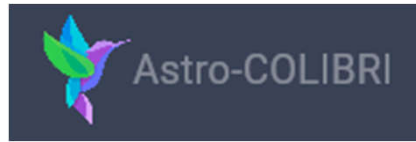




ATELIER 14 et 15 décembre 2024 - Workflow réductions avec AstrolmageJ

Éléments utilisés



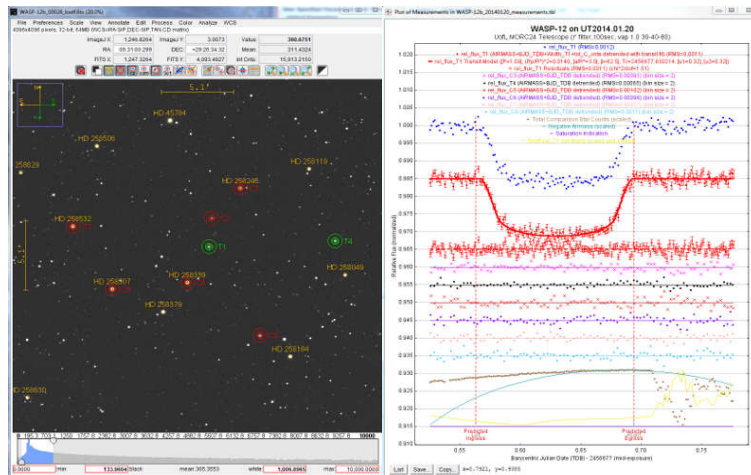
<https://astro-colibri.com/>



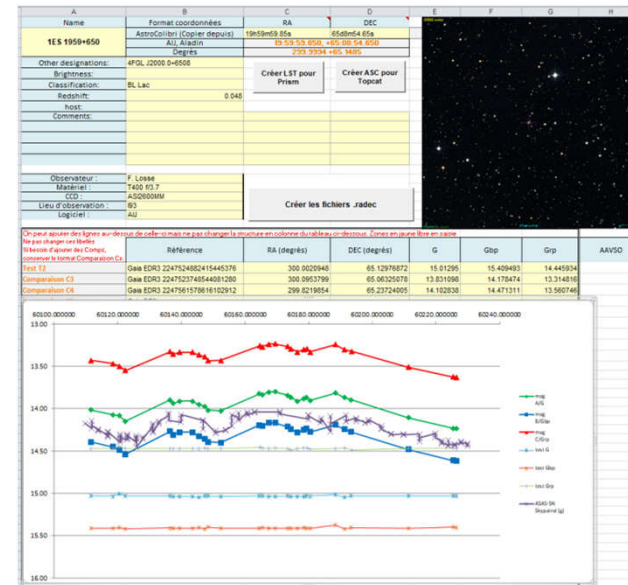
<https://aladin.cds.unistra.fr/>



Tool for OPerations on Catalogues And Tables
<https://www.star.bris.ac.uk/~mbt/topcat/>



<https://www.astro.louisville.edu/software/astroimagej/>



Feuille de calcul Excel

Réception de l'alerte

P
R
E
P
A

Initialisation template à partir des éléments de Colibri, insertion d'une image DSS

Création fichier LST pour Prism et fichier ascii pour TopCat

Acquisition de la première série d'images

Identification cible, sélection des étoiles de comparaison, étoiles tests ...

Création des fichiers RaDec pour chaque filtre

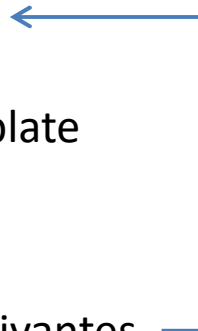
S
U
I
V
I

Réduction dans AIJ

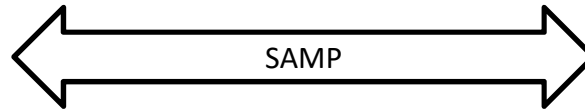
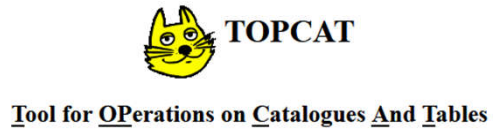
Injection dans template

Màj feuille RAPAS

Acquisition nuits suivantes



Identification cible, sélection des étoiles de comparaison, étoiles tests ...



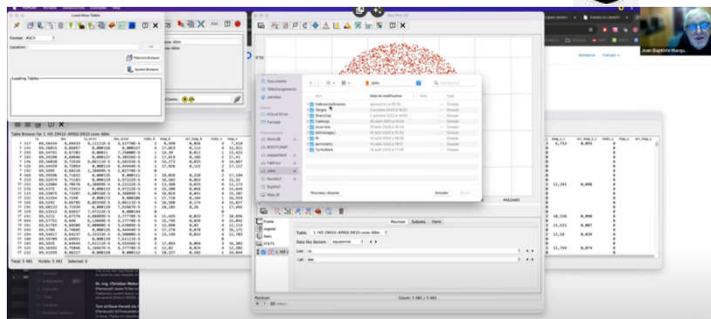
Ciblage cone search et critères numériques
Élimination variables connues

Vérification visuelle avec image locale,
DSS, Catalogues...



Création des fichiers RaDec

cf. Masterclass J.B. Marquette



Démo live + tard si assez de temps

<https://www.youtube.com/watch?v=sTwtfdQPv1Y>



Fichiers RaDec

#RA in decimal or sexagesimal HOURS
 #Dec in decimal or sexagesimal DEGREES
 #Ref Star=0,1,missing (0=target star, 1=ref star, missing->first ap=target, others=ref)
 #Centroid=0,1,missing (0=do not centroid, 1=centroid, missing=centroid)
 #Apparent Magnitude or missing (value = apparent magnitude, or value > 99 or missing = no mag info)
 #Add one comma separated line per aperture in the following format:
 #RA, Dec, Ref Star, Centroid, Magnitude

19:59:59.850, +65:08:54.650, 0, 1
 20.0001, 65.1298, 0, 1,
 20.0064, 65.0633, 1, 1, 13.831
 19.9881, 65.2372, 1, 1, 14.103

Observateur :	F. Losse					
Matériel :	T400 f/3.7					
CCD :	ASI2600MM					
Lieu d'observation :	I93					
Logiciel :	AU					
Créer les fichiers .radec						
On peut ajouter des lignes au-dessus de celle-ci mais ne pas changer la structure en colonne du tableau ci-dessous. Zones en jaune libre en saisie						
Ne pas changer ces libellés						
Si besoin d'ajouter des Comps, conserver le format Comparaison Cx:						
	Référence	RA (degrés)	DEC (degrés)	G	Gbp	Grp
Test T2	Gaia EDR3 2247524882415445376	300.0020948	65.12976872	15.01295	15.409493	14.445934
Comparaison C3	Gaia EDR3 2247523748544081280	300.0953799	65.06325078	13.831098	14.178474	13.314816
Comparaison C4	Gaia EDR3 2247561578616102912	299.8219854	65.23724005	14.102838	14.471311	13.560746
Comparaison C5	Gaia DR3 xxxxx					
Comparaison C6	Gaia DR3 xxxxx					
Comparaison C7	Gaia DR3 xxxxx					
Comparaison C8	Gaia DR3 xxxxx					

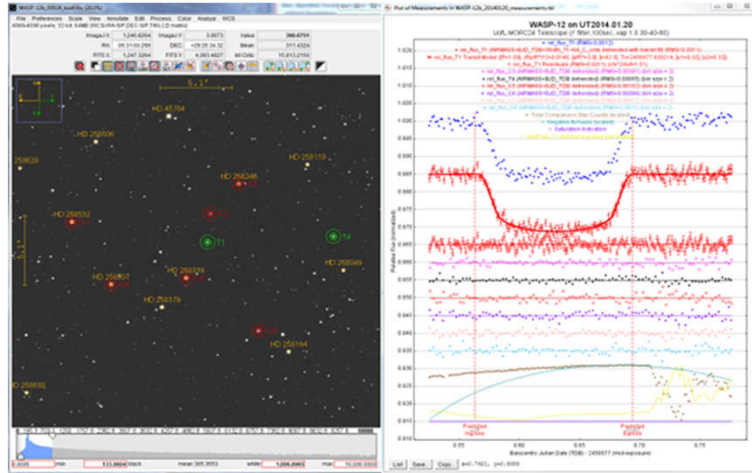
On peut les créer de multiples façons:

- Interactivement dans AIJ
- Editeur de texte

- ...



AstrolmageJ



Karen A. Collins, John F. Kielkopf, Keivan G. Stassun, and Frederic V. Hessman

[THE ASTRONOMICAL JOURNAL](https://iopscience.iop.org/article/10.3847/1538-3881/153/2/77)

<https://iopscience.iop.org/article/10.3847/1538-3881/153/2/77>

Site

<https://www.astro.louisville.edu/software/astroimagej/>

User Guide

https://www.astro.louisville.edu/software/astroimagej/guide/AstrolmageJ_User_Guide.pdf

Forum

<http://astroimagej.170.s1.nabble.com/>

Releases régulières (dernier build hier)

https://www.astro.louisville.edu/software/astroimagej/installation_packages

Nombreux plugins

Options de personnalisation

Runs on Linux, Windows and Mac OS

Provides an interactive interface similar to ds9

Reads and writes FITS images with standard headers

Allows FITS header viewing and editing

Plate solves and adds WCS to images seamlessly using the Astrometry.net web interface

Displays astronomical coordinates for images with WCS

Provides object identification via an embedded SIMBAD interface

Aligns image sequences using WCS headers or by using apertures to correlate stars

Image calibration including bias, dark, flat, and non-linearity correction with option to run in real-time

Interactive time-series differential photometry interface with option to run in real-time

Allows comparison star ensemble changes without re-running differential photometry

Provides an interactive multi-curve plotting tool streamlined for plotting light curves

Includes an interactive light curve fitting interface with simultaneous detrending

Allows non-destructive object annotations/labels using FITS header keywords

Provides a time and coordinate converter tool with capability to update/enhance FITS header content (AIRMASS, BJD, etc.)

Exports analyses formatted as spreadsheets

Creates color images and with native ImageJ processing power

Optionally enter reference star apparent magnitudes to calculate target star magnitudes automatically

Optionally create Minor Planet Center (MPC) format for direct submission of data to the MPC

Recently added when you update to the daily build after installation --

Nearby eclipsing binary star identification from expected depth versus light curve RMS table for TESS follow-up

Delta-magnitude versus RMS plot

Enhanced contrast controls

Annotations are retained when placing apertures

FITS header search feature

...

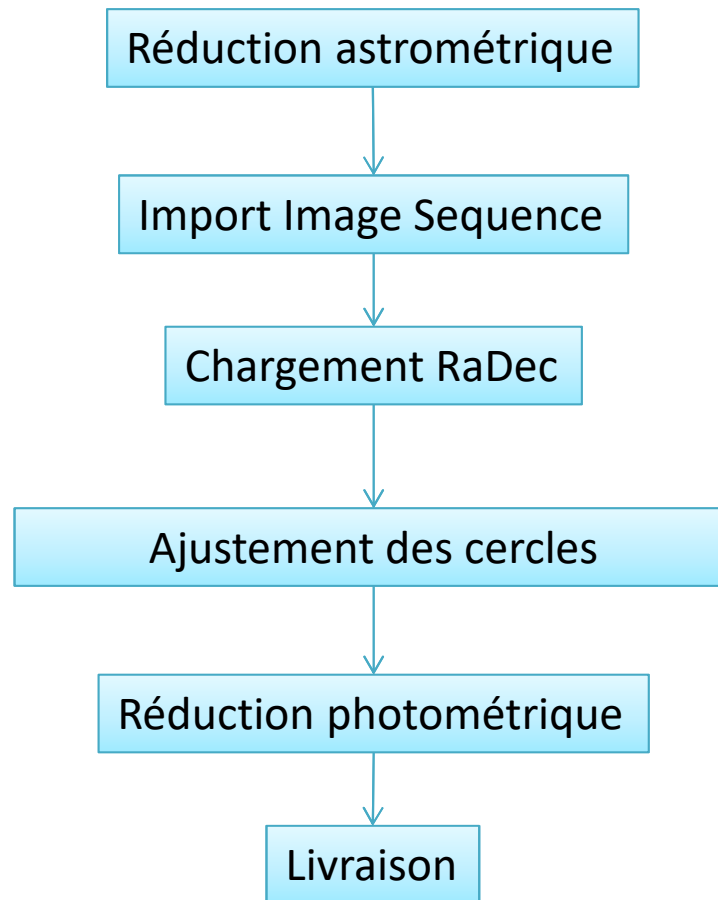


ATELIER 14 et 15 décembre 2024 - Workflow réductions avec AstrolImageJ

LIVE OPERATIONS SOUS AIJ
démonstration de réduction d'une longue série



LIVE OPERATIONS SOUS AIJ
séquence typique





ATELIER 14 et 15 décembre 2024 - Workflow réductions avec AstromImageJ

Réduction astrométrique

DP CCD Data Processor

File Edit Image Process Analyze Plugins Window Help

Control Options Directory Filename/Pattern Totals

Science Image Processing

Filename Pattern Matching

Enable Sort Num E:\MANIPSRAPAS\241214_Atelier1ES_1959+650_60164\ *.fits 9

Filename Number Filtering

Enable Min: 0 Max: 1000000000 *.fits 9

Bias Subtraction

Build ave med bias_ 0

Enable mbias.fits 0

Dark Subtraction

Build ave med dark_ 0

Enable scale deBias mdark.fits 0

Flat Division

Build ave med flat_ 0




Enable Remove Gradient mflat.fits 0

Image Correction

Enable Linearity Correction New pixel value = 0.0E0 + 1.0E0 × (PixVal) + 0.0E0 × (PixVal)² + 0.0E0 × (PixVal)³

Remove Outliers Bright Dark Radius: 2 Threshold: 50

FITS Header Updates

General Plate Solve   

Target Coordinate Source: FITS header target RA/DEC (J2000)

Observatory Location Source: FITS header latitude and longitude

Save Calibrated Images

Enable 16 32 Sub-dir: WCS Suffix: Format: FPACK GZIP

Post Processing

M-App Save Image Macro 1 C:\Users\fore\ 0

M-Plot Save Plot Macro 2 C:\Users\fore\ 0

Control Panel

Polling Interval: 0

START PAUSE RESET

Processed: 0 Remaining: 9

DP Astrometry Settings

User Key: (Get key from: nova.astrometry.net)

Use Custom Server: Enable http://127.0.0.1:8080

Re-save Raw Science: Enable FPACK GZIP **WARNING: may re-writes raw science file**

Skip Images With WCS: Enable

Annotate: Enable

Add To Header: Enable

Median Filter: Enable

Radius (pixels): 30.00

Filter Radius (pixels): 2

Peak Find Options: Limit Max Peaks

Max Peak (ADU): 50000

Noise Tol (StdDev): 1.00

Max Num Stars: 50

Centroid Near Peaks: Enable

Radius (pixels): 20.00

Sky Inner (pixels): 30.00

Sky Outer (pixels): 40.00

Constrain Plate Scale: Enable

Plate Scale (arcsec/pix): 1.500

Tolerance (arcsec/pix): 0.250

Constrain Sky Location: Enable

Center RA (Hours): 19:59:56.672

Center Dec (Degrees): +65:09:02.58

Radius (arcmin): 40.0

SIP Distortion Correction: Enable

SIP Order: 3

SAVE AND EXIT SAVE

```
HISTORY Previous Filename = 1ES_1959+650_b3_G-60164_53292299_t120.fits
HISTORY WCS created by AIJ link to Astrometry net website
HISTORY WCS created on 2024-12-12T17:27:33.827
CSAXES =
CTYPE1 = 'RA---TAN-SIP'
UNIT1 = 'deg'
UNIT2 = 'deg'
UNIT3 = 'deg'
EQUINOX = 2000.0
LONPOLE = 180.0
LATPOLE = 0.0
RVALL = 300.008627037
RVALL2 = 65.15182282
REFPIX = 1042
REFRAX = 657
DI_1 = -0.000421079186906
DI_2 = 4.7616289178E-05
DI_3 = -4.79332078505E-05
DI_4 = -0.000420013722268
IMAGEW = 2082
IMAGEH = 1392
IP_ORDER = 3
IP_ORDER2 = 3
IP_ORDER3 = 3
BP_ORDER = 3
L_0_C = 1.87793153761E-07
L_0_1 = -2.8658352926E-09
L_1_1 = 5.38526211489E-07
L_1_2 = -5.84134940303E-09
L_2_0 = -9.72202629685E-08
L_2_1 = 7.88953992539E-10
L_3_0 = -6.14855003975E-09
L_3_1 = 2.31792102965E-06
L_3_2 = -1.925094442E-09
L_3_3 = 3.94376711425E-08
L_3_4 = 3.75277626788E-10
L_3_5 = -4.23897917894E-07
L_3_6 = -3.2280672023E-09
L_3_7 = -3.87682609349E-10
L_3_8 = -6.8579253998E-06
L_3_9 = -1.9629510244E-07
L_3_10 = 3.97685801214E-09
L_3_11 = -5.82802743159E-05
L_3_12 = -5.56315417079E-07
L_3_13 = 5.99458576202E-09
L_3_14 = 1.00162926063E-07
L_3_15 = -7.9094842454E-10
L_3_16 = 6.3257723186E-09
L_3_17 = -1.43301261225E-05
L_3_18 = -2.33038923737E-06
L_3_19 = 1.96642415601E-09
L_3_20 = -2.7544519177E-06
L_3_21 = -4.04516796352E-08
L_3_22 = -3.7052641105E-10
L_3_23 = 4.28102775413E-07
L_3_24 = 3.39695304242E-09
L_3_25 = 4.0878085831E-10
END
```


Import Image Sequence

The screenshot displays the Astrolmage software interface. On the left, the 'File' menu is open, with 'Import' > 'Image Sequence...' selected. The 'Import Image Sequence' dialog box is centered, showing the following settings:

- Dir: E:\MANIP\SIRAPAS\241214_Atelier\1ES_1959+650_60164\WCS\
- Type: default
- Filter: [G]
- Start: 1
- Count: 3
- Step: 1
- Scale: 100 %
- Filter based on FITS header keywords and values:
 - Keyword 1: [] Value 1: []
 - Keyword 2: [] Value 2: []
 - AND/OR selection: AND is selected.
- Sort names numerically:
- Use virtual stack:
- Open as separate images:
- Matched files: 3
- Estimated stack size: 34.8 MB

The main image window shows a star field with a WCS overlay. The WCS parameters are:

Image J X:	1,404.5085	Image J Y:	1,380.2034	Value:	1,609.9056
RA:	19:58:13.320	DEC:	+65:25:13.99	Peak:	1,715.8829
FITS X:	1,405.0085	FITS Y:	12,2866	Int Cnts:	535.8875

The image window also shows a histogram at the bottom with the following statistics:

min	1,295.6271	black	1,073.8597	mean	1,687.4414	white	3,183.9782	max	88,925.2578
-----	------------	-------	------------	------	------------	-------	------------	-----	-------------

Chargement RaDec

WCS (51.7%)

File Preferences Contrast View Annotate M

- Open image in this window...
- Open image in new window...
- Open image sequence in new window...
- Open data file...
- Save image display as PNG...
- Save image display as JPEG...
- Save image display as PDF...
- Create NEB search reports and plots...
- Open apertures...
- Save apertures...
- Import apertures from RA/Dec list...
- Export apertures to RA/Dec list...

WCS (101%)

File Preferences Contrast View Annotate Measure Edit Process Color Analyze WCS

1/3 (1ES_1959+650_b3_G-60164.53293299_t120.fits); 2082x1392 pixels; 32-bit; 33MB (WCS=RA-SIP,DEC-SIP,TAN,CD matrix)

ImageJ X:	1,044.4476	ImageJ Y:	813.9344	Value:	1,618.5031
RA:	19:59:56.213	DEC:	+65:12:05.11	Peak:	1,719.9840
FITS X:	1,044.9476	FITS Y:	578.5656	Int Cnts:	162.9530

4.04"

C4=14,103

T1

T2

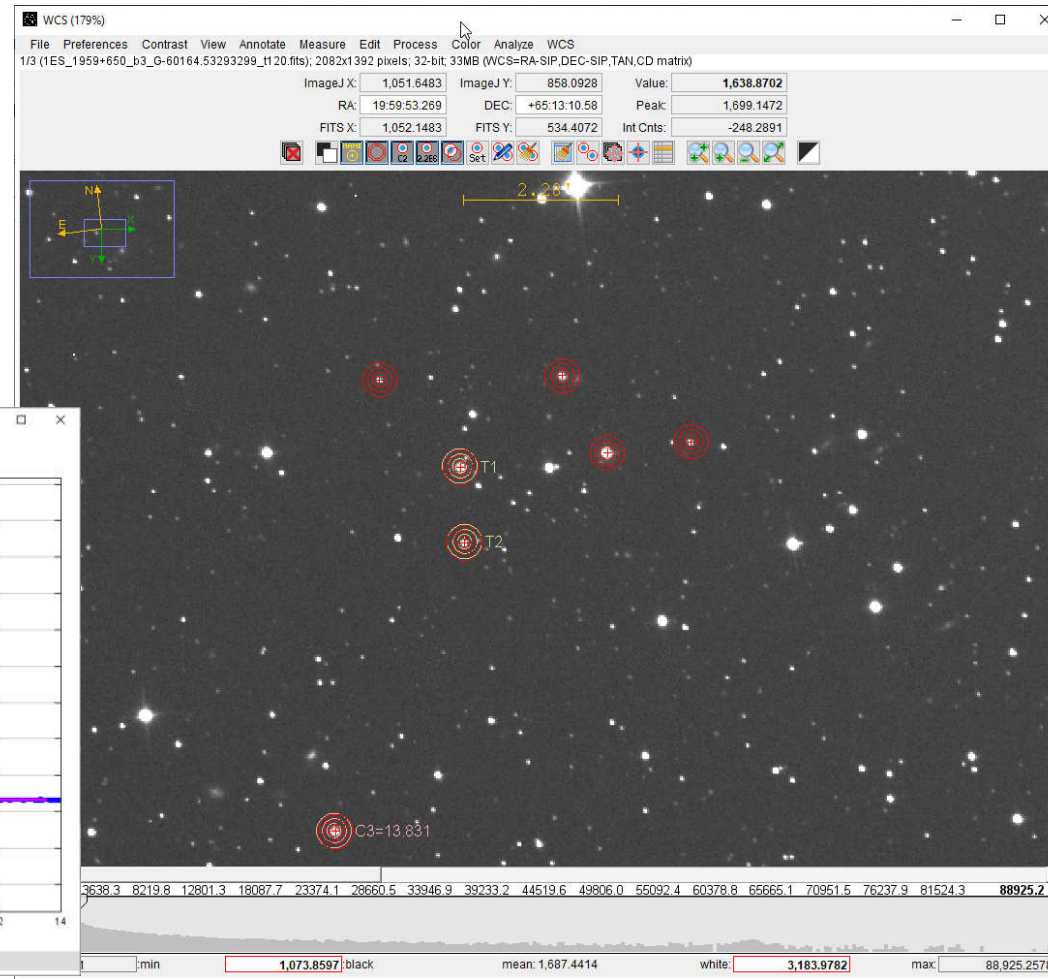
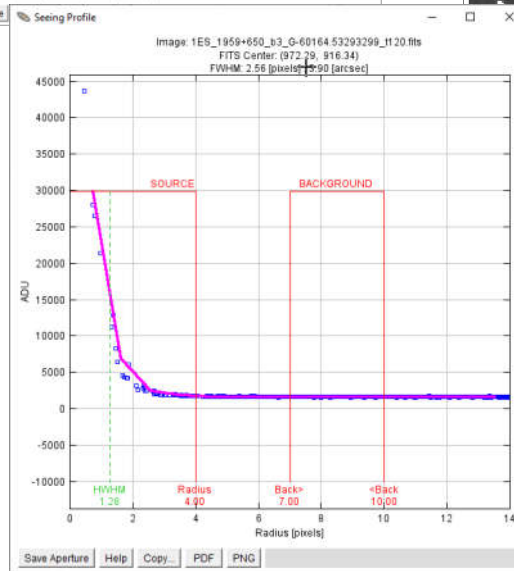
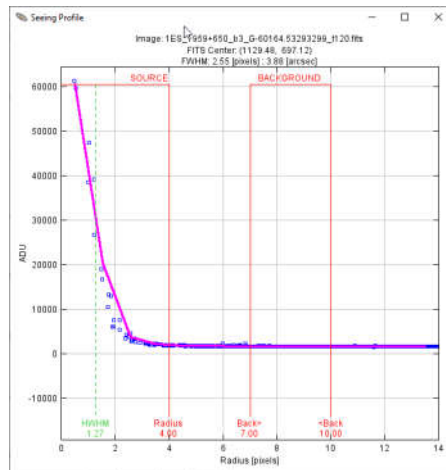
C3=13.831

4.03"

1295.6 3285.9 7515.0 11744.1 16678.0 21612.0 26545.9 31479.9 36413.8 41347.8 46281.7 51215.7 56149.7 61083.6 66017.6 70951.5 75885.5 80819.4 88925.2

-1,295.6271 :min 1,073.8597:black mean:1,687.4414 white: 3,183.9782 max: 88,925.2578

Ajustement des cercles (Alt clic) en vérifiant sur plusieurs étoiles





Réduction photométrique

Multi-Aperture Measurements

Aperture Shape: **Circular**

First slice: Last slice:

Fixed/Base radius of photometric aperture:

Fixed/Base radius of inner background annulus:

Fixed/Base radius of outer background annulus:

Fixed Apertures as selected above
 Auto Fixed Apertures from first image T1 radial profile
 Auto Fixed Apertures from multi-image T1 radial profiles
 Auto Variable Apertures from each image T1 radial profile
 Auto Variable Apertures from each image T1 FWHM

Place all new apertures
 Place first previously used aperture
 Place 4 previously used apertures
 Place 4 imported apertures

Use RA/Dec to locate aperture positions
 Use single step mode (1-click to set first aperture location in each image)
 Allow aperture changes between slices in single step mode (right click to advance image)

Auto comparison stars Enable log Show peaks
 Smoothing Filter Radius: pixels

Auto Thresholds
 Max. Peak Value: Min. Peak Value:
 Base Aperture: Max. Comp. Brightness %: Min. Comp. Brightness %:
 Weight of Distance: vs Brightness Max. Comp. Stars:

Centroid apertures (initial setting) Halt processing on WCS or centroid error
 Remove stars from background Assume background is a plane

Prompt to enter ref star apparent magnitude (required if target star apparent mag is desired)
 Update plot while running Show help panel during aperture selection
 Update image display while running

CLICK 'PLACE APERTURES' AND SELECT APERTURE LOCATIONS WITH LEFT CLICKS.
 THEN RIGHT CLICK or <ENTER> TO BEGIN PROCESSING.
 (to abort aperture selection or processing, press <ESC>)

Multi-Aperture Help

- left-click: Add reference star aperture C5, or delete aperture
- <Shift>left-click: Add target star aperture T5, or change T/C designation
- <Shift><Ctrl>left-click: Add target star aperture T1, or rename aperture to T1
- <Alt>left-click: Toggle centroid setting of existing aperture or new aperture
- right-click: Finalize aperture selection and start processing
- <Enter>: Finalize aperture selection and start processing
- <Ctrl>left-click: Zoom In
- <Ctrl>right-click: Zoom Out
- roll mouse wheel: Zoom In/Out
- left-click-drag: Move aperture, or pan image up/down/left/right
- <Alt>left-click-drag: Move aperture & toggle centroid, or measure arclength
- middle-click: Center clicked point in image display (if enabled in Preferences menu)
- <escape>: Cancel Multi-Aperture

Measurements

File Edit Font Results Filter

Label	slice	Saturated	J.D.-2400000	JD_UTC	Source_Radius	Sky_Rad(min)	Sky_Rad(max)	RA_T1	DEC_T1	Source-Sky_T1	N_Src_Pixels_T1	Source_Error_T1
1 1ES_1959+650_b3_G-60164.53293299_t120.fits	1	0.0	60164.53362743044	2460164.5336274...	4.0	7.0	10.0	19.99993955837039	65.14814712576684	176188.3284896167	50.26548245743...	1080.79097285439...
2 1ES_1959+650_b3_G-60164.53435359_t120.fits	2	0.0	60164.535048021	2460164.535048021	4.0	7.0	10.0	19.999927909717...	65.14818492381433	174746.9570556091	50.2654824574367	1080.73358985714...
3 1ES_1959+650_b3_G-60164.53576644_t120.fits	3	0.0	60164.53646086808	2460164.536460868	4.0	7.0	10.0	19.99993613553959	65.14822082548758	173886.80170804088	50.2654824574367	1077.29886881095...



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Livraison

Name				Format coordonnées				RA		DEC		RESULTATS																	
1ES 1959+650				AstroColibri (Copier depuis)				19h59m59.85s		65d8m54.65s		DATE_OBS image du milieu de la série pour la feuille RAPAS																	
				AU, Aladin				19:59:59.850, +65:08:54.650		Note: s'il manque un filtre durant une session, mettre un x dans la case MJD correspondante																			
Other designations:				4FGL J2000.0+6508						Delta / Test																			
Brightness:				Créer LST pour Prism				Créer ASC Topca		JJ/MM/AAAA (pour RAPAS)	HH:MM:SS (pour RAPAS)	MJD A/G	mag A/G	incert A/G	MJD B/Gbp	mag B/Gbp	incert B/Gbp	MJD C/Grp	mag C/Grp	incert C/Grp	indice B-C	test G +/- δ	test Gbp +/- δ	test Grp +/- δ	Warning				
Classification: BL Lac				Créer les fichiers .radec				16/06/2023	12:07:25	60111.503660	14.01	0.01	60111.506644	13.43	0.02	0.97	15.03	0.02	0.01	15.41	0.02	0.00	14.47	0.04	0.03	Ok			
Redshift: 0.048								23/06/2023	11:48:37	60118.489678	14.07	0.01	60118.491865	14.45	0.01	60118.494746	13.47	0.01	0.88	15.03	0.02	0.02	15.41	0.02	0.00	14.47	0.02	0.03	Ok
host:								25/06/2023	11:05:10	60120.457163	14.08	0.01	60120.461456	14.48	0.01	60120.467139	13.50	0.01	0.99	15.01	0.02	0.00	15.41	0.01	0.00	14.45	0.02	0.00	Ok
Comments:								27/06/2023	09:45:37	60122.403801	14.15	0.01	60122.406682	14.54	0.02	60122.409562	13.55	0.02	0.99	15.03	0.02	0.02	15.42	0.03	0.01	14.47	0.04	0.02	Ok
Observateur: F. Losse								11/07/2023	11:01:21	60136.452127	13.90	0.01	60136.459272	14.27	0.01	60136.466412	13.33	0.02	0.94	15.03	0.01	0.02	15.41	0.02	0.00	14.47	0.03	0.03	Ok
Matériel: T400 f/3.7								12/07/2023	11:28:43	60137.473522	13.94	0.01	60137.477817	14.31	0.01	60137.483498	13.35	0.02	0.95	15.04	0.02	0.02	15.41	0.01	0.00	14.47	0.03	0.02	Ok
CCD: ASI2600								14/07/2023	11:35:12	60139.473352	13.91	0.01	60139.481858	14.28	0.01	60139.493140	13.33	0.01	0.95	15.04	0.02	0.03	15.41	0.01	0.00	14.47	0.03	0.03	Ok
Lieu d'observation: B3								18/07/2023	10:55:57	60143.446096	13.91	0.01	60143.454601	14.28	0.01	60143.465881	13.33	0.01	0.95	15.04	0.02	0.03	15.41	0.02	0.00	14.48	0.03	0.03	Ok
Logiciel: AU								20/07/2023	11:52:08	60145.490559	13.96	0.01	60145.494149	14.33	0.01	60145.498897	13.36	0.01	0.96	15.05	0.01	0.03	15.41	0.01	0.00	14.47	0.02	0.02	Ok
Référence								22/07/2023	10:35:50	60147.434457	13.97	0.01	60147.440855	14.35	0.01	60147.449336	13.39	0.02	0.97	15.03	0.02	0.02	15.42	0.02	0.01	14.46	0.04	0.02	Ok
Test T2								23/07/2023	10:39:45	60148.437180	14.02	0.01	60148.443577	14.39	0.01	60148.452058	13.43	0.01	0.96	15.03	0.02	0.02	15.40	0.01	-0.01	14.47	0.02	0.02	Ok
Comparaison C3								27/07/2023	09:56:05	60152.406862	14.03	0.01	60152.413258	14.40	0.01	60152.421737	13.43	0.01	0.97	15.04	0.02	0.03	15.41	0.01	0.00	14.47	0.02	0.02	Ok
Comparaison C4								08/08/2023	13:00:41	60164.535045	13.83	0.01	60164.541446	14.20	0.01	60164.549929	13.26	0.01	0.94	15.03	0.02	0.02	15.41	0.02	0.00	14.46	0.02	0.01	Ok
ASAS-SN Sky patrol (g)								09/08/2023	11:29:43	60165.471873	13.84	0.01	60165.478271	14.21	0.01	60165.486751	13.27	0.01	0.94	15.03	0.01	0.02	15.41	0.01	0.00	14.46	0.02	0.02	Ok
ASAS-SN Sky patrol (g)								11/08/2023	09:45:58	60167.397489	13.80	0.01	60167.405992	14.17	0.01	60167.417271	13.24	0.01	0.93	15.04	0.01	0.03	15.41	0.01	0.00	14.47	0.02	0.03	Ok
ASAS-SN Sky patrol (g)								13/08/2023	10:26:42	60169.424816	13.80	0.01	60169.431216	14.17	0.01	60169.449590	13.23	0.01	0.93	15.04	0.02	0.03	15.41	0.01	0.00	14.47	0.02	0.02	Ok
ASAS-SN Sky patrol (g)								17/08/2023	11:00:00	60173.451236	13.84	0.01	60173.457634	14.21	0.01	60173.466115	13.27	0.01	0.95	15.03	0.02	0.02	15.41	0.02	0.00	14.47	0.02	0.03	Ok
ASAS-SN Sky patrol (g)								18/08/2023	09:47:04	60174.400589	13.87	0.01	60174.406987	14.24	0.01	60174.415466	13.29	0.02	0.95	15.04	0.02	0.02	15.41	0.03	0.00	14.49	0.04	0.04	Ok
ASAS-SN Sky patrol (g)								20/08/2023	11:21:33	60176.466211	13.91	0.01	60176.472608	14.28	0.01	60176.481089	13.33	0.01	0.95	15.04	0.01	0.03	15.41	0.01	0.00	14.47	0.02	0.02	Ok
ASAS-SN Sky patrol (g)								22/08/2023	12:33:09	60178.515925	13.88	0.01	60178.522323	14.25	0.01	60178.530804	13.30	0.01	0.95	15.04	0.01	0.02	15.41	0.01	0.00	14.47	0.02	0.02	Ok
ASAS-SN Sky patrol (g)								23/08/2023	08:59:44	60179.367729	13.87	0.01	60179.374126	14.24	0.01	60179.382606	13.29	0.01	0.94	15.03	0.02	0.02	15.41	0.02	0.00	14.47	0.02	0.02	Ok
ASAS-SN Sky patrol (g)								24/08/2023	10:23:24	60180.425824	13.90	0.01	60180.432221	14.28	0.01	60180.440701	13.33	0.01	0.95	15.03	0.02	0.02	15.41	0.01	0.00	14.48	0.02	0.03	Ok
ASAS-SN Sky patrol (g)								01/09/2023	08:35:21	60188.350322	13.82	0.01	60188.356720	14.19	0.01	60188.366611	13.24	0.01	0.95	15.02	0.02	0.01	15.38	0.02	-0.03	14.47	0.03	0.03	Ok
ASAS-SN Sky patrol (g)								04/09/2023	08:34:07	60191.352271	13.87	0.01	60191.356565	14.24	0.02	60191.362253	13.30	0.03	0.94	15.05	0.03	0.03	15.42	0.04	0.01	14.46	0.06	0.02	Ok
ASAS-SN Sky patrol (g)								06/09/2023	09:46:52	60193.399983	13.89	0.01	60193.406384	14.27	0.01	60193.416275	13.32	0.02	0.95	15.03	0.03	0.01	15.41	0.03	0.00	14.49	0.05	0.04	Ok
ASAS-SN Sky patrol (g)								24/09/2023	08:35:58	60211.351220	14.11	0.01	60211.357620	14.48	0.01	60211.366107	13.51	0.01	0.97	15.03	0.02	0.02	15.41	0.02	0.00	14.47	0.03	0.03	Ok
ASAS-SN Sky patrol (g)								08/10/2023	09:06:42	60225.372555	14.23	0.01	60225.378957	14.61	0.01	60225.387448	13.63	0.01	0.99	15.03	0.02	0.02	15.40	0.01	-0.01	14.46	0.02	0.02	Ok
ASAS-SN Sky patrol (g)								09/10/2023	10:32:36	60226.432200	14.23	0.01	60226.438609	14.61	0.01	60226.447101	13.63	0.02	0.99	15.03	0.02	0.02	15.40	0.02	-0.01	14.47	0.03	0.02	Ok

