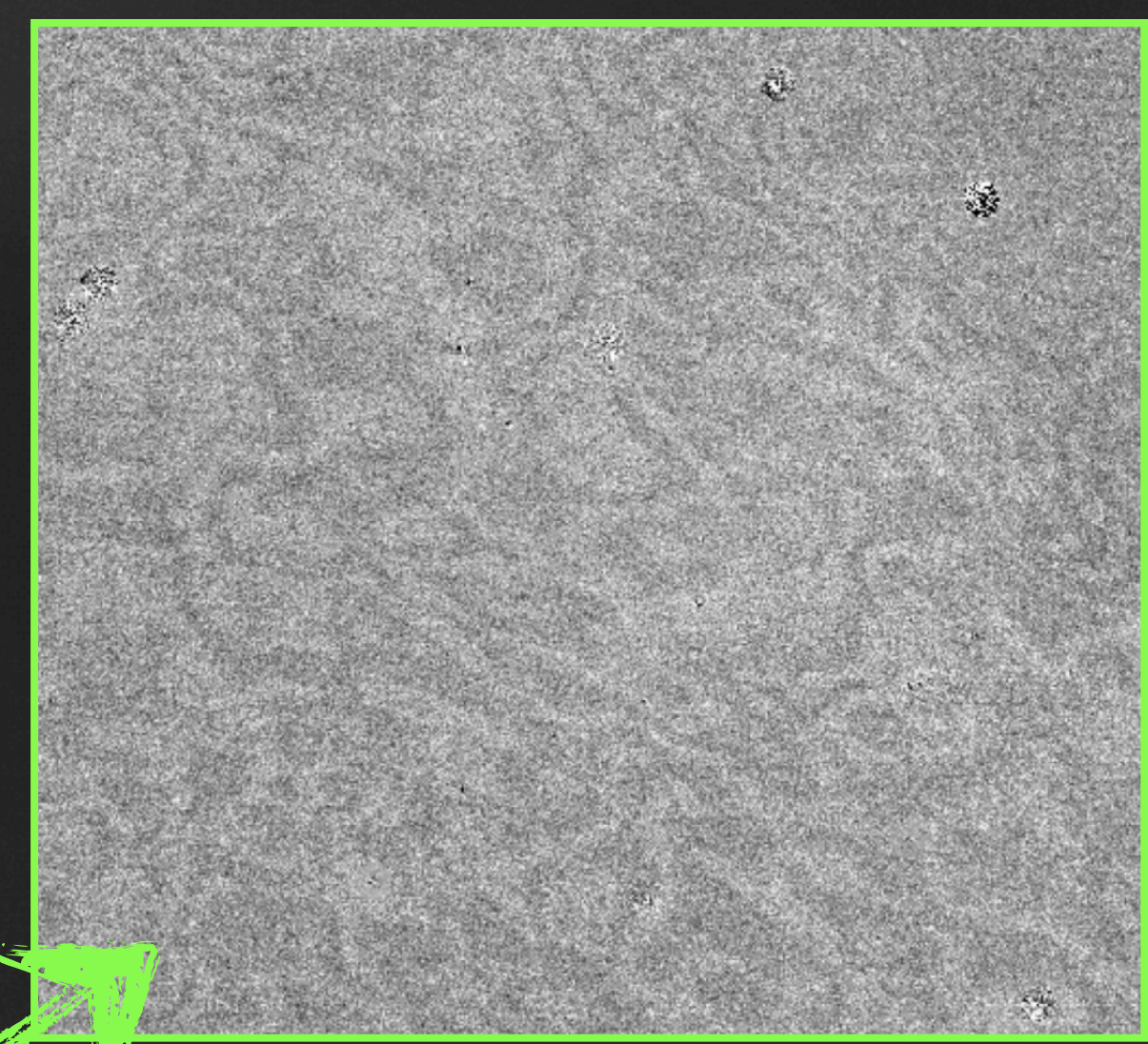
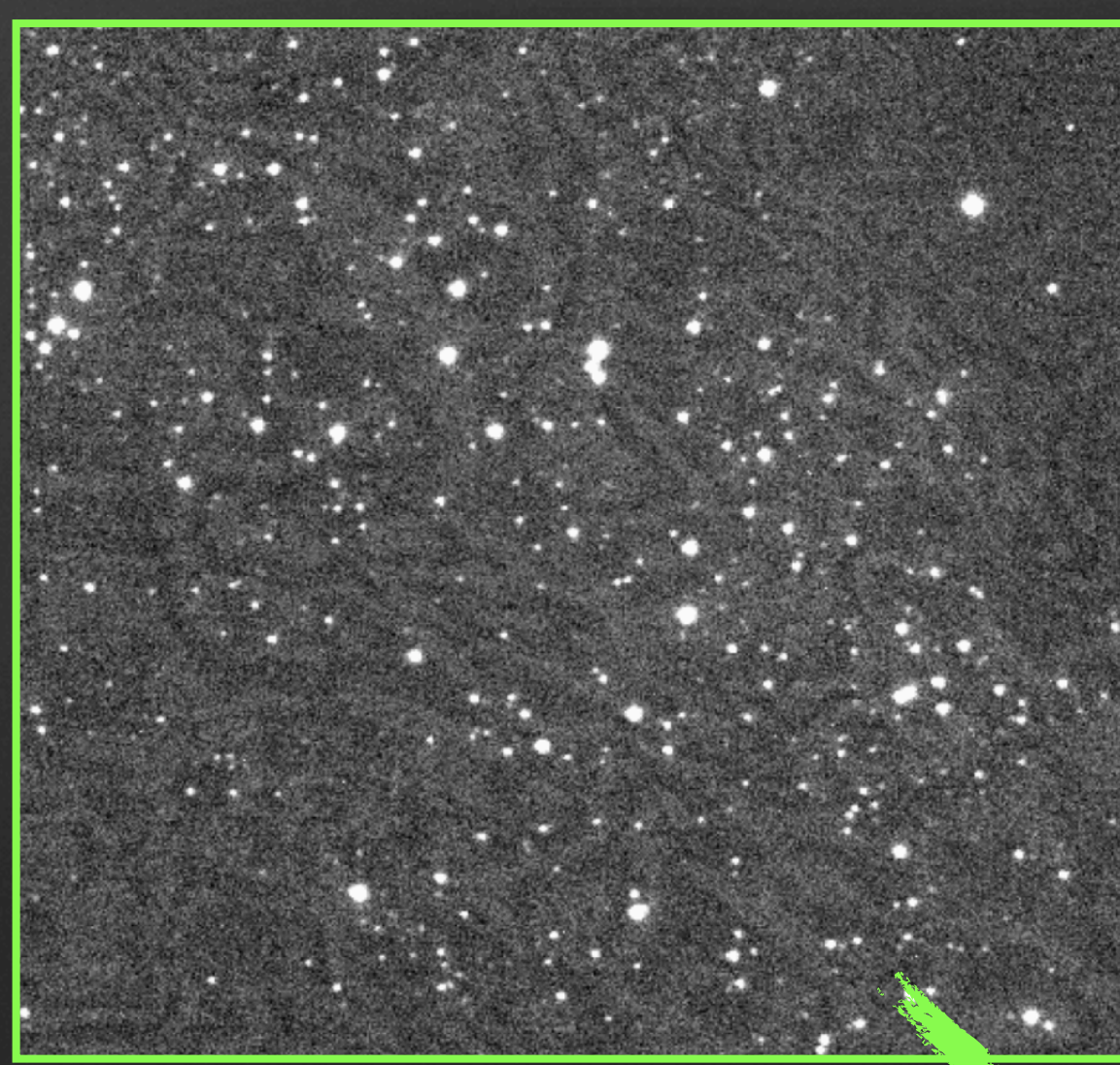
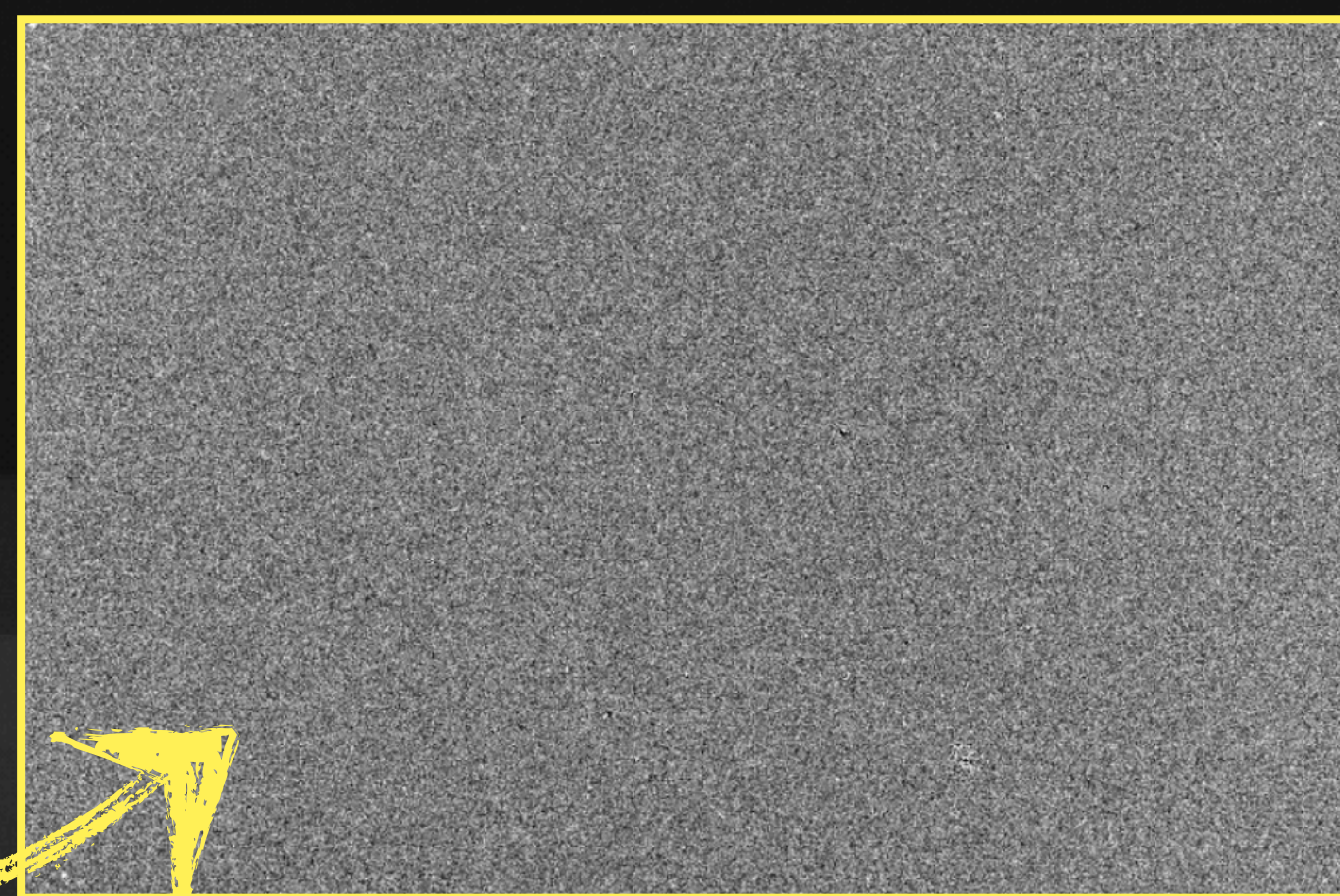
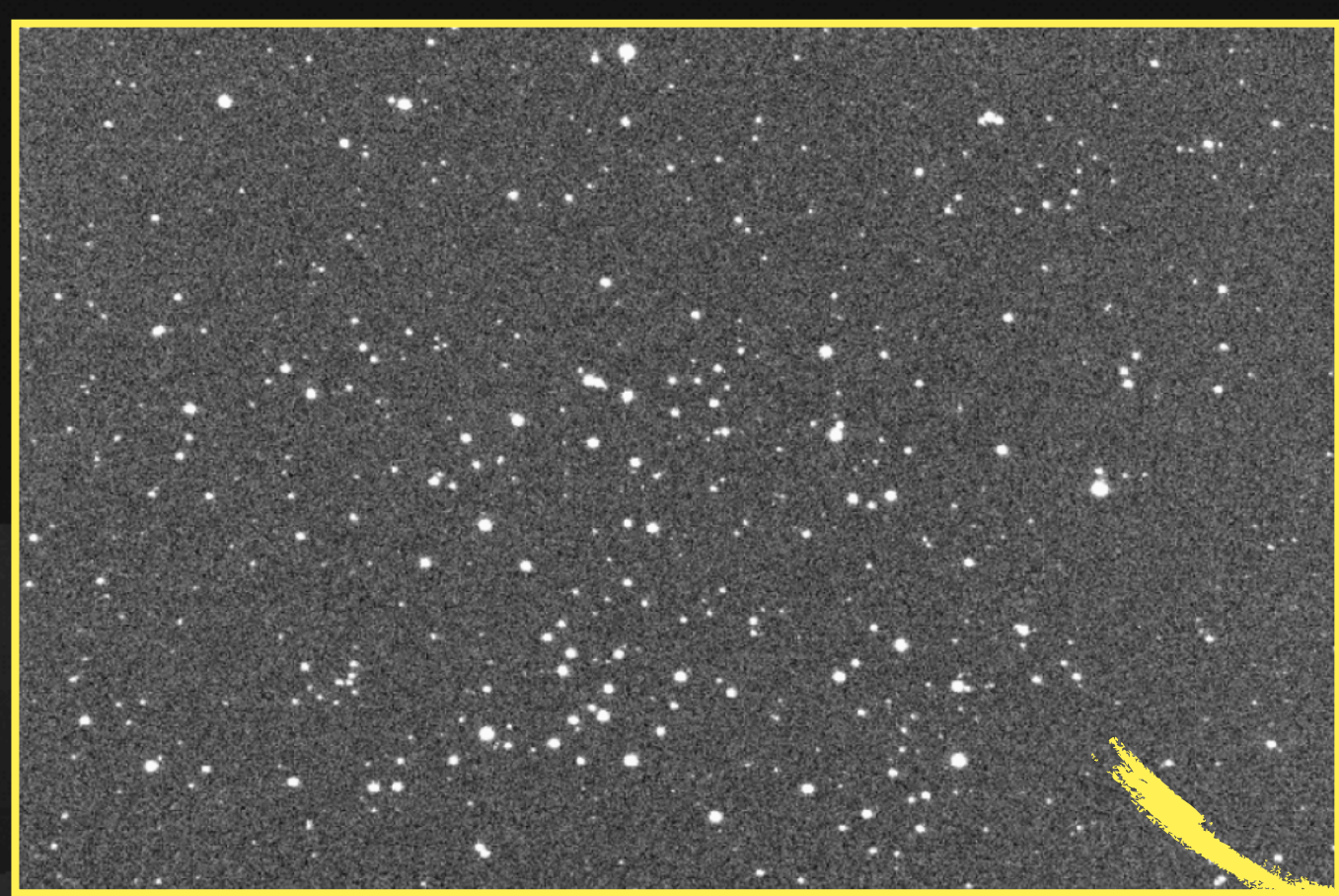
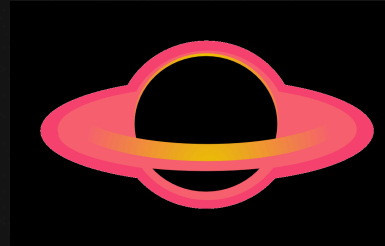


LIGHTCURVES FOR **ALL** SOURCES

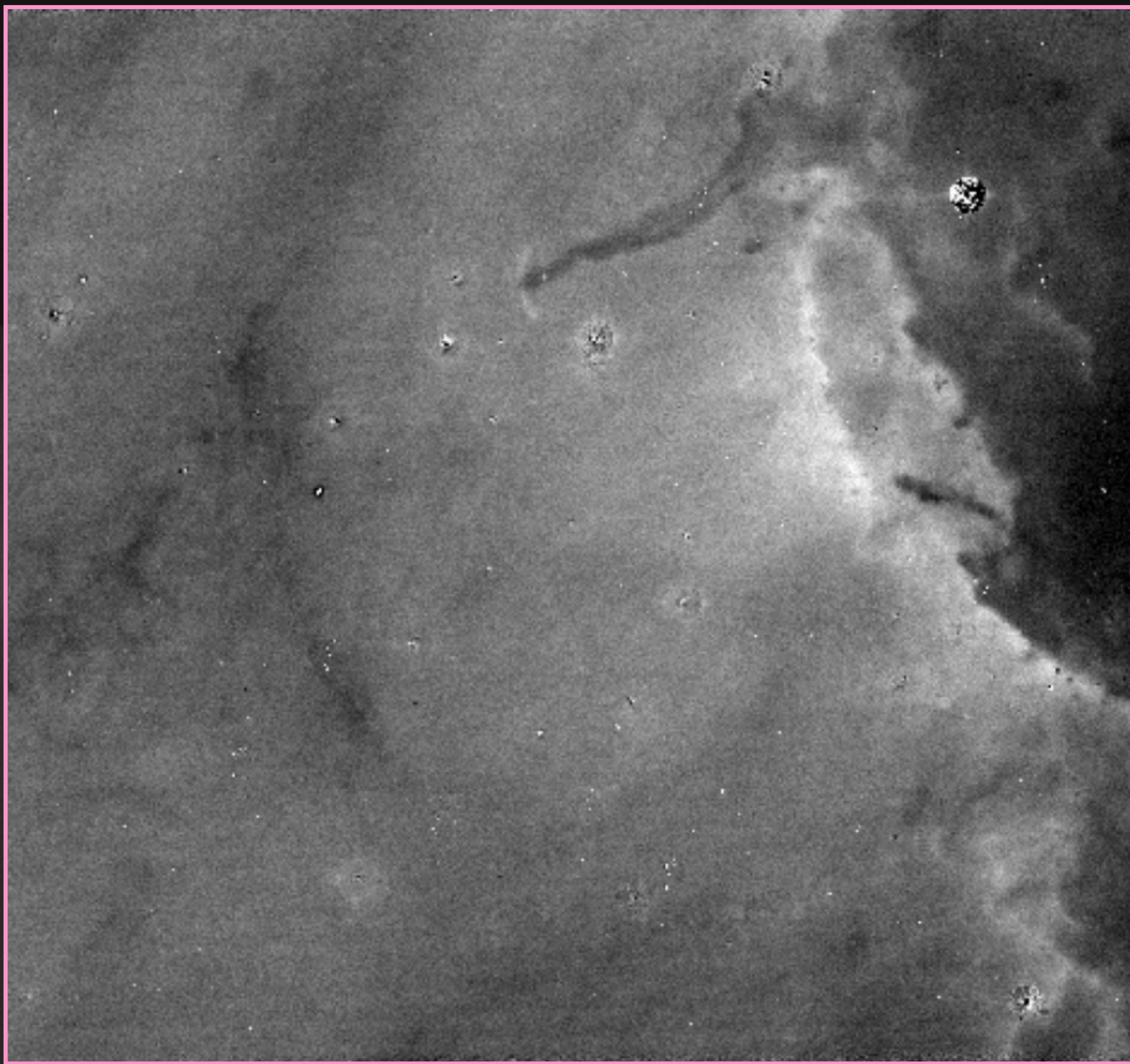
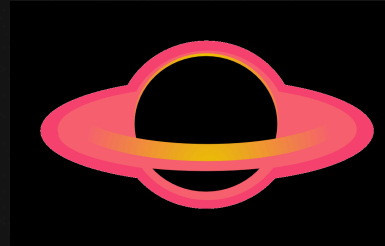
ALLOWS FOR OBTAINING
PSF PHOTOMETRY AUTOMATICALLY
AND WITH LOW MAGNITUDE ERROR
FOR EACH SOURCE
IN THE FIELD-OF-VIEW

ONE MORE SCIENCE PRODUCT:
ASTROMETRIC TIME SERIES

What is CCDPhot and how does it work?

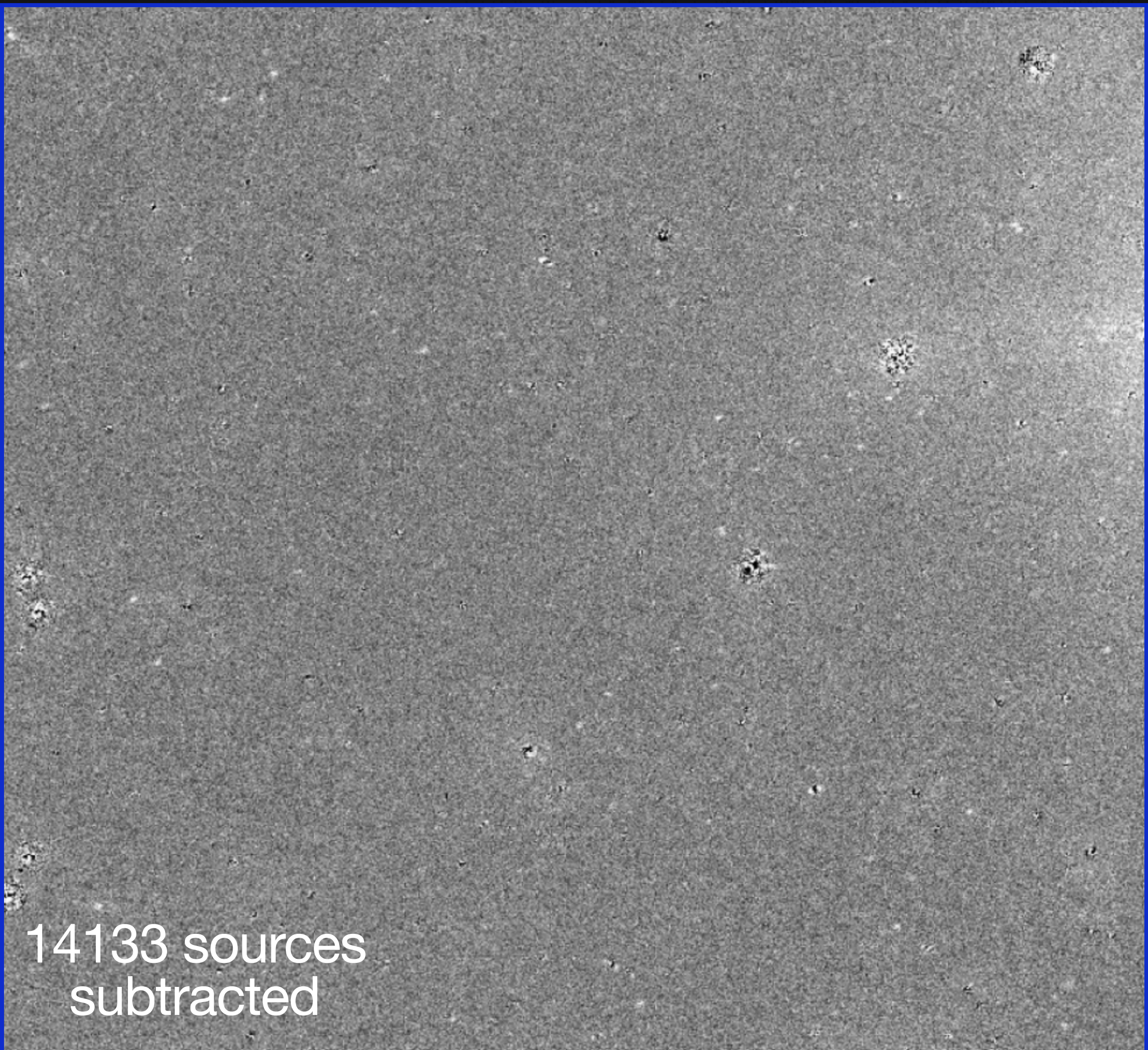
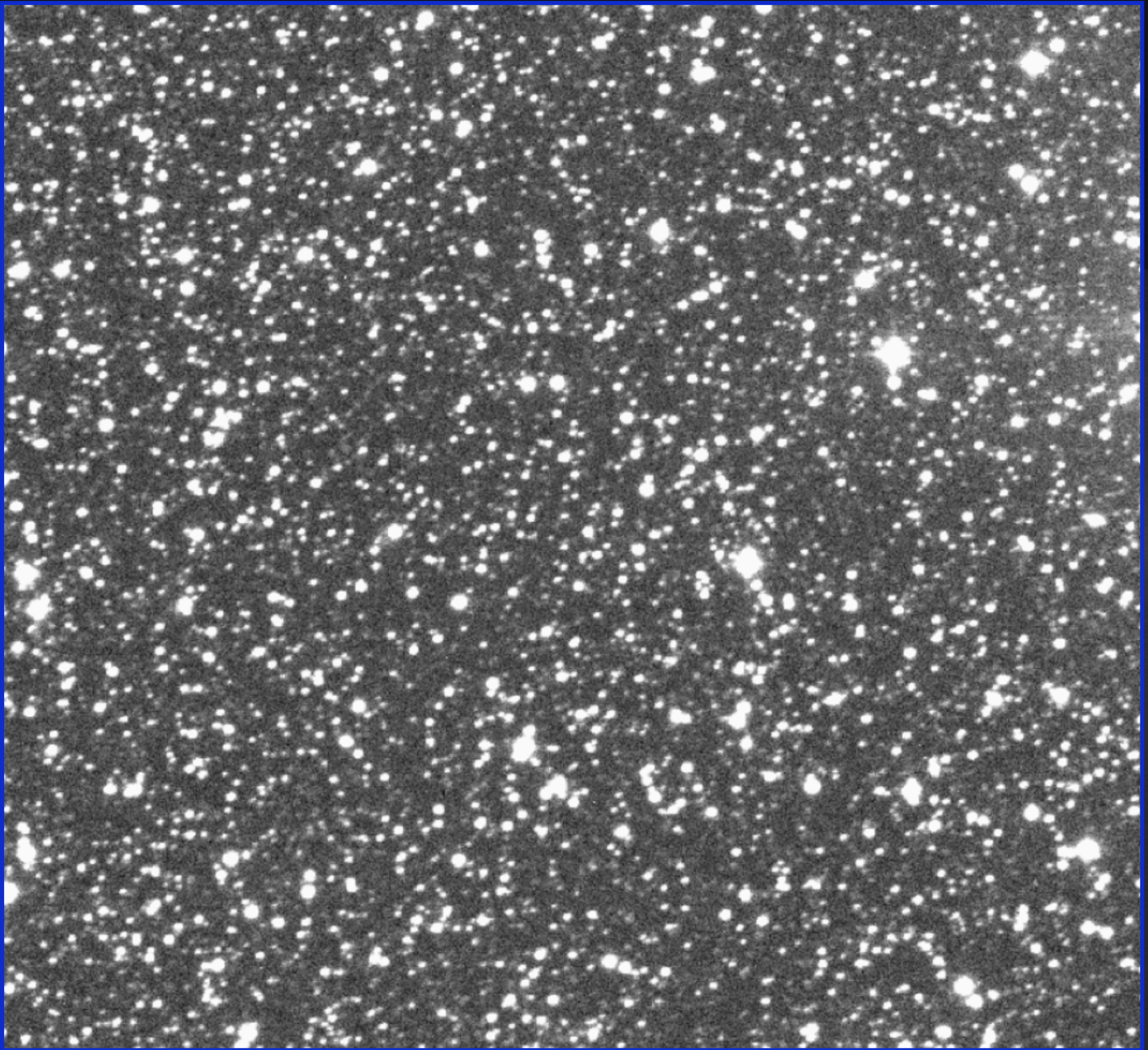
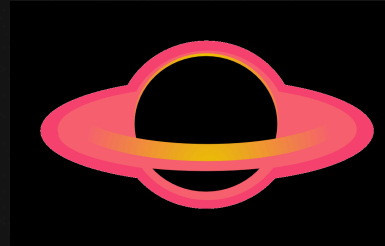


What is CCDPhot and how does it work?



DENSE FoV WITH NEBULA

What is CCDPhot and how does it work?

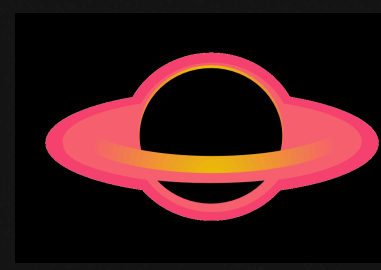


14133 sources
subtracted



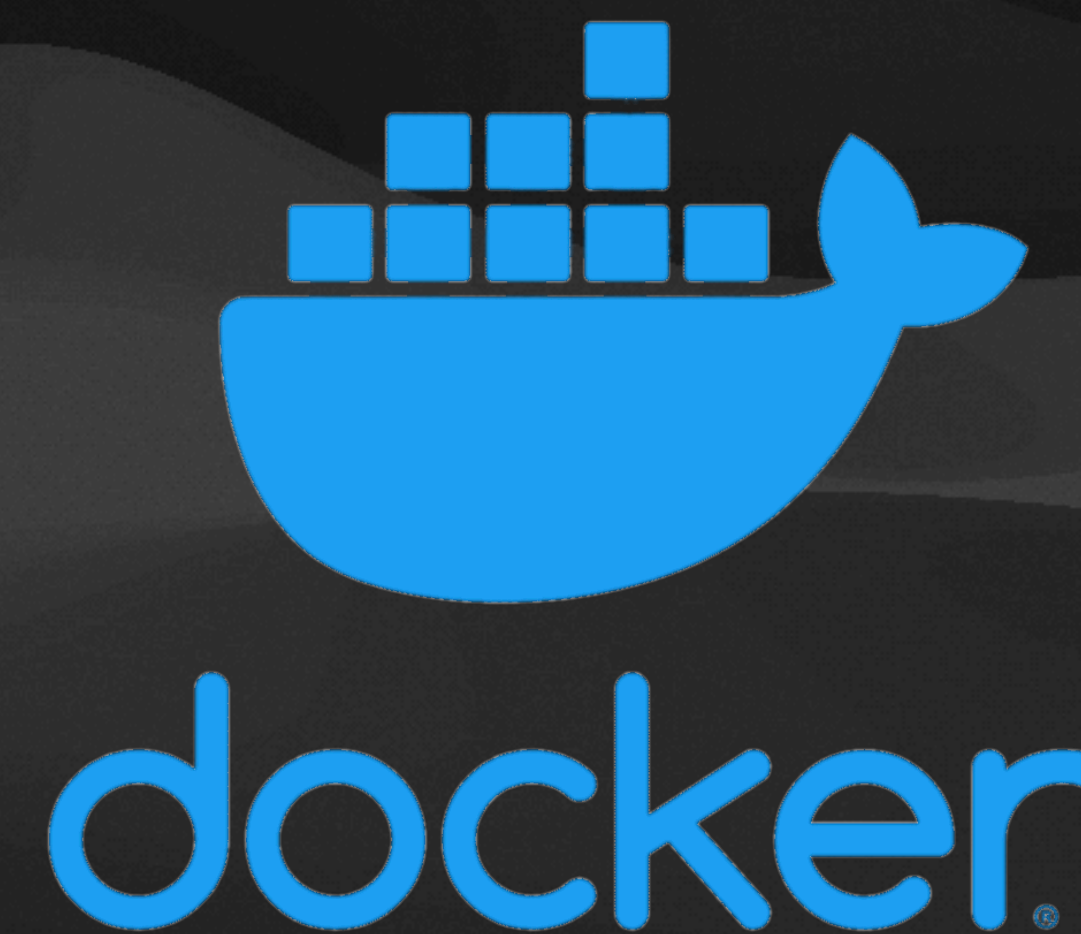
VERY DENSE

What is CCDPhot2 and how does it work?

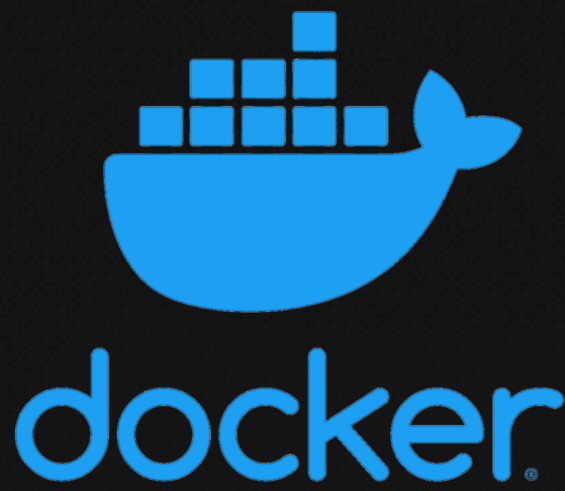
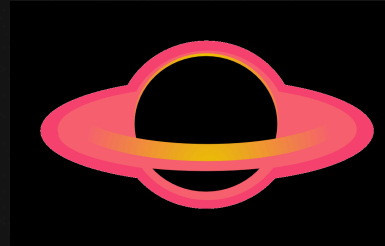


CCDPHOT2 WILL WORK **ONLY** IN THE DOCKER ENVIRONMENT.

CCDPHOT WILL STAY IN THE SAME FORM, BUT WITH IRAF/PYRAF ROUTINES REMOVED.



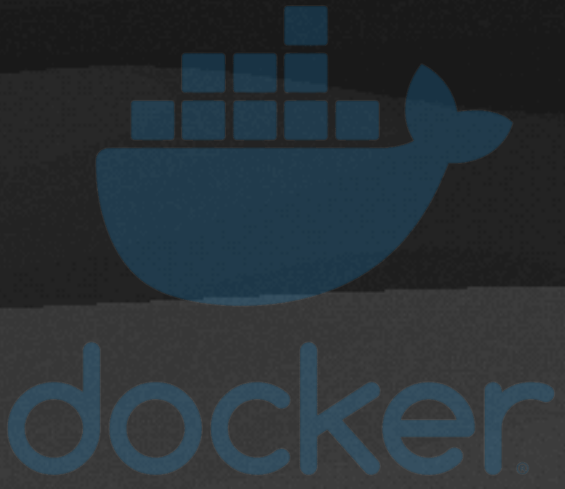
What is CCDPhot2 and how does it work?



(1) FITS MANAGER

FILLING IN THE FITS HEADERS WITH THE INFORMATION NEEDED FOR THE ASTROMETRIC CALCULATIONS AND DATABASE ENTRIES

SINGLE PROCESS - ALWAYS ON

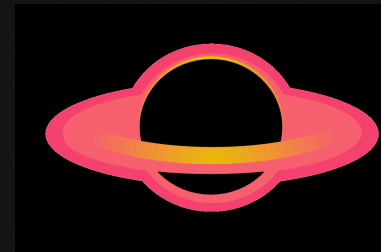


(2) ASTROMETRIC PIPELINE



(3) PHOTOMETRIC PIPELINE

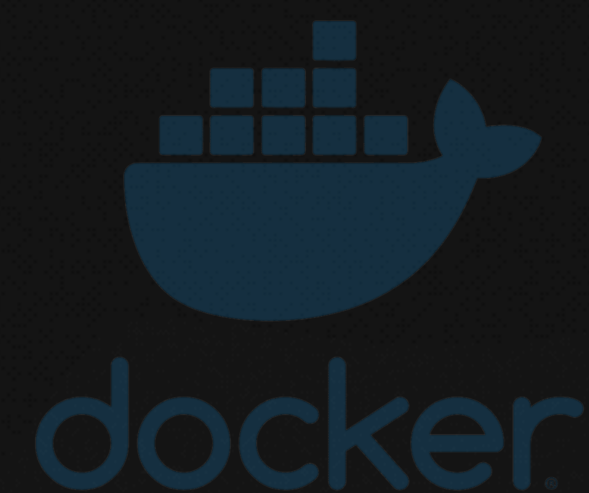
What is CCDPhot2 and how does it work?



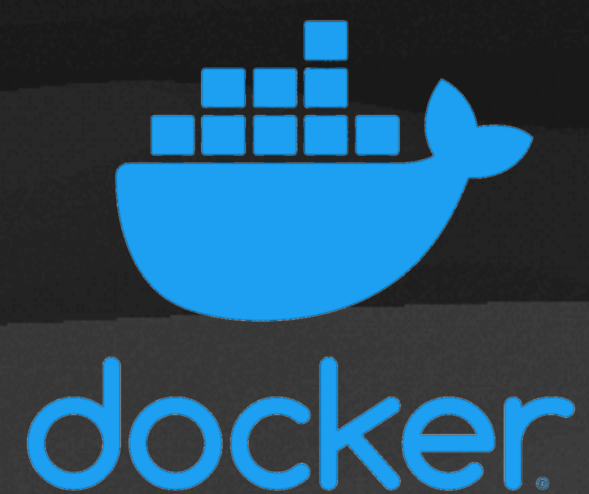
DEDICATED ROUTINES FOR ASTROMETRY:

SEXTRACTOR, SCAMP + URAT-1, UCAC-4,
NOMAD-1, 2MASS

LAST CHANCE ASTROMETRY: NOVA.ASTROMETRY.NET

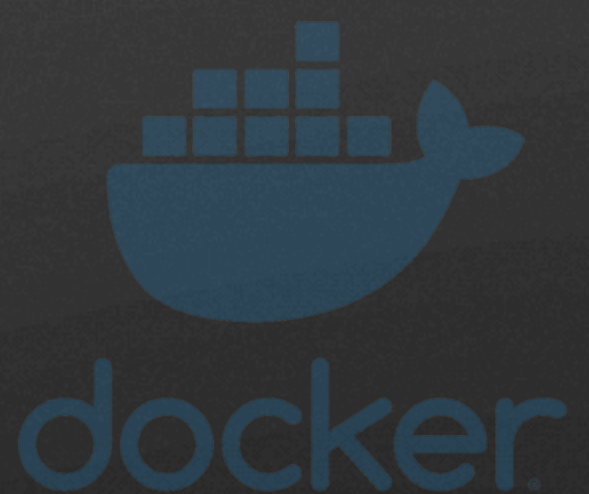


(1) FITS MA



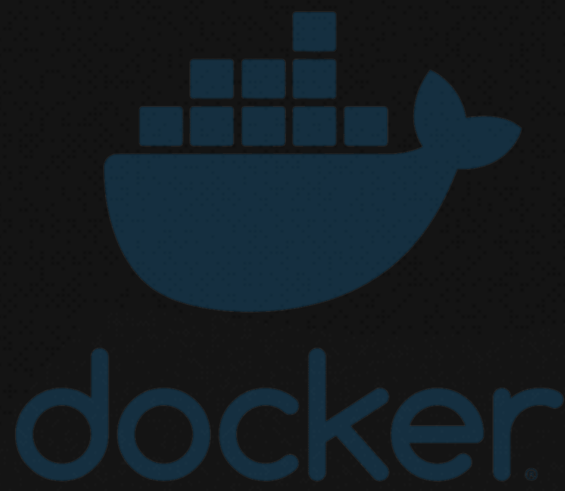
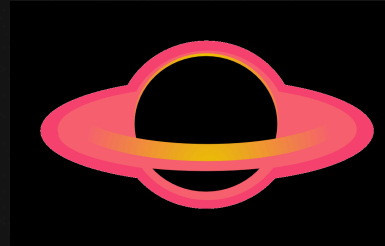
(2) ASTROMETRIC PIPELINE

MANY PROCESSES MAY WORK AT THE SAME TIME



(3) PHOTOMETRIC PIPELINE

What is CCDPhot2 and how does it work?

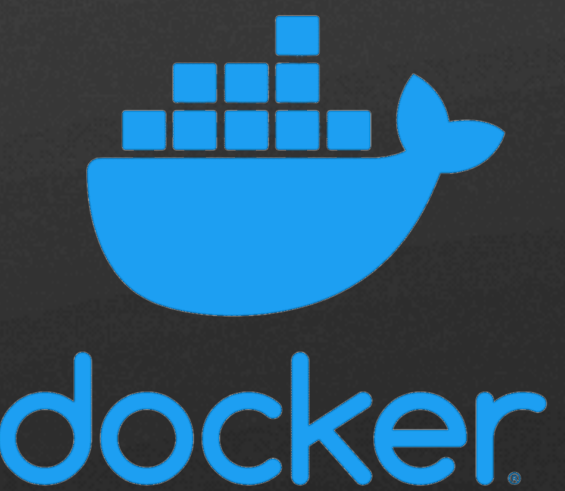


(1) FITS MANAGER



(2) AST

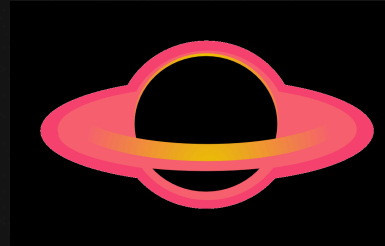
DEDICATED ROUTINES FOR PHOTOMETRY:
SEXTRACTOR (KRON-LIKE APERTURE PHOTOMETRY,
PROFILE PHOTOMETRY WITH PSFEX), **DAOPHOT**, PYTHON
PHOTOMETRY



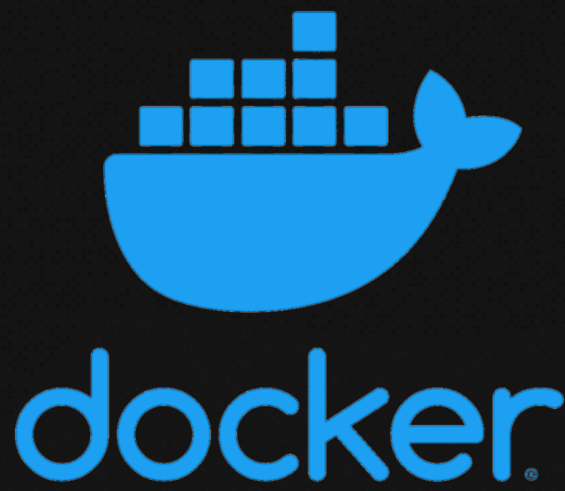
(3) PHOTOMETRIC PIPELINE

MANY PROCESSES MAY WORK AT THE SAME TIME

What is CCDPhot2 and how does it work?

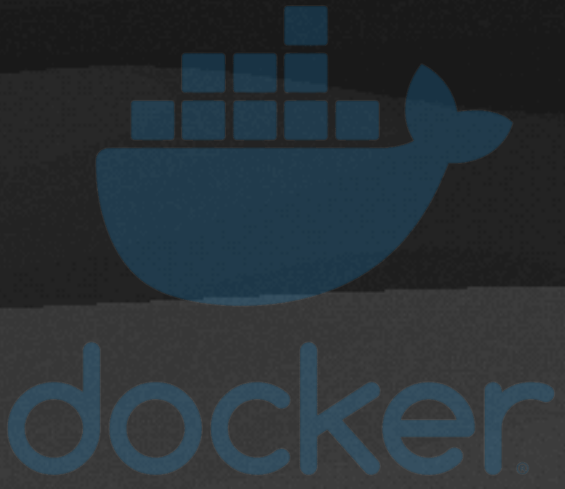


SINGLE PROCESS - ALWAYS ON

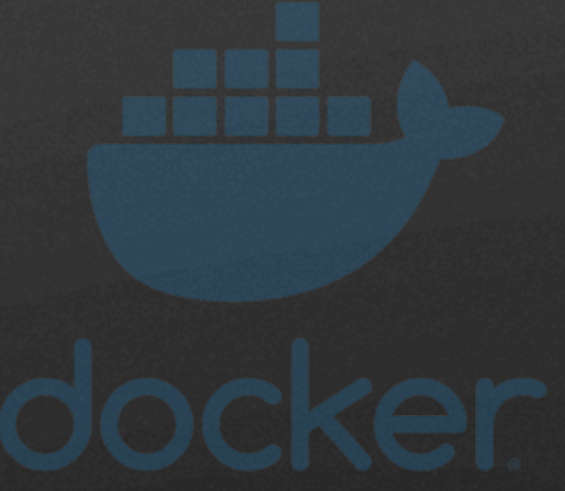


(4) GAIA ASTROMETRY

ASTROMETRIC GRID WITH GAIA-DR3 ASTROMETRIC DATA

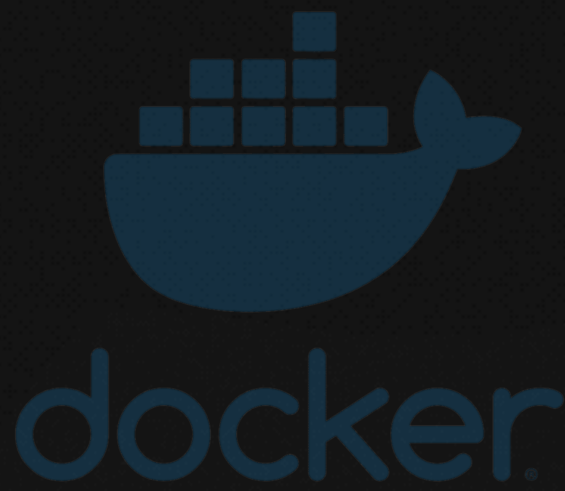
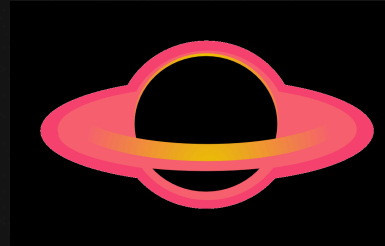


(5) RESULTS PREPARATION

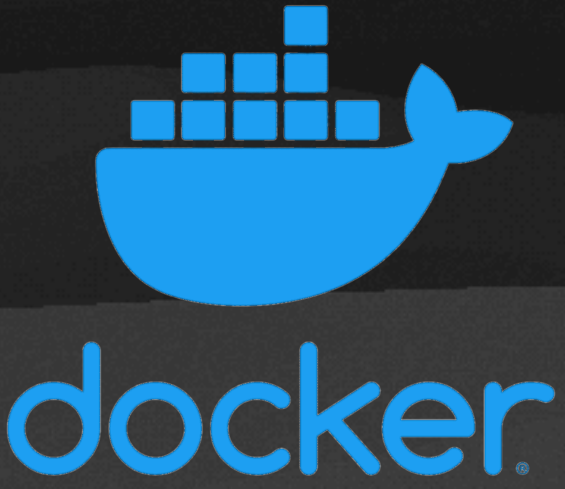


(6) IRAF/PYRAF FUNCTIONALITY

What is CCDPhot2 and how does it work?

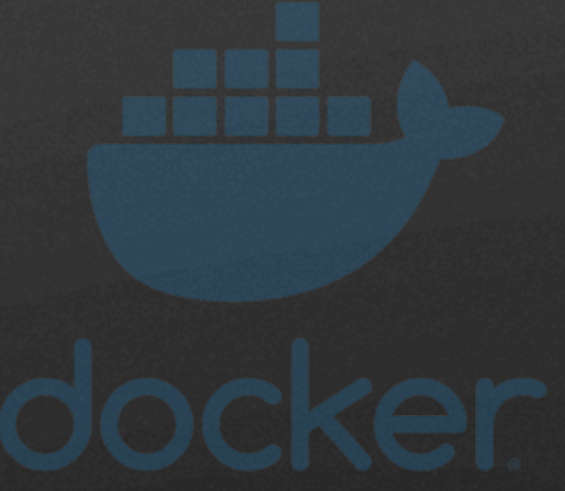


(4) GAIA ASTROMETRY



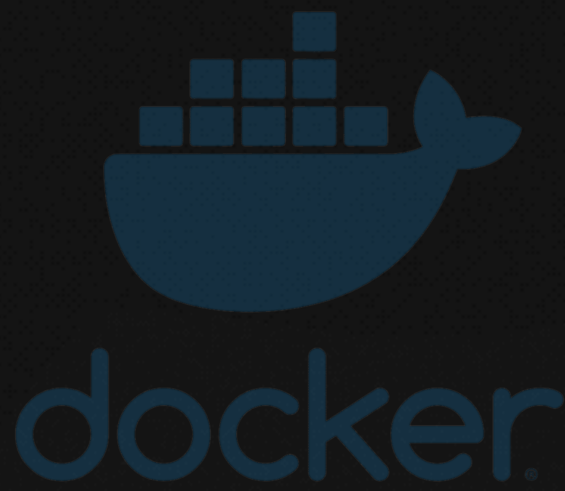
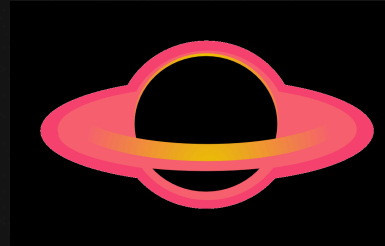
(5) RESULTS PREPARATION
SINGLE PROCESS - ALWAYS ON

PREPARING RESULTING FILES
& PERFORMING QUALITY CHECKS

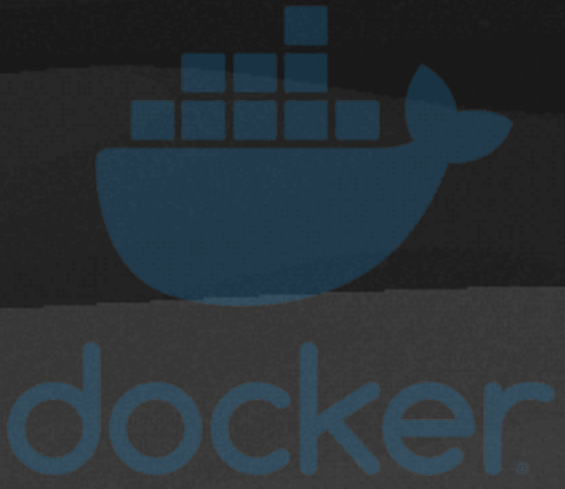


(6) IRAF/PYRAF FUNCTIONALITY

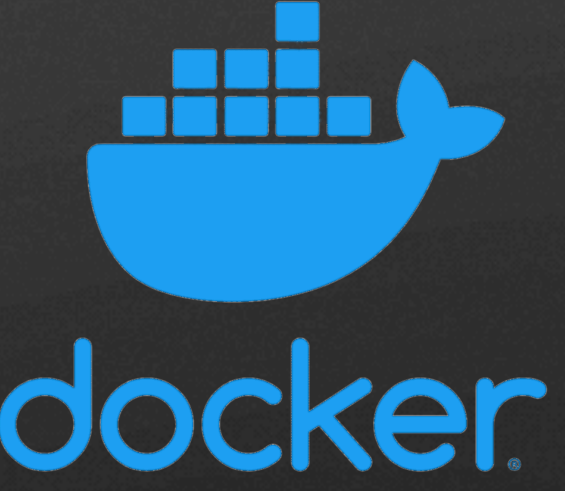
What is CCDPhot2 and how does it work?



(4) GAIA ASTROMETRY



(5) RESULTS PREPARATION

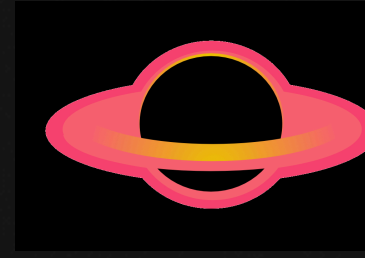


(6) IRAF/PYRAF FUNCTIONALITY

SINGLE PROCESS - ALWAYS ON

(JUST TO HAVE IT AROUND)

BHTOM Observatories



#	DESCRIPTION	KEYWORD (in FITS)	KEYWORD (standard)	FORMAT	VALUE(S)	COMMENT	CONF FLAG (True/False)
#	-----						
#	OBSERVATORY						
	Observatory	: -	: OBSERVAT	: str	: GoChile-GoT1	: observatory ID	: F
	Observer	: -	: OBSERVER	: str	: -	: observer ID	: F
	Observatory longitude [deg]	: -	: LONGITUD	: float	: 70.7631	: deg, West is +	: F
	Observatory latitude [deg]	: -	: LATITUDE	: float	: -30.4725	: deg	: F
	Observatory altitude [m]	: -	: ALTITUDE	: float	: 1560.0	: meters	: F
	Telescope	: -	: TELESCOP	: str	: T1_RC0.4m	: telescope ID	: F
	Organization	: -	: ORIGIN	: str	: GoChile	: institution ID	: F
#	TIME (start of exposition)						
	Time system	: -	: TIMESYS	: str	: UTC	: used time standard	: F
	Date	: DATE-OBS	: DATE-OBS	: yyyy/mm/dd	: -	: date of exposure	: F
	Time	: -	: TIME-OBS	: hh:mm:ss	: -	: time of exposure	: F
	Julian date	: -	: JD	: float	: -	: middle of exposure	: F
	Exposition time	: EXPTIME	: EXPTIME	: float	: -	: seconds	: F
#	INSTRUMENT						
	Instrument name	: -	: INSTRUME	: str	: ZW0_ASI_6200_MM_Pro_Mono	: camera ID	: F
	Detector X size [pix]	: NAXIS1	: NAXIS1	: int	: -	: pixels	: F
	Detector Y size [pix]	: NAXIS2	: NAXIS2	: int	: -	: pixels	: F
	Binning	: -	: BIN	: int	: 2	: no binning	: F
	Instr. mode, readout speed	: -	: READTIME	: int	: 9999	: ns/pix	: F
	Gain	: GAIN	: GAIN	: float	: -	: e/ADU	: F
	Read-out noise*	: -	: RDNOISE	: float	: 14.0	: (3.5 erms) ADU	: F
	Saturation limit	: -	: SATURATE	: int	: 62000	: ADU	: F
	Pixel scale along x-axis	: -	: CDELTA1	: float	: 0.000164046	: deg/pix	: F
	Pixel scale along y-axis	: -	: CDELTA2	: float	: 0.000164046	: deg/pix	: F
	Position angle	: -	: ORIENTAT	: float	: 90.0	: deg	: F
	Image type	: -	: OBSTYPE	: str	: OBJECT	: type of data	: F
	Filters	: FILT-1	: FILTER	: str	: Blue, B, V, R / Ha03, I, G / DARK	: B, B, V, R, I, G : passband ID	: F
	Pixel size along x-axis	: -	: PIXSIZE1	: float	: 7.52	: microm	: F
	Pixel size along y-axis	: -	: PIXSIZE2	: float	: 7.52	: microm	: F
	X reference pixel (center)	: -	: CRPIX1	: int	: 250	: X reference pixel	: F
	Y reference pixel (center)	: -	: CRPIX2	: int	: 250	: Y reference pixel	: F
	Tel. limiting magnitude (V)	: -	: MAGLIMIT	: float	: 20.0	: mag (in V band)	: F
#	OBJECT & WCS						
	Object name	: OBJECT	: OBJECT	: str	: -	: object name	: F
	Epoch of coord. system	: -	: EQUINOX	: float	: 2000.0	: year	: F
	Coord. system	: -	: RADESYS	: str	: FK5	: coord. ref. system	: F

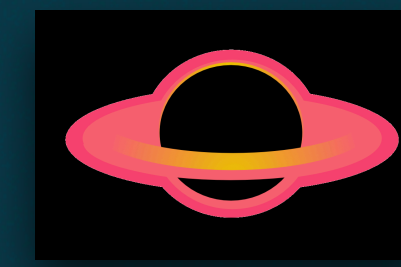
I'm outta here

BHTOM Observatories



```
1, Białkow 60-cm Cassegrain / ANDUR iKon-L DW432 camera, 343.341944, 51.4/4167, BIALKOW_ANDUR-DW432, 2, user_fits/BIALKOW_ANDUR-DW432_obs.info, ObsInfo/V1490_Cyg-010/-bdtT.fits, "Białkow Station, 1
2, OSTROWIK_TEK512, 338.5792, 52.0897, OSTROWIK_TEK512, 2, user_fits/16aye00002.fits, ObsInfo/OSTROWIK_TEK512_obs.info, "Ostrowik station, Warsaw University Observatory, Poland", false, true, 0, 18, 1
3, JENA90_STK, 348.51583333, 50.92888889, JENA90_STK, 2, user_fits/JENA90_STK_obs.info, ObsInfo/gaia19ajp-001_V120-DF.fits, "Friedrich Schiller University and Observatory Jena, 90/60 cm telescope
4, VATT_Vatt4k, 109.7198, 32.7244, VATT_Vatt4k, 2, user_fits/I1369P0749TP.fits, ObsInfo/VATT_Vatt4k_obs.info, Vatican Observatory 1.83 m & Vatt4k instrument, false, true, 0, 18, 1, "V,R,I", 2, 0.8, 13.5, 2
5, LCOGT Siding Spring 1-meter telescope / 4K instrument (file code: coj), 210.9291229, -31.2727986, LCOGT-SS-1m_4K, 2, user_fits/coj1m003-20180620-0080.fits, ObsInfo/LCOGT-SS-1m_4K_obs.info, "Sid
6, LCOGT CTIO 1-meter telescope / 4K instrument (file code: lsc), 70.8047889, -30.1673833, LCOGT-CTIO-1m_4K, 2, user_fits/LCOGT-CTIO-1m_4K_obs.info, ObsInfo/lsc1m005-20180618-0059.fits, "Cerro Tol
7, LCOGT SAAO 1-meter / 4K instrument (file code: cpt), 339.18748, -30.1673833, LCOGT-SAAO-1m_4K, 2, user_fits/cpt1m012-20180616-0160.fits, ObsInfo/LCOGT-SAAO-1m_4K_obs.info, "South African Astron
8, LCOGT-MCD-1m_4K, 104.015173, 30.6798, LCOGT-MCD-1m_4K, 2, "", "", "McDonald Observatory LCOGT node, 1m, 4K instrument", false, true, 0, 18, 1, "V,R,I", 2, 0.8, 13.5, 2, 3, 63000
9, MOLETAI-35cm_CCD4710, 334.436944, 55.315833, MOLETAI-35cm_CCD4710, 2, user_fits/G19apc_I0407.fits, ObsInfo/MOLETAI-35cm_CCD4710_obs.info, "Moletai Observatory, Vilnius University, 35 cm Maksuto
10, WIEN0.8_SBIG, 343.66572, 48.231958, WIEN0.8_SBIG, 2, user_fits/ngc6811-010v2-bdf.fit, ObsInfo/WIEN0.8_SBIG_obs.info, "Universitätssternwarte Wien, VLT (Vienna Little Telescope) 0.8m telescope,
11, LOIAN01.52_BFOSC, 348.66611, 44.25917, LOIAN01.52_BFOSC, 2, user_fits/pol_203_z_n.fits, ObsInfo/LOIAN01.52_BFOSC_obs.info, "Loiano Observatory 1.52 m telescope & BFOSC instrument, Loiano, Ital
12, OAC91_KAF1001E, 344.928416, 37.528761, OAC91_KAF1001E, 2, user_fits/NGC6811-0-V17082010_003429_20-bdf.fits, ObsInfo/OAC91_KAF1001E_obs.info, "Cassegrain 91 cm reflector, Osservatorio Astrofis
13, IAC80_CAMELOT, 16.51104, 28.29959, IAC80_CAMELOT, 2, user_fits/0100625_0114-otfh.fits, ObsInfo/IAC80_CAMELOT_obs.info, "CAMELOT wide-field camera, IAC80 Telescope, Observatorio del Teide, Ins
14, OHP12_ANDOR-936, 354.286667, 43.930833, OHP12_ANDOR-936, 2, user_fits/G16aye-002R_BF.fits, ObsInfo/OHP12_ANDOR-936_obs.info, "1.2 m telescope, Andor iKon-L CCD camera, L'Observatoire de Haute-
15, REM 60-cm telescope / ROS2 instrument, 70.73, -29.26, REM_ROS2, 2, user_fits/IMG2019006BLs065.fits, ObsInfo/REM_ROS2_obs.info, "ROSS2 optical camera, 60 cm, Rapid Eye Mount, La Silla, ESO, INA
16, SMARTS1.3_ANDICAM, 70.815, -30.165, SMARTS1.3_ANDICAM, 2, user_fits/rccd171115.0121.fits, ObsInfo/SMARTS1.3_ANDICAM_obs.info, "ANDICAM Detector, CTIO 1.3m Telescope, SMARTS Consortium, Chile",
17, ROAD Observatory / FLI KAF-16803 CCD camera, 68.1803, -22.9528, ROAD_FLI-KAF-16803, 2, user_fits/Gaia19bld60V_000611033_FLAT.fit, ObsInfo/ROAD_FLI-KAF-16803_obs.info, "40cm ODK telescope, Josc
18, MOLETAI-165cm_CCD4710, 334.436944, 55.315833, MOLETAI-165cm_CCD4710, 2, user_fits/gaia18arn_I_01696.fits, ObsInfo/MOLETAI-165cm_CCD4710_obs.info, "Moletai Observatory, Vilnius University, 1.65
19, KONKOLY90_FLI-Microline, 340.10555556, 47.91833333, KONKOLY90_FLI-Microline, 2, user_fits/medi.fits, ObsInfo/KONKOLY90_FLI-Microline_obs.info, "Piszkesteto Mountain Station, 90/60-cm Schmidt c
20, SOLARIS1_ANDOR-939, 339.18917, -32.3804, SOLARIS1_ANDOR-939, 2, user_fits/SLR2_UW_00_Gaia18dkp_00_I_120_00_2019_01_24_22_24_18.fits, ObsInfo/SOLARIS1_ANDOR-939_obs.info, "0.5m Ritchey-Cretien
21, SOLARIS2_ANDOR-939, 339.18917, -32.3804, SOLARIS2_ANDOR-939, 2, "", "", "0.5m Ritchey-Cretien f/15 Solaris-2 telescope, ANDOR iKon-L 939 CCD camera, SAAO, Republic of South Africa", false, true,
22, SOLARIS3_ANDOR-939, 210.9388056, -31.2733611, SOLARIS3_ANDOR-939, 2, "", "", "0.5m Schmidt-Cassegrain f/9 Solaris-3 telescope, ANDOR iKon-L 939 CCD camera, Siding Spring Observatory, Australia
23, SOLARIS4_ANDOR-939, 69.30333333, -31.799166667, SOLARIS4_ANDOR-939, 2, "", "", "0.5m Ritchey-Cretien f/15 Solaris-4 telescope, ANDOR iKon-L 939 CCD camera, Complejo Astronomico El Leoncito, A
24, RBT 0.7-meter telescope / Andor iXon 888 CCD camera, 110.601667, 31.665556, PST2_ANDOR-888, 2, user_fits/G16aye-006i_BF.fits, ObsInfo/PST2_ANDOR-888_obs.info, "RBT/PST2 0.7 m telescope, ANDOR
25, SUHORA60_APOGEE, 339.9325, 49.5691, SUHORA60_APOGEE, 2, user_fits/chiperr180s0003.fits, ObsInfo/SUHORA60_APOGEE_obs.info, "0.6 m Cassegrain Zeiss telescope, Apogee Aspen-47 CCD camera, Mt. Suh
26, Terskol Observatory 2 m / FLI PL4301, 317.5007, 43.276, TERSKOL-2m_FLI-PL4301, 2, user_fits/gaia17ddi-B-052.fit, ObsInfo/TERSKOL-2m_FLI-PL4301_obs_9MSeywL.info, "2-m Zeiss Ritchey-Chretien-Cou
27, LOWELL1.1_NASACAM, 111.5355, 35.09675, LOWELL1.1_NASACAM, 2, user_fits/20180410.0051.fits, ObsInfo/LOWELL1.1_NASACAM_obs.info, "Hall 1.1 m telescope, NASACAM instrument, Lowell Observatory, AZ
29, TJO_MEIA3, 359.27027778, 42.05166667, TJO_MEIA3, 2, user_fits/TJO2459230.27056_V_imc_xChAPsz.fits, ObsInfo/TJO_MEIA3_obs_sktCRYZ.info, "The 0.8m Telescope Joan Oró with MEIA3 instrument. The M
32, Astrolab IRIS Observatory / SBIG camera, 357.087333, 50.817222, Astrolab-IRIS_SBIG, 2, user_fits/GAIA19BSY_20190728_I_000011985.REDUCED.fit, ObsInfo/Astrolab-IRIS_SBIG_obs.info, "68-cm NMPT te
33, Flarestar Observatory (code: MPC171) / Moravian G2-1600 camera, 345.530289, 35.910192, Flarestar-MPC171_G2-1600, 2, user_fits/20200711_220617_Gaia20cek_V.fit, ObsInfo/Flarestar-MPC171_G2-1600
34, Warrumbungle0.51_SBIG6303E, 210.806728, -31.276249, Warrumbungle0.51_SBIG6303E, 2, user_fits/Gaia20fnr_clear_1_WgFUqES.fit, ObsInfo/Warrumbungle0.51_SBIG6303E_obs.info, "51 cm (20 inch) PlaneW
35, Aristarchos telescope / TEK2K camera, 337.803889, 37.984444, ARISTARCHOS_TEK2K, 2, user_fits/Gaia19apc-I22-bf.fits, ObsInfo/ARISTARCHOS_TEK2K_obs.info, "Aristarchos 2.3 m telescope, TEK2K instr
36, Horten 68-cm telescope / Moravian G2-1600 CCD camera, 349.61138, 59.43425, HA068_G2-1600, 2, user_fits/20cek20201225R1.fit, ObsInfo/HA068_G2-1600_obs_GY20dMo.info, "0.68m Horten telescope, Mor
37, LCOGT-SS-2m_Spectral, 210.9291229, -31.2727986, LCOGT-SS-2m_Spectral, 2, user_fits/coj2m002-fs01-20200708-0064-e91.fits, ObsInfo/LCOGT-SS-2m_Spectral_obs.info, "LCOGT SS node, 2m telescope, Sp
38, IAC80_CAMELOT2, 16.51104, 28.29959, IAC80_CAMELOT2, 2, user_fits/0170105_0200.new.fits, ObsInfo/IAC80_CAMELOT2_obs.info, "IAC80_CAMELOT, but with different headers, CAMELOT wide-field camera,
39, PROMPT6_FLI, 70.8053889, -30.1676389, PROMPT6_FLI, 2, user_fits/Gaia20fnr_6029474_I_052.fits, ObsInfo/PROMPT6_FLI_obs.info, "PROMPT6 telescope 0.4 m, FLI CCD camera, Available filters: Johnson
40, LCOGT-HO-2m_Spectral, 156.258, 20.7069, LCOGT-HO-2m_Spectral, 2, user_fits/ogg2m001-fs02-20200528-0100-e91.fits, ObsInfo/LCOGT-HO-2m_Spectral_obs.info, "LCOGT HO node, 2m telescope, Spectral i
41, Adiyaman 60 / Andor iKon-M 934, 321.77459, 37.751703, Adyu60_Andor-934, 2, user_fits/gaia19dke-001_r.fit, ObsInfo/Adyu60_Andor-934_obs.info, "PlaneWave 24" CDK on ASA DM160 with Andor iKon-M
42, TRT-GA0_Andor936, 259.3045, 26.6955, TRT-GA0_Andor936, 2, user_fits/2020_11_12T11.47.16.869Z_V_3AVUp2S.fits, ObsInfo/TRT-GA0_AndorL936_obs.info, "Thai Robotic Telescopes, 0.7m, Andor iKon-L DW
43, ZAO_G2-1600, 345.560002, 35.9203, ZAO_G2-1600, 2, user_fits/20190609_Gaia_19aik_Light_I_sop-west_0001.fit, ObsInfo/ZAO_G2-1600_obs_fp60T5g.info, "Znith Astronomy Observatory, 20 cm SCT Telesco
45, GeoNAO 0.36-m SCTelescope / SXVR-H36 camera, 317.180574, 41.754378, GeoNAO_SXVR-H36, 2, user_fits/Gaia21efs-I-1_Hq3Pdqf_HXt6YQP.fits, ObsInfo/GeoNAO_SXVR-H36_obs.info, "0.36 m (14") Celestron
46, IST60_Andor-888, 333.52556, 40.09888, IST60_Andor-888, 2, user_fits/Gaia21efs-20211029-S001-g-R001-g_dupe-1_out.fits, ObsInfo/IST60_Andor-888_obs_WReikk3.info, IST 60 cm telescope (Astelco RC w
47, UCLO-C14EAST FLI ProLine PL9000, 0.242266, 51.613297, UCLO-C14EAST_PL9000, 2, user_fits/2021-11-01T18-22-19-Gaia21efs-i-proc.fits, ObsInfo/UCLO-C14EAST_PL9000_obs_xuVmn3x.info, "Celestron C14
49, TRT-SRO_Andor934, 119.41306, 37.07028, TRT-SRO_Andor934_CpcsOnly, 2, user_fits/2021_11_19T05.30.17.449Z_R.fits, "", true, false, 52, 0, 18, 1, "V,R,I", 2, 0.8, 13.5, 2, 3, 63000
50, Danish 1.54-m telescope / DFOSC CCD instrument, -70.7403, -29.263, DANISH_DFOSC-FASU, 2, user_fits/V1988Sgr_calibrated.fits, ObsInfo/DANISH_DFOSC-FASU_obs_YESlab3.info, "1.54 m Danish Telesco
51, OAUJ_Krakow-CDK500 / with Apogee Alta U47, 340.171875, 50.054305556, OAUJ-CDK500_Alta-U47, 2, user_fits/OAUJ-CDK500_sample.fits.zip, ObsInfo/OAUJ-CDK500_Alta-U47_obs.info, "CDK 50 cm telescope
52, UZPW 50 cm / Moravian G4-9000, 6.6269444, 38.215556, UZPW50_G4-9000, 2, user_fits/gaia21efs-0007_rs.fit, ObsInfo/UZPW50_G4-9000_obs_AMuNqTE.info, "PlaneWave 20" CDK on PlaneWave L500 with Mor
53, PROMPT5 & Apogee CCD, 70.8053889, -30.1676389, PROMPT5_Apogee, 2, user_fits/Gaia21fkl_7038978_V_001_NFk8uxe.fits, ObsInfo/Gaia21fkl_7048929_R_003.fits, "Skynet Network, Ritchey-Chretien 0.41 m
55, Lesedi 1m with Mookodi / SAAO, 339.189931, -32.37944444, Lesedi-1m_Mookodi, 2, user_fits/MKD_20220426.0429.fits, ObsInfo/Lesedi-1m_Mookodi_obs_8VDSAFi.info, "SAAO Lesedi 1 m telescope, Mookodi
56, Terskol Observatory 60 cm / SBIG STL 1001E, 317.4995, 43.27499, TERSKOL-60_SBIG-STL-1001, 2, user_fits/Gaia19dke-R-002.fit, ObsInfo/TERSKOL-60_SBIG-STL-1001_obs.info, "60-cm Zeiss Cassegrain t
57, Montarrenti Observatory 0.53 m / Apogee Alta U47, 348.8167, 43.23278, Montarrenti-0.53_Alta-U47, 2, user_fits/ZTF18aarippg-006_R.fit, ObsInfo/Montarrenti-0.53_Alta-U47_obs.info, "Montarrenti O
58, TJO_MEIA2, 359.27027778, 42.05166667, TJO_MEIA2, 2, user_fits/TJO2459617.52798_U_imc_YAVdd4N.fits, ObsInfo/TJO_MEIA2_obs_fa1bHtd.info, "The 0.8m Telescope Joan Oró with MEIA2 instrument. The M
60, Kryoneri 1.2 m Telescope / ANDOR Zyla sCMOS camera, 337.3814, 37.9719, Kryoneri-1.2_Andor-Zyla, 2, user_fits/SDSSJ143016.05230344.4_R_00001_7xJxCAA.fits, ObsInfo/Kryoneri-1.2_Andor-Zyla_obs_u
61, OASDG T1 telescope / FLI 24240 camera, 319.376085, 40.623915, OASDG-T1_FLI24240, 2, user_fits/Galaxy_SDSSJ_LIGHT_I_180s_BIN1_-30C_001_20220310_022134_524_W.FIT, ObsInfo/OASDG-T1_FLI24240_obs_
63, LCOGT-Teide-1m_4K (code: tfn), 16.511654, 28.300435, LCOGT-Teide-1m_4K, 2, user_fits/tfn1m014-fa20-20220212-0320-e91.fits, ObsInfo/LCOGT-Teide-1m_4K_obs.info, "Teide Observatory LCOGT node, 1m
64, GoChile-GoT1 40-cm telescope / ZWO ASI 6200 MM Pro, 70.7631, -30.4725, GoChile-GoT1_ASI6200, 2, user_fits/GoChile_B_900s_processed_ZTF18.fits, ObsInfo/GoChile-GoT1_ASI6200_obs_AN13r0p.info, "Go
65, OAUJ_Krakow-CDK500 / with Apogee F42, 340.171875, 50.054305556, OAUJ-CDK500_F42, 2, user_fits/gaia21efs_7484493_V_000.fits, ObsInfo/OAUJ-CDK500_F42_obs_y9ValvK.info, "CDK 50 cm telescope and A
66, RTT150 / Andor 936 CCD camera, 329.66444, 36.82416, RTT150_Andor936, 2, user_fits/awa22014.fit, ObsInfo/RTT150_Andor936_obs.info, "Russian-Turkish 1.5-m Telescope (RTT150)", Andor 936 CCD came
67, SUTO-Otivar_ASI1600MM, 3.679444, 36.815833, SUTO-Otivar_ASI1600MM, 2, user_fits/SUTO2_Gaia22awa_V_360s_ZWO_ASI1600MM-Cool_2022-04-19_04-21-37_out.fit, ObsInfo/SUTO-Otivar_ASI1600MM_obs_tLpm8Q
68, SUTO-Pyskowice_ATT1100MM, 341.366667, 50.388333, SUTO-Pyskowice_ATT1100MM, 2, user_fits/SUTO2_Gaia22awa_V_360s_Atik_Camera_Driver_2022-04-18_02-12-21_out.fit, ObsInfo/SUTO-Pyskowice_ATT1100
```


Create your own observatory



<https://bh-tom2.astrolabs.pl/observatory/>

List of observatories

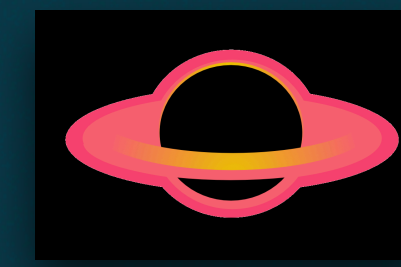
List of your registered observatories/instruments you can use for uploading the data for processing. You should register an observatory in your account if you want a datapoint to be labeled with your name.

Here you can add a new observatory to your list if you are planning to upload images or instrumental photometry for it. You can choose one from the list of already registered observatories, or create a new one. Note that different instrument (e.g. CCD) on the same telescope counts as a different observatory.

Favorite Observatories Observatories

Observatory Name	Lon	Lat	Observatory(ONAME)	Comment	Details
Adiyaman 60-cm telescope	38.22541	37.751703	Adyu60_Andor-934	PlaneWave 24" CDK on ASA DM16...	Details
Adonis observatory	2.925382	50.91524	Adonis_G2-1600	Sky-watcher quattro F4 250 mm...	Details
Aristarchos 2.3-m telescope	22.198294	37.985587	ARISTARCHOS_TEK2K	Aristarchos 2.3-m telescope, ...	Details
Asiago Astrophysical Observatory 67/92-cm Schmidt telescope	11.568825	45.84944	AsiagoAO-0.67_G4-16000	Schmidt 67/92 Telescope, Filt...	Details
Astrolab IRIS Observatory	2.909895	50.818066	Astrolab-IRIS_SBIG	68-cm NMPT telescope Public ...	Details
ASV 1.4 m Milankovic Telescope	21.555617	43.140234	ASV1.4_Andor	The Astronomical Station Vido...	Details
ASV 60-cm Telescope	21.555617	43.140234	ASV60_FLI	60-cm telescope in ASV (Astro...	Details
ATA50	41.244163	39.904442	ATA50_AltaU230	51 cm RC telescope on ASA Dir...	Details
AZT-8 telescope	30.524145	50.297939	AZT-8_C4-16000	AZT-8 telescope, Lisnyky obse...	Details
Białków 60-cm Cassegrain	16.657822	51.47425	BIALKOW_ANDOR-DW432	Białków station, Wrocław Univ...	Details
Danish 1.54-m telescope	-70.737437	-29.25773	DANISH_DFOSC-FASU	1.54-m Danish Telescope La S...	Details
Flarestar Observatory (code: MPC171)	14.469711	35.910192	Flarestar-MPC171_G2-1600	Meade SSC-10 Schmidt-Cassegra...	Details
FRAM	-69.449755	-35.496138	FRAM_G4	FRAM (F/Photometric Robotic A...	Details
GeoNAO 0.36-m SCTelescope	42.819426	41.754378	GeoNAO_SXVR-H36	0.36 m (14") Celestron SCT te...	Details

Create your own observatory



<https://bh-tom2.astrolabs.pl/observatory/>

List of observatories

List of your registered observatories/instruments you can use for uploading the data for processing. You should register an observatory in your account if you want a datapoint to be labeled with your name.

Here you can add a new observatory to your list if you are planning to upload images or instrumental photometry for it. You can choose one from the list of already registered observatories, or create a new one. Note that different instrument (e.g. CCD) on the same telescope counts as a different observatory.

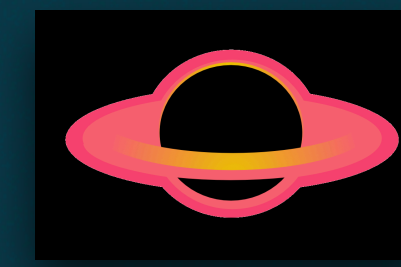
Favorite Observatories

Observatories

Add new observatory

Observatory Name	Lon	Lat	Observatory(ONAME)	Comment	Only Instrumental photometry file	Details	Update	Delete
Adiyaman 60-cm telescope	38.22541	37.751703	Adyu60_Andor-934	PlaneWave 24" CDK on ASA DM16...	False	Details	Edit	Delete
Adonis observatory	2.925382	50.91524	Adonis_G2-1600	Sky-watcher quattro F4 250 mm...	False	Details	Edit	Delete
APT2	-14.974738888	37.6932694	APT2_Only instrumental photometry file camera		True	Details	Edit	Delete
Aristarchos 2.3-m telescope	22.198294	37.985587	ARISTARCHOS_TEK2K	Aristarchos 2.3-m telescope, ...	False	Details	Edit	Delete
Asiago Astrophysical Observatory 67/92-cm Schmidt telescope	11.568825	45.84944	AsiagoAO-0.67_G4-16000	Schmidt 67/92 Telescope, Filt...	False	Details	Edit	Delete
Astrolab IRIS Observatory	2.909895	50.818066	Astrolab-IRIS_SBIG	68-cm NMPT telescope Public ...	False	Details	Edit	Delete
ASV 1.4 m Milankovic Telescope	21.555617	43.140234	ASV1.4_Andor	The Astronomical Station Vido...	False	Details	Edit	Delete
ASV 60-cm Telescope	21.555617	43.140234	ASV60_FLI	60-cm telescope in ASV (Astro...	False	Details	Edit	Delete
ATA50	41.244163	39.904442	ATA50_AltaU230	51 cm RC telescope on ASA Dir...	False	Details	Edit	Delete
AZT-8 telescope	30.524145	50.297939	AZT-8_C4-16000	AZT-8 telescope, Lisnyky obse...	False	Details	Edit	Delete

Create your own observatory



<https://bh-tom2.astrolabs.pl/observatory/>

Add a new Observatory to your list.

Here you can add a new observatory to your list in two ways.
You can choose an observatory from the list of already registered ones.
If your observatory is not yet registered you can create a new entry.

Observatory

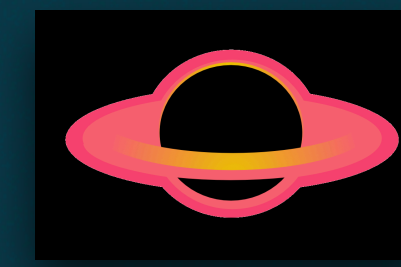
Comment

Comment

Add to my list

Create new Observatory

Create your own observatory



Create a new Observatory.

<https://bh-tom2.astrolabs.pl/observatory/create>

Please fill the form below, check BHTOM manual for details. Your entry has to be then activated by the Administrator.

The sample fits file is necessary for new observatories for verification of the automatic photometric processing. Please refer to the BHTOM Manual or get in touch.

Observatory name

Longitude (West is positive) [deg]

Latitude (North is positive) [deg]

Approx. limit magnitude in V band* [mag]

Filters*

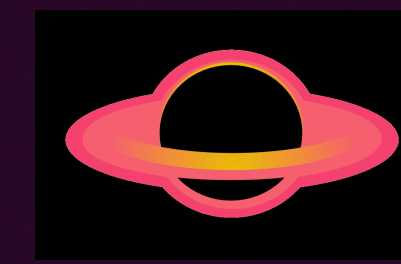
Altitude [m]*

Aperture [m]

Focal length [mm]

Telescope name

Process your data via Web Interface



BHTOM About Us Targets Target Grouping Alerts Observations Data Proposals Observatory Admin Przemyslaw J. Mikolajczyk (mikolajczyk) Logout

Gaia23bay

Photometry Models Spectroscopy Observe Observations Publication **Manage Data** Manage Groups

Name	Gaia23bay
Ra,Dec	297.42915 10.72818 19:49:42.996 +10:43:41.448
Galactic (l,b)	49.248689 -7.763727
Constellation	Aquila
Discovered	2023-03-07 23:02:03
Class	Unknown
Description	~0.9 mag rise in Gaia source
Phot.Class	Red Giant 98.2%
Last MJD	60290.199829
Last Mag/Filter	13.6 mag [ATLAS(o)]
Target importance (0-10)	0.0
Cadence requested (d)	100.0
Observing priority	0.0
Sun Separation (deg)	84.0

Other names:

- GAIA_DR3**
4303504797635723264
- SDSS**
SDSS_1237666226973443073
- NEOWISE**
NEOWISE+J297.42915_10.72818
- CRTS**
CRTS+J297.42915_10.72818
- PS1**
PS1_120872974291354376

Upload a data product

Here you can upload your photometric and spectroscopic observations for this target. Please refer to the BHTOM manual for details. Example CSV formats for [photometry](#) and [spectroscopy](#). Note, we require MJD (Modified Julian Date = JD-240000.5) in the photometry file! SExtractor format is required for instrumental photometry. FITS is not supported for spectra yet. Non-detections are marked with error ≥ 99.0 (e.g. 99.0, 99.9 etc.) For photometric FITS processing choose the observatory from the list. You can add a new observatory [here](#). **You can upload up to 5 files at once.**

You can also use a python script for external fits upload, [see the BHTOM's API documentation](#)

Choose a Files
 No file chosen

Data product type

- Photometry - SExtractor format
- Photometry - CSV
- FITS File
- Spectroscopy

Dry Run (no data will be stored in the database)

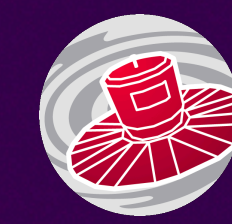
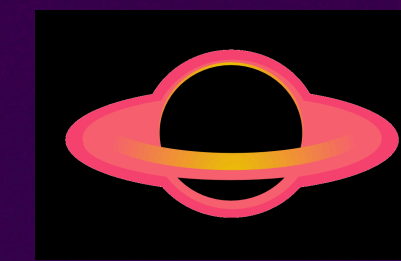
MJD OBS *

Observer's Name *

Observatory*

Force filter

Process your data via API Interface



BHTOM-Team / bhtom2

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- DocumentationAPI.md
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- .gitignore
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- qodana.yaml
- requirements.txt

bhtom2 / Documentation / Documentation.md

wyrzykow docs: Update 'Brokers' section in Documentation.md 9a60f9e · 3 months ago History

Preview Code Blame 84 lines (49 loc) · 4.97 KB Raw Copy Download Edit

BHTOM2 Documentation

Click [here for BHTOM2 API documentation](#).

Note: the documentation is still in preparation.

In the meantime, you can listen to [a recording on the BHTOM2 presentation by Lukasz Wyrzykowski from Malta 2023 workshop](#)

Data Download and Use policy

Please contact us if you plan to use the data in a publication. By downloading the data from BHTOM you agree to follow our data policy and to use this acknowledgment:

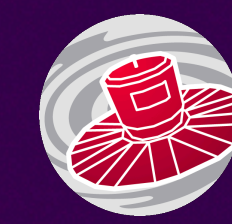
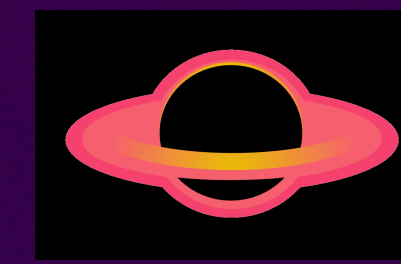
```
The data was obtained via [BHTOM](https://bhtom.space), which has received funding from the European Union's Horizon
```

For more information about acknowledgement and data policy contact us and visit <https://about.bhtom.space>

1 Time-Domain Archives

<https://github.com/BHTOM-Team/bhtom2/tree/master/Documentation>

Process your data via API Interface



BHTOM-Team / bhtom2

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bhtom2 / Documentation / DocumentationAPI.md

Yurii Purdenko fix: match_dist + validation error for cone_search 451a8d3 · 3 weeks ago History

Preview Code Blame 1073 Lines (759 loc) · 32 KB Raw

BHTOM2 API Documentation

Introduction

This is a simple guide for BHTOM's REST API. It lets you use BHTOM webpage features in your own programs. You can get a list of targets, add observations, download data and more. Let's get started!

Remember! To use API you should get your own TOKEN first!

AUTHORIZATION API: /api/token-auth/

Description

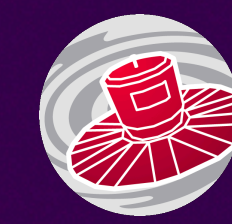
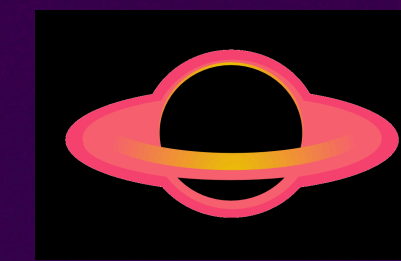
The `token-auth` API provides a method for users to obtain an **authentication token** by submitting their `username` and `password`. Once you have acquired this token, it allows you to access and utilize all other available APIs.

Endpoint

Method: POST

<https://github.com/BHTOM-Team/bhtom2/tree/master/Documentation>

Process your data via API Interface



BHTOM-Team / bhtom2

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- create_target.py
- delete_favourite_observatory...
- download_photometry.py
- download_radio.py
- get_calib_res.py
- get_catalogs_script.py
- get_favourite_observatory.py
- get_token.sh
- get_token_interactive.sh
- send_fits_to_bhtom.py
- update_observatory.py
- update_target.py
- upload_files_script.p

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Yurii Purdenko fix: match_dist + validation error for cone_search 451a8d3 · 3 weeks ago History

Name	Last commit message	Last commit date
..		
create_observatory.py	fix: name	7 months ago
create_target.py	target create api and download fixes	6 months ago
delete_favourite_observatory.py	fix	2 months ago
download_photometry.py	docs: download scripts added	6 months ago
download_radio.py	docs: download scripts added	6 months ago
get_calib_res.py	fix: get calib res	6 months ago
get_catalogs_script.py	feat(documentation_scripts): update API URL in get_catalogs_script	3 months ago
get_favourite_observatory.py	fix	2 months ago
get_token.sh	Update get_token.sh	5 months ago
get_token_interactive.sh	new files	5 months ago
send_fits_to_bhtom.py	Script to send FITS files to BHTOM ver. 2.0.	5 months ago
update_observatory.py	fix	2 months ago

<https://github.com/BHTOM-Team/bhtom2/tree/master/Documentation>

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- Files
- master
- Go to file
- delete_favourite_observatory....
- download_photometry.py
- download_radio.py
- get_calib_res.py
- get_catalogs_script.py
- get_favourite_observatory.py
- get_token.sh
- get_token_interactive.sh
- send_fits_to_bhtom.py
- update_observatory.py
- update_target.py
- upload_files_script.py
- Documentation.md
- DocumentationAPI.md
- bhtom2
- bhtom_base

bhtom2 / Documentation / documentation_scripts / send_fits_to_bhtom.py

astromiki Script to send FITS files to BHTOM ver. 2.0. 66c710f · 5 months ago History

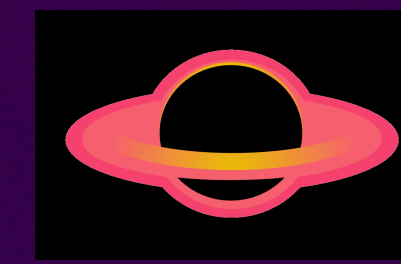
Download raw file

Code Blame 130 lines (118 loc) · 5.08 KB Raw Copy Download Edit View

```
1  #!/usr/bin/env python3
2
3  ### BHTOM system script
4  ### Script allows to upload bulk FITS data to BHTOM server.
5  ### Last modified: Nov 8, 2023
6  ### Authors: PM
7  ### Important: Added support for new server (!)
8
9  import os
10 import subprocess
11 import requests
12 import time
13 import argparse
14 import sys
15
16 bhtom2_url = "https://uploadsvc2.astro labs.pl/upload/"
17
18 def input_arguments():
19     global indir, inhash, inobject, infilter, intype, dryrun, inmjd, inobservat, intoken
20     des = ">>> " + os.path.basename(sys.argv[0]) + " <<<\n" + \
21         "Sends image data to BHTOM system\n" + \
22         "Requires: Python3 with os,subprocess,requests,time,\n" + \
23         "      argparse,sys packages\n" + \
```

```
usage: send_fits_to_bhtom.py [-h] -d DIR -t TOKEN -o OBJECT -oname OBSERVATORY [-f FILTER] [--dryrun]
send_fits_to_bhtom.py: error: the following arguments are required: -d/--dir, -t/--token, -o/--object, -oname/--observatory
```


Process your data via API Interface



```
usage: send_fits_to_bhtom.py [-h] -d DIR -t TOKEN -o OBJECT -oname OBSERVATORY [-f FILTER] [--dryrun]
```

```
>>> send_fits_to_bhtom.py <<<
```

```
Sends image data to BHTOM system
```

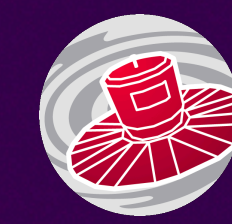
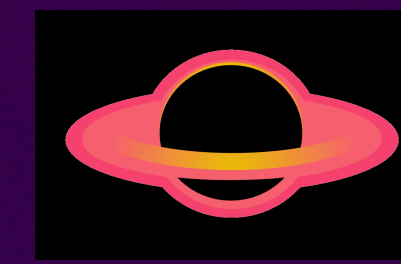
```
Requires: Python3 with os, subprocess, requests, time,  
          argparse, sys packages
```

```
Example: send_to_bhtom.py -d ./files_to_be_sent -o Gaia18dif -t 65u6gqiubs88d7c27083cfb51af71 -oname ROAD_QHY600M  
[-f filter] --dryrun
```

optional arguments:

- h, --help show this help message and exit
- d DIR, --dir DIR directory containing FITS images or a PHOT filepath
- t TOKEN, --token TOKEN
your dedicated hashtag
- o OBJECT, --object OBJECT
object name
- oname OBSERVATORY, --observatory OBSERVATORY
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- f FILTER, --filter FILTER
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- dryrun sends data, but does not store datapoints in BHTOM database

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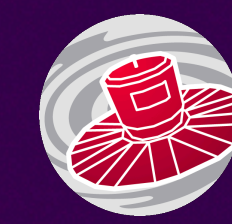
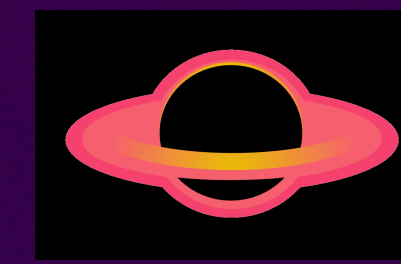
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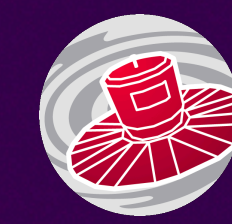
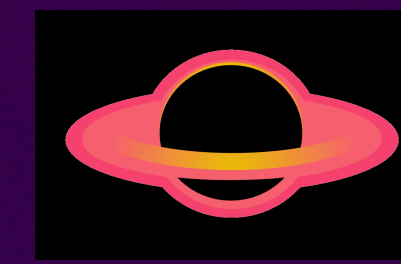
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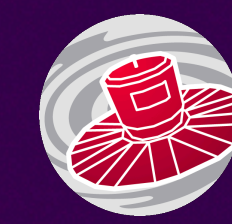
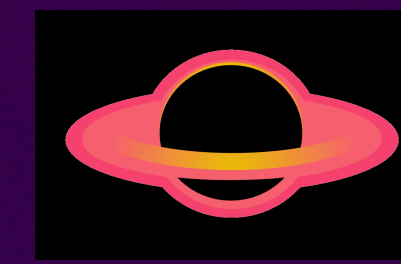
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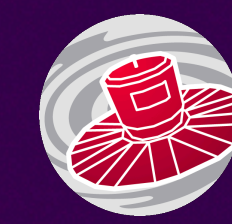
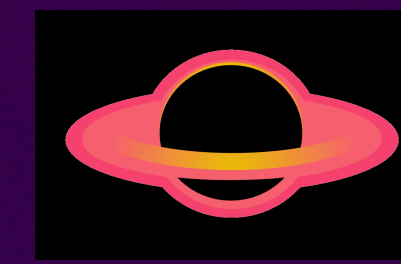
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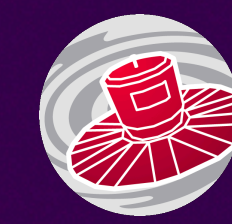
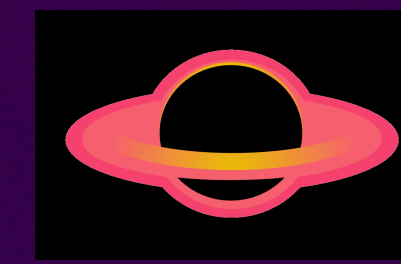
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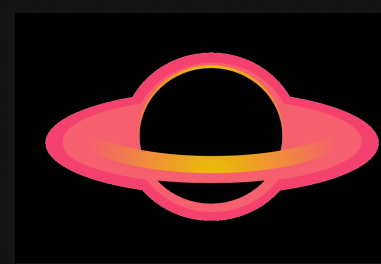
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We are here to help and assist you!



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Questions?



Contact info:

 bhtom@astrouw.edu.pl

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