ASTROIMAGEJ dedicated software to analyze astronomical observations





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ASTROIMAGEJ

Download, Install (V5) and Read:

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

TRANSIT









What is the AIJ package?
 What can we do with AIJ?

- Data Reduction & Calibration
- Differential photometry
- Fitting model (exoplanets)
- 3) Practise yourself with WASP-12b !

1) What is the AIJ package?

- Graphical User Interface (GUI) software

- Multi-platform (Windows, Mac, Linux) and is Java-based
- Performs time-series differential photometry: exoplanets, asteroids, var. stars
- Do you want more details? Have a look on:

https://www.astro.louisville.edu/software/astroimagej/ - This is your first contact with AIJ and is expected you practice more, and read the reference texts, papers, user guide, etc.

2) What can we do with AIJ?

See See Sector AstroImageJ File Edit Image Process Analyze Plugins Window Help Image Image

"More Tools" menu (switch toolsets or add tools)

2.1) Data Reduction & Calibration



"More Tools" menu (switch toolsets or add tools)

2.1) Data Reduction & Calibration

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After an observation night you should have: - Science Images - Calibration Images (Flats,Darks and Bias)

Pag. 17 to 21 Mathilde's presentation

2.1) Data Reduction & Calibration

Pag. 17 Mathilde's presentation

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Observatory Longitude Keyword: SITELONG

Target J2000 DEC Keyword: DECOBJ2K

Target Altitude Keyword: ALT OB

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Observatory Latitude Keyword: SITELAT

Observatory Longitude Keyword: SITELONG

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Target Zenith Distance Keyword: ZD OBJ

Target RA Keyword: RA OBI

Target DEC Keyword: DEC OBI

FITS Header Output Settings Target (2000 RA Keyword: RAOBI2K

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2.1) Data Reduction & Calibration

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2.1) Data Reduction & Calibration

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2.2) Differential photometry

Analyze

Plugins

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Window

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Pag. 22 to 23 Mathilde's presentation

Calibrated Images!

"Mc e Tools" menu (switch toolsets or add tools)

Process

AstroImageJ

Edit Image

Import

File

Image Sequence

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Help

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2.2) Differential photometry (Aperture selection)



Field of View

(1) Click on T1(2) Analyse tab(3) Seeing profile

Optimum aperture

Pag. 22 Mathilde's presentation



Seeing profile

2.2) Differential photometry (Aperture selection)

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2.2) Differential photometry (comparison stars)



Similar brightness (Delta Mag < |1.5|)
As flat as possible (to be checked later)

Hold click right and drop over a comparison star

Pag. 23 Mathilde's presentation

2.2) Differential photometry (comparison stars)



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2.2) Differential photometry (plotting results)

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2.2) Differential photometry (plotting results)

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Plot:

- T1 flux
- expected ingress and egrees times
- Comparison stars fluxes
- Typical systematics (airmass, sky/pixel, FWHM, X-Y, BJD_TDB, total_C_cnts)



2.3) Fitting model

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2.3) Fitting model

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(Ry / Ry) ²	0.825072002				6.012004647			
a/Re	4.825839294	la 🗍	6.21.903.208		7.6		1.0	
τ _c	2458290 555695293	🛛 🖬 🛛 😒						
Inclination (deg)	82.90571.8267	8 F 📃			15.0		1.0 +	
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1 30/Post 11			100	2	1.0	-	0.1	
E MULTING	0.00000075287		4.4		A.4 (1)		44	
El Chabladian				-	A 1 [1]		24 F	
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Pit Optimization								
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Fit Centrel								
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				_				

2.3) Fitting model



Use the available values of:

- Period
- Teff

- Compute the LD (Limb Darkening coefficients)

https://exoctk.stsci.edu/limb_darkening

- Temp (K)
- Metalicity [Fe/H]
 ExoFOP
- log(g)
- Filter

2.3) Fitting model

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User Specified Paran	eters (ast fitted)	Next files December	(
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Rental Country Ta	The second second				
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Fit Centrel					
Pit Control	Pit Update Options	Fit Tale av	Max Alexed Days	Taps Taken 478	

Apply some detrends to improve your model

- airmass
- sky/pixel
- FWHM
- X & Y
- BJD_TDB
- total_C_cnts

The lower the BIC the better BIC (Bayesian Information Criterion)

2.3) Fitting model

	User Specified Parameters (not fitted)															
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These are the results of your model:

- Depth: (Rp/R*) ^2
- The scale parameter: a/R*
- Orbital Inclination: i
- Impact parameter: b
- Full transit duration: T14
- Planetary radius: Rp
- Check carefully that the model is realistic and compare them with the expected values !!

2.3) Fitting model





2.3) Fitting model

In your final report :

- Depth: (Rp/R*) ^2
- The scale parameter: a/R*
- Orbital Inclination: i
- Impact parameter: b
- Full transit duration: T14
- Planetary radius: Rp
- Check carefully that the model is realistic and compare them with the predictions







Tess Object of Interest Candidates

https://docs.google.com/spreadsheets/d/1WbUW_LZcgKqk9yV3_dEtJ4radUi5 o-QfFV3wag1KWP0/edit#gid=0