





BD And : a Detached System and Photometric LCs

Group 1

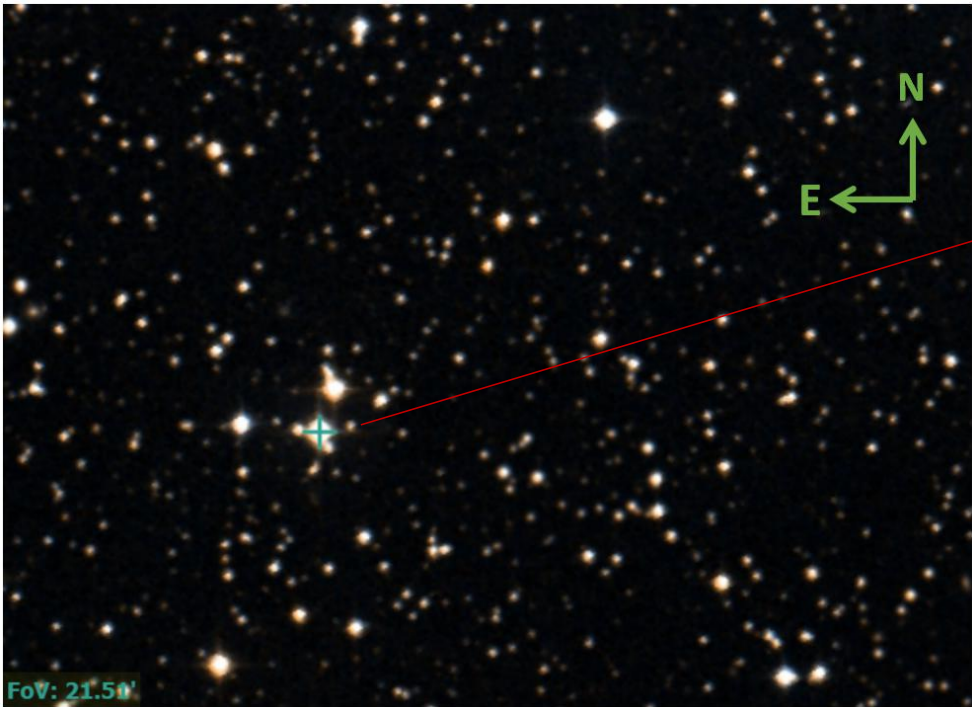
1. **Ahmed Estiak**, SUST, Bangladesh 
2. **Guo Yani**, Shandong University at Weihai, China 
3. **Suruchi Shahi**, Tribhuvan University, Nepal 
4. **Wang Zhihua**, UCAS / YNOs, CAS, China 

ISYA2019, Kunming, China
2019-11-01

Outline

- About ***BD And***
- Research survey
- A brief introduction to the photometry
- Part of the Light Curves of ***BD And***

- About BD And



BD And Image from *SIMBAD*
(<http://simbad.u-strasbg.fr/simbad/sim-basic?Ident=BD+And&submit=SIMBAD+search>)

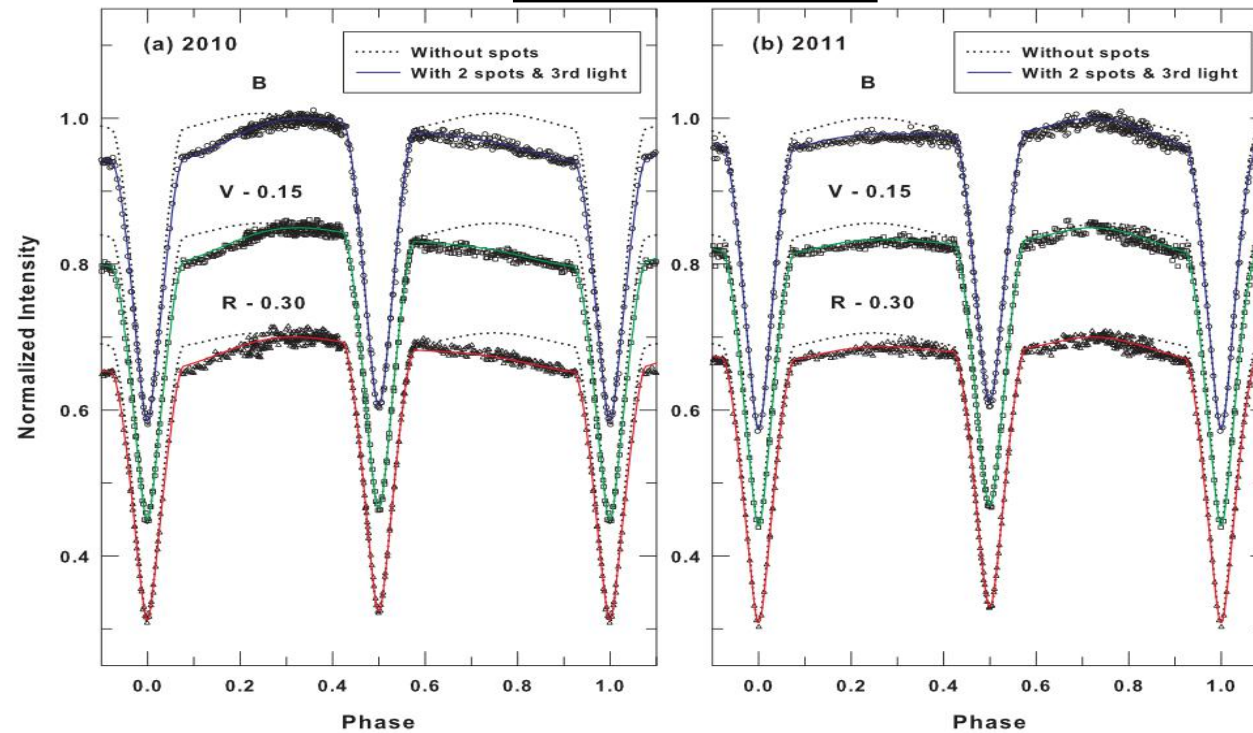
Basic information:

Coor: 23 07 05.17 +50 57 30.9
(346.77154 +50.95858)
Type: EA type eclipsing binary system
P_{orb} = 0.92579852 d (22.219164 h)
Spec: G1V+G1V+G6/7V
Magnitude: 10.87 - 11.44 V

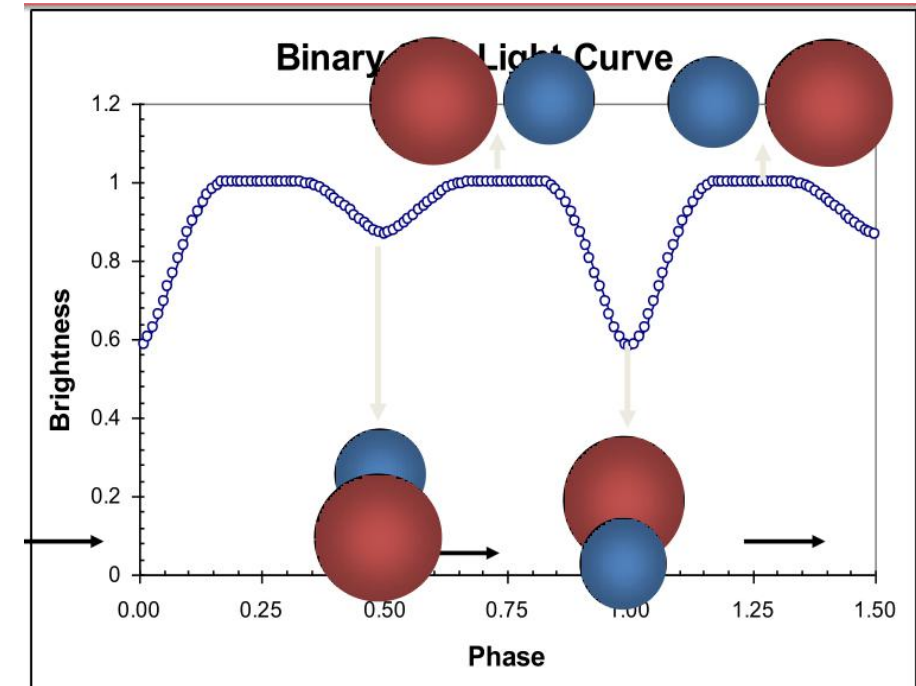
Parameters	Primary	Secondary
Absolute dimensions		
$M (M_{\odot})$	1.145 (± 0.053)	1.004 (± 0.047)
$R (R_{\odot})$	1.278 (± 0.020)	1.155 (± 0.018)
$R_{\text{Roche}} (R_{\odot})$	2.010 (± 0.014)	1.984 (± 0.013)
$\log g \text{ (cgs)}$	4.284 (± 0.024)	4.314 (± 0.024)
$\bar{\rho} (\bar{\rho}_{\odot})$	0.549 (± 0.036)	0.651 (± 0.043)
$a (R_{\odot})$	2.407 (± 0.036)	2.745 (± 0.041)

- Research Survey: evolution of spot

O'Connell Effect



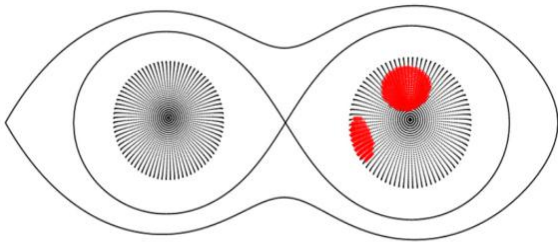
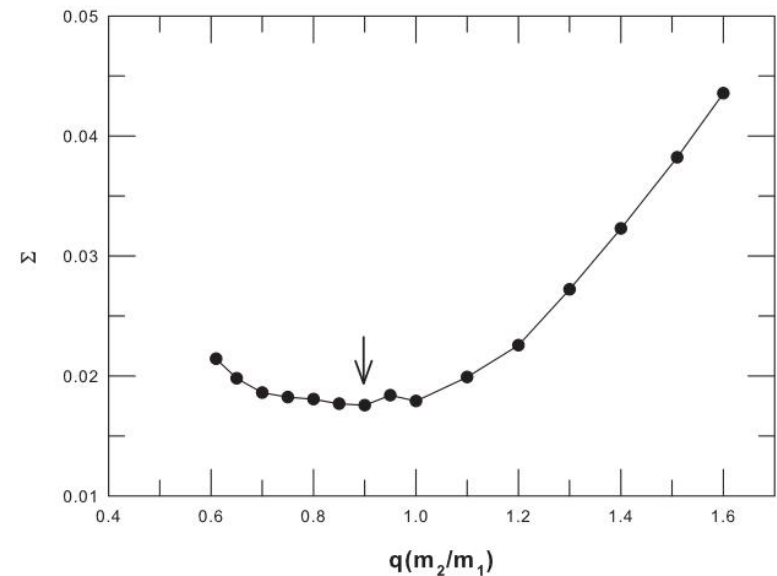
Light curve and WD solution for *BD And*,
2014ApJ...788..134K



Lecture of Prof. Zhu ISYA2019

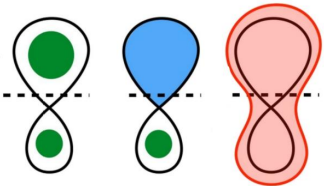
- Research Survey:

WD solution for BD And

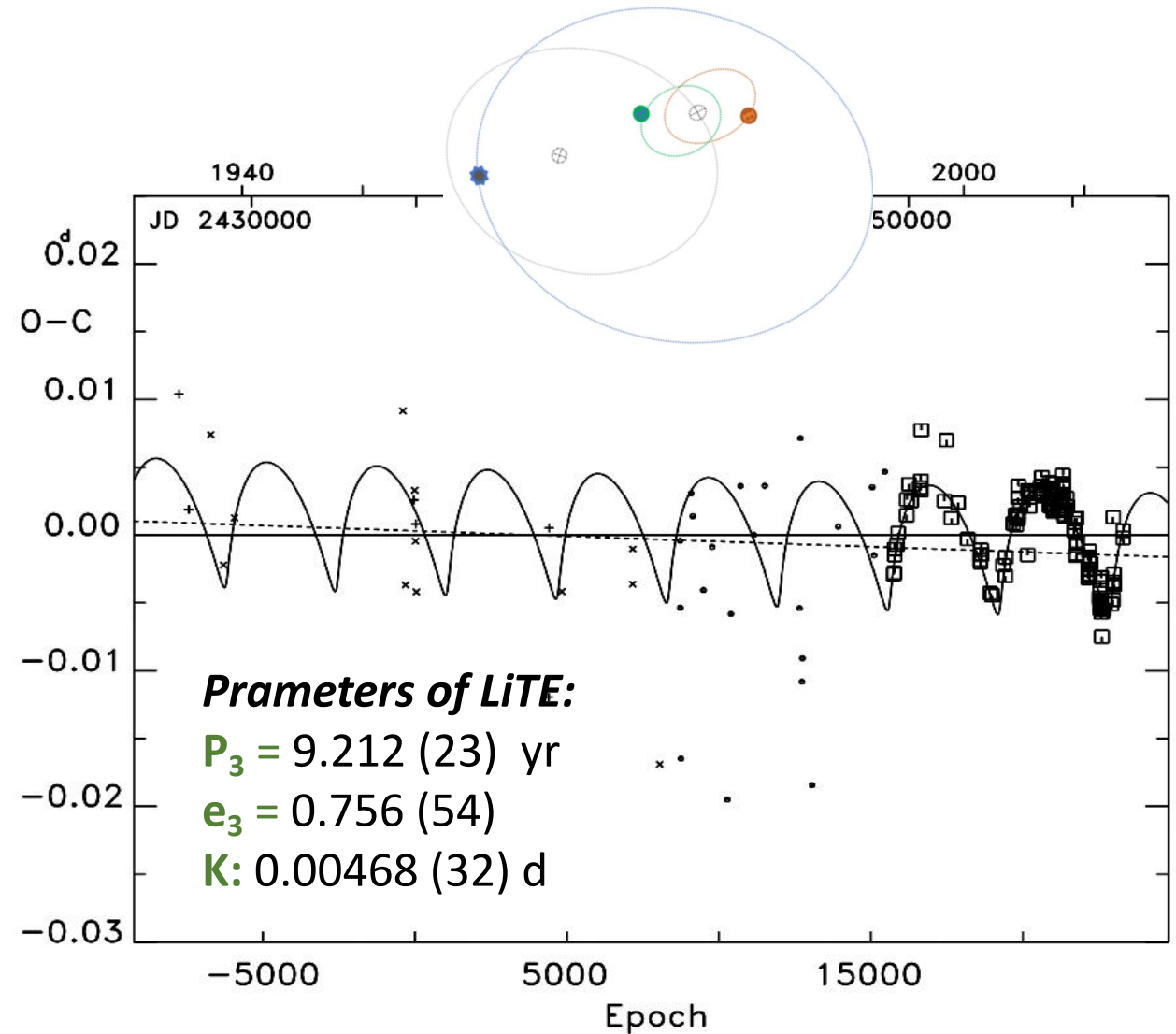
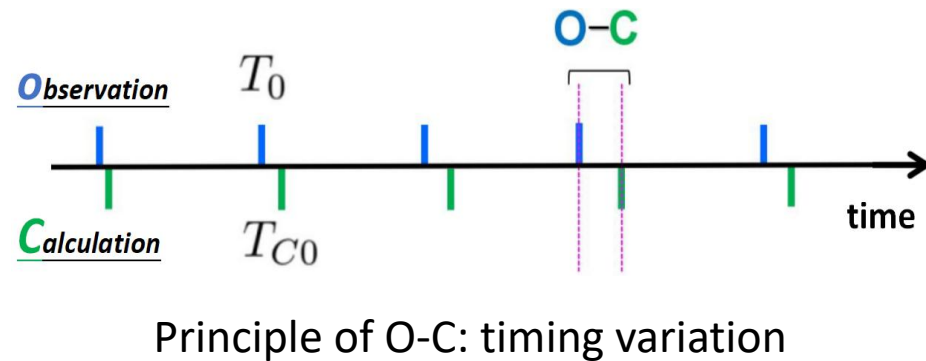
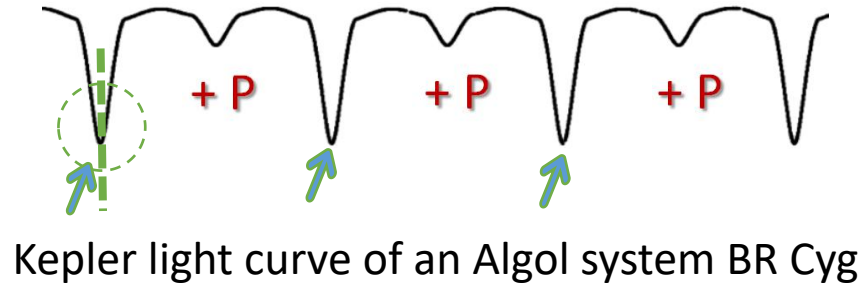


Parameter	Values	
q	0.8770(31)	
$i(^{\circ})$	92.72(19)	
	pri.	sec.
$T(K)$	5880 ^a	5842(3)
Ω	4.960(7)	5.010(11)
$l/(l_1+l_2)_B$	0.5595(6)	0.4405(6)
$l/(l_1+l_2)_V$	0.5569(5)	0.4431(5)
$l/(l_1+l_2)_R$	0.5556(5)	0.4444(6)
$r(\text{pole})$	0.2439(3)	0.2208(4)
$r(\text{point})$	0.2542(4)	0.2286(4)
$r(\text{side})$	0.2473(4)	0.2234(4)
$r(\text{back})$	0.2518(4)	0.2273(4)
$r(\text{volume})$	0.2478(4)	0.2240(4)
$r(\text{Roche})$	0.3902(4)	0.3678(4)
l_{3B}^b		0.129(6)
l_{3V}^b		0.143(6)
l_{3R}^b		0.162(5)

Notes.
^a Fixed parameter.
^b Value at phase 0.25.



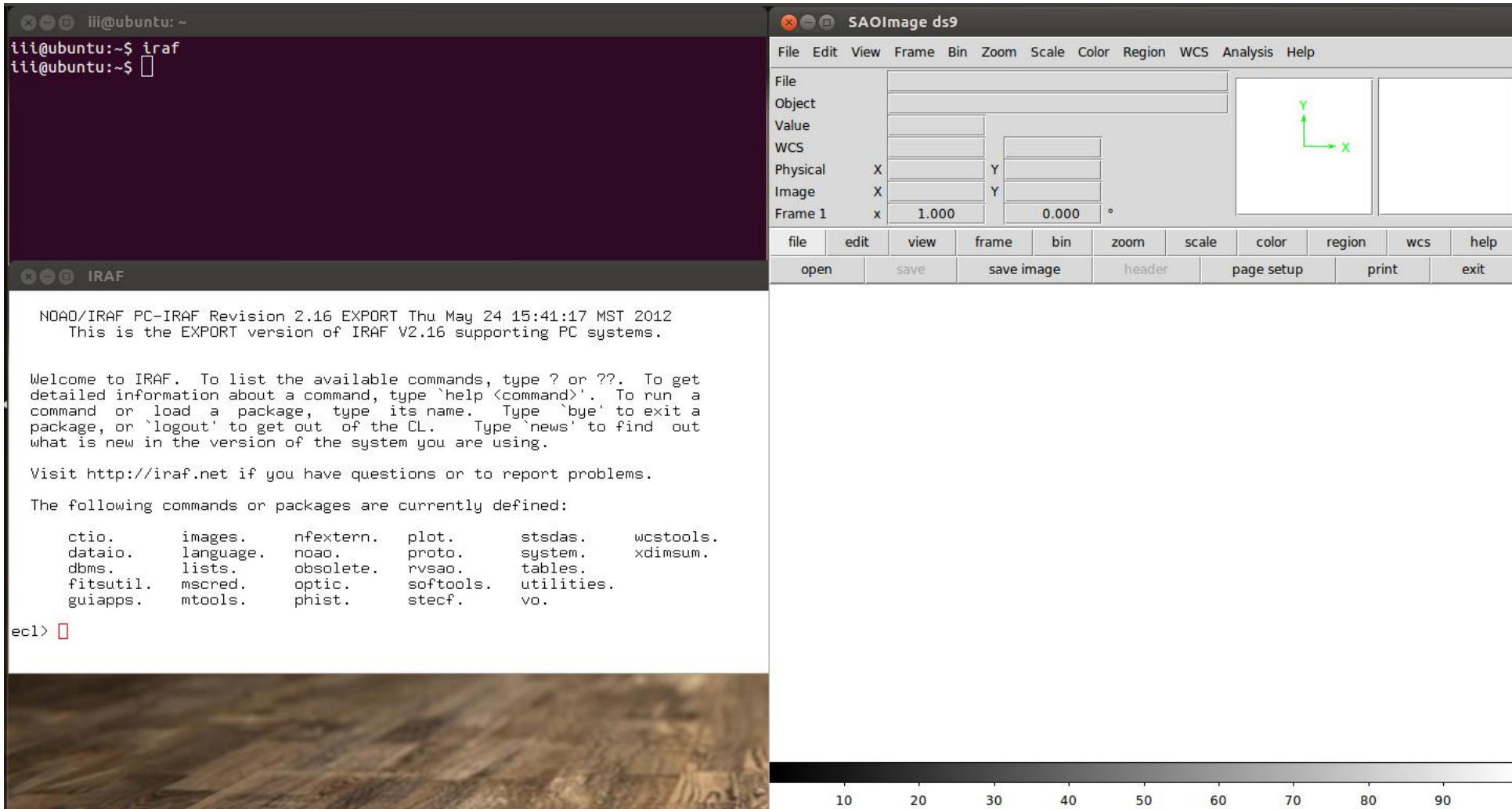
- Research Survey: Triple system



The O-C diagram of *BD And*, 2014ApJ...788..134K

- IRAF (Image Reduction and Analysis Facility)

A software for dealing with the astronomical images.



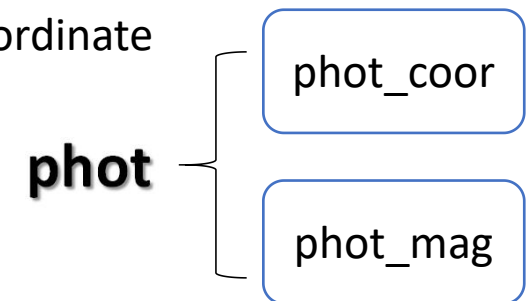
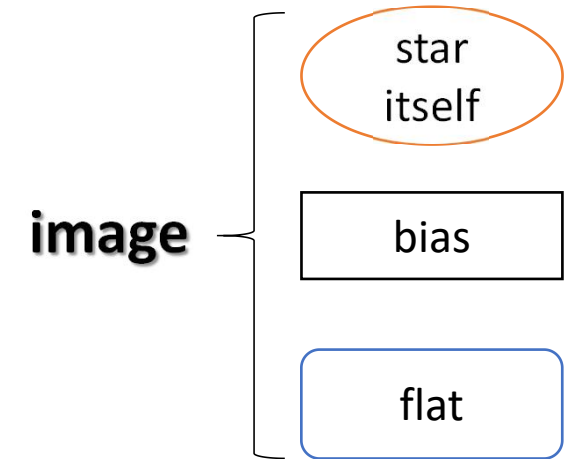
- ***A brief introduction to the photometry***

① Preprocess:

- 1、combine the bias, combine the flat
- 2、make a list for all *.fit files, then deduct the combined-bias and combined-flat from all target images

② Photometry:

- 3、open a image as the reference
- 4、photometry to derive the position, then extract the coordinate of this target
- 5、make a list for all pt_*.fit files, then extract the coordinate of all images
- 6、aligning all the images
- 7、open an aligned image as the reference, then photometry and extract the coordinate
- 8、photometry for all the images in the list
- 9、extract the photometric result



One step of displaying the image after deducting bias & flat and before photometry

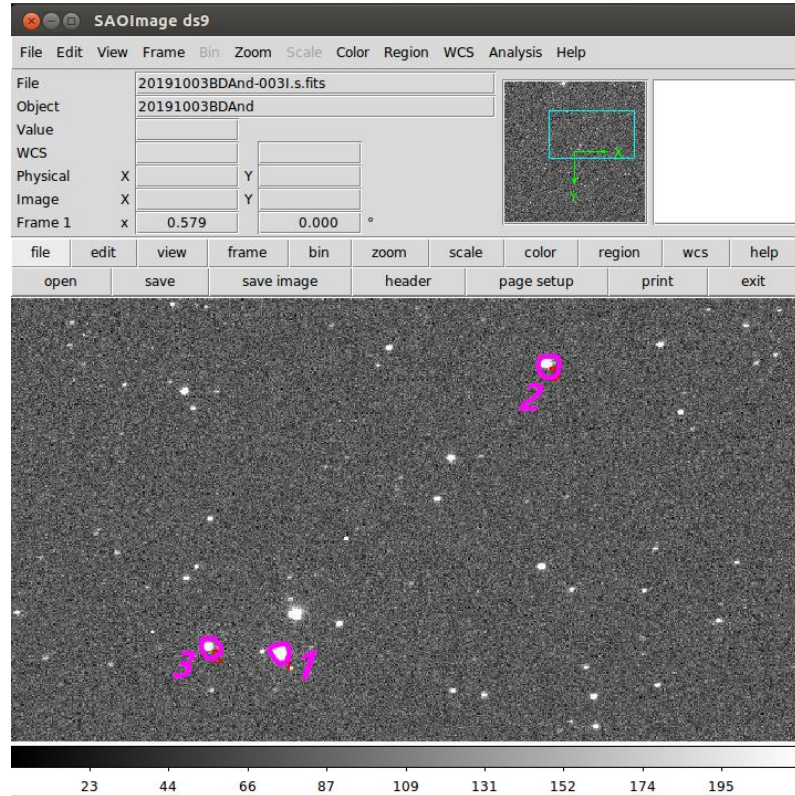
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20191003BDAnd-018I.fit 20191003BDAnd-048V.fit 20191003BDAnd-079R.fit
20191003BDAnd-018R.fit 20191003BDAnd-049I.fit 20191003BDAnd-079V.fit
20191003BDAnd-018V.fit 20191003BDAnd-049R.fit 20191003BDAnd-080I.fit
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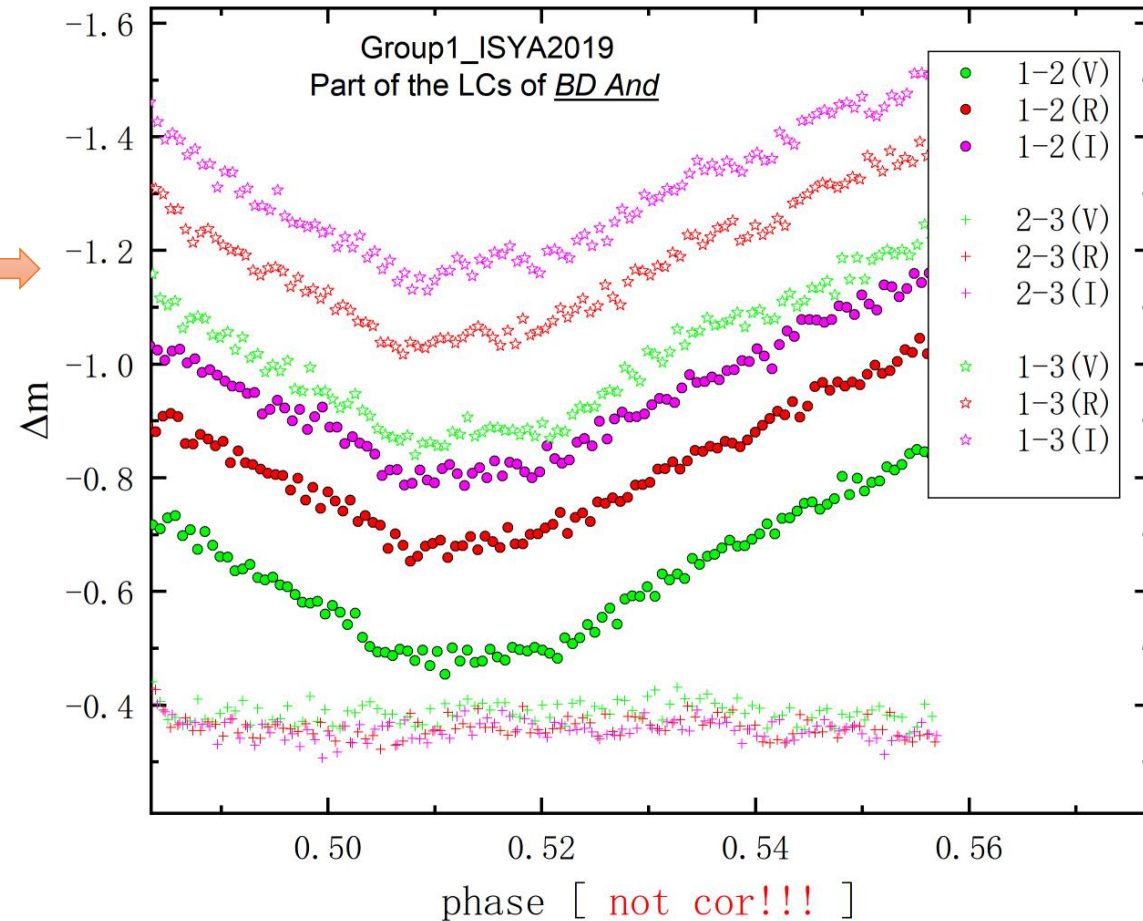
daophot> centerpars.maxshift = 2.5*fwhm
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daophot> fitskypars.annulus = 3*fwhm
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daophot> photpars.aperture = 1.5*fwhm
daophot> display(image='pt_20191003BDAnd-057R.fit',frame=1,fill=yes)
z1=51.62837 z2=104.6856
daophot>

```


- Part of the Light Curves of BD And



The target and comparison and check star

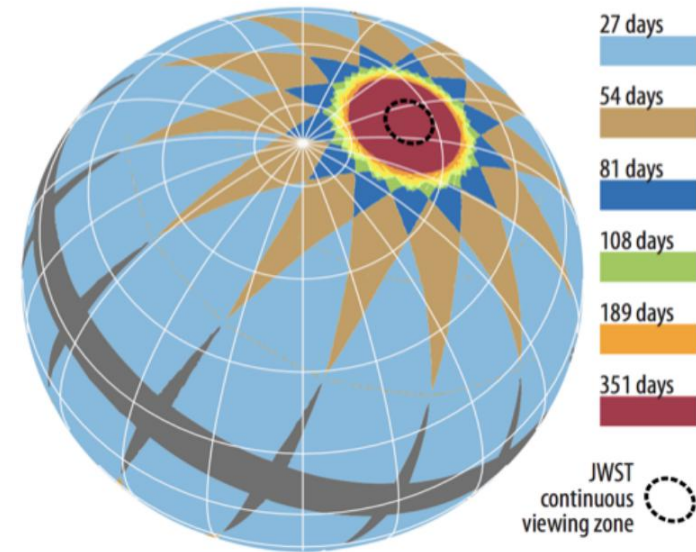


The LCs but phase is not correct due to the wrong eclipse minimum

- *New Observation by TESS & Future work*

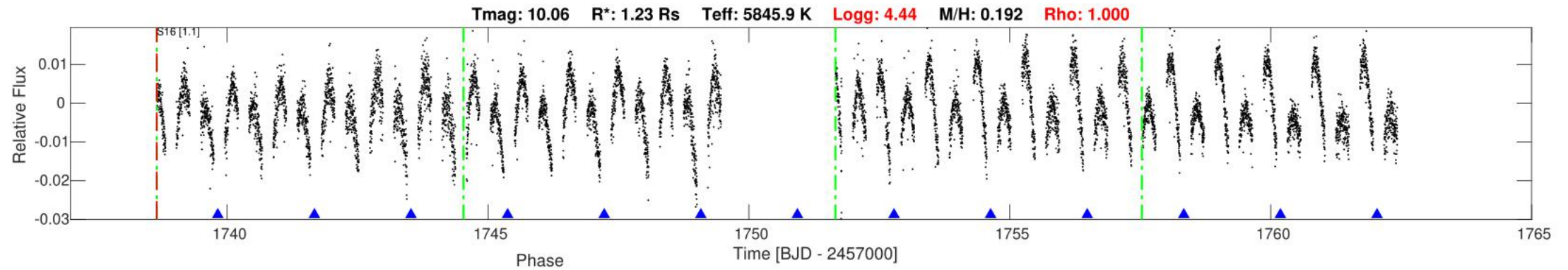


The TESS mission

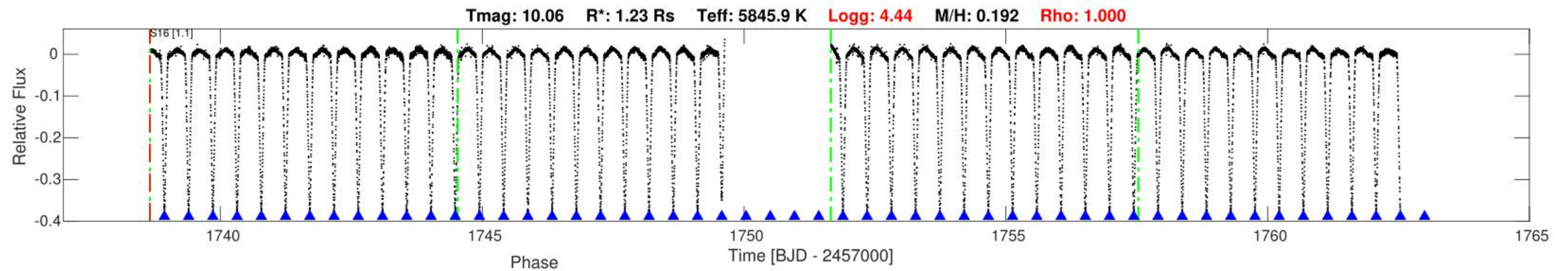


TESS observation

- *New Observation by TESS & Future work*

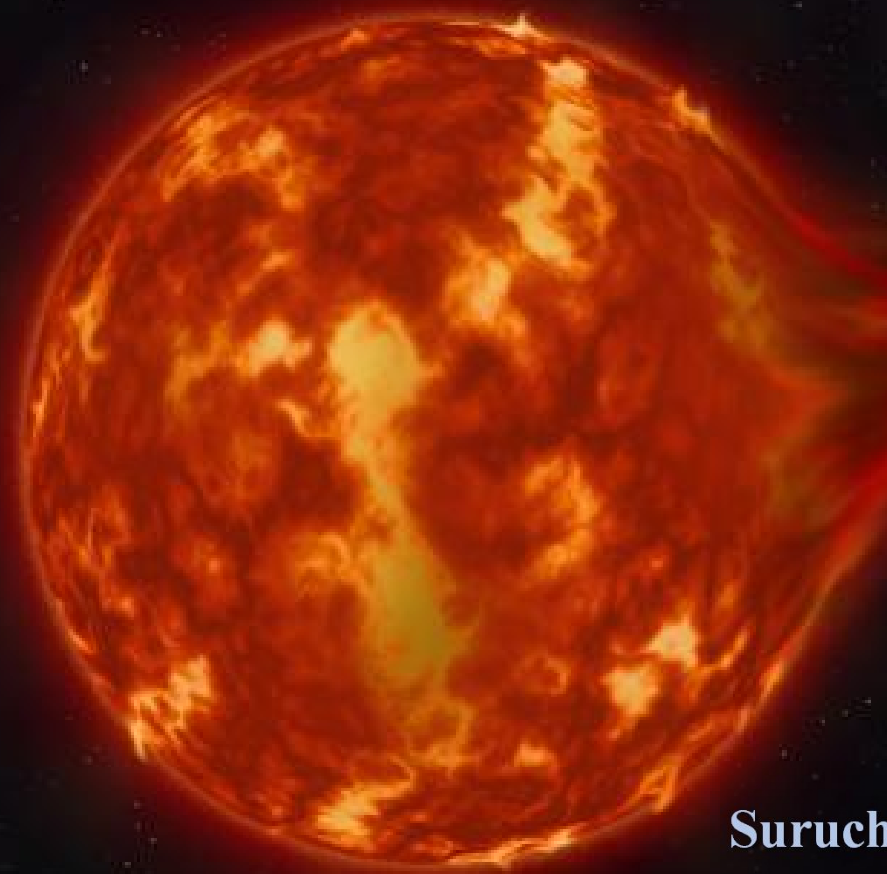


O' Connell effect of BD And



TESS light curves of BD And

For ISYA 2019, IAU



*Thanks for listening.
Much Appreciated !*

Suruchi Shahi, Guo Yani, Ahamed Estiak, Wang Zhihua

[Group One]