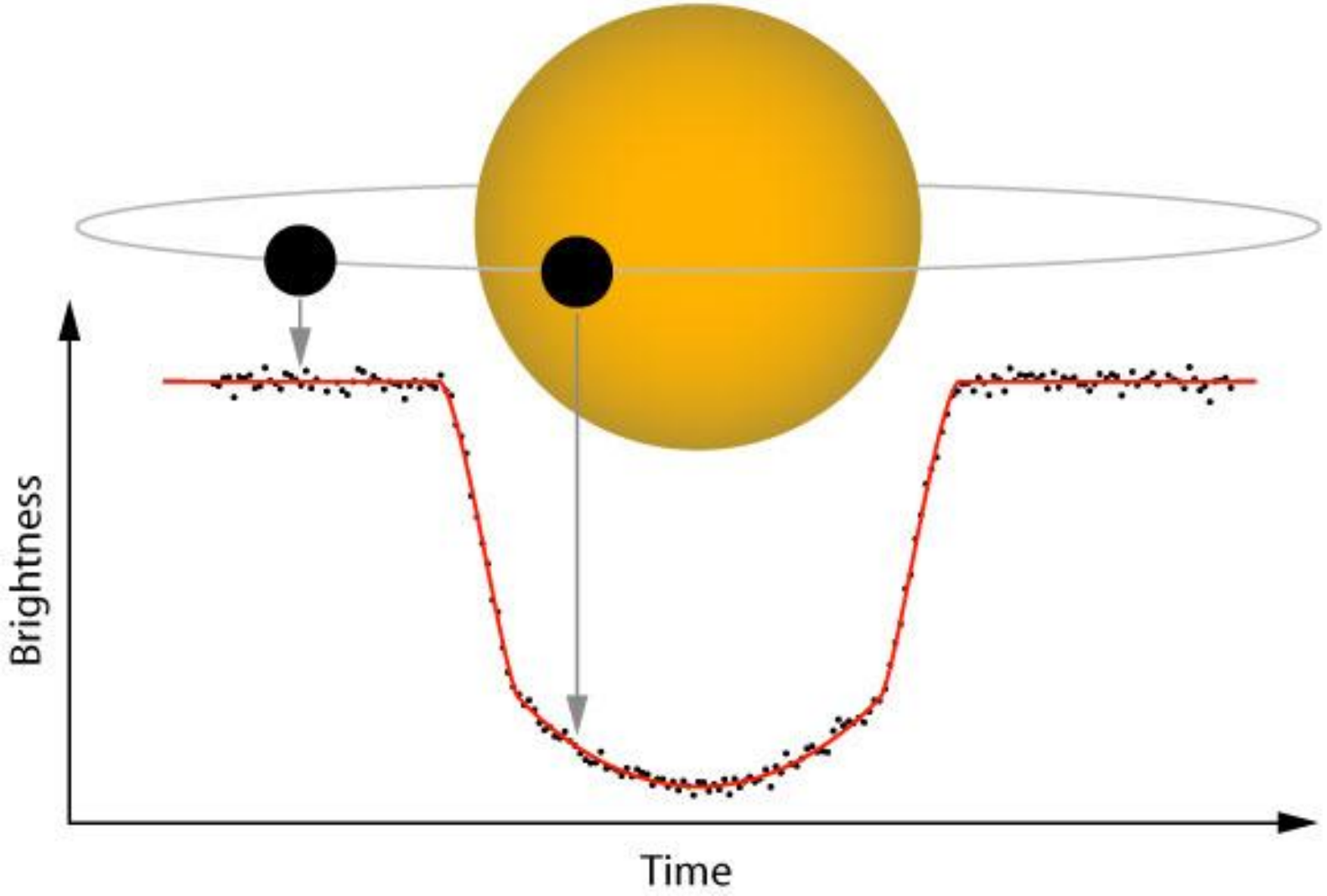
Observing Exoplanets

Haley Bates-Tarasewicz

Introduction



Exoplanet transit. Digital image. *Https://github.com/OSCAAR/OSCAAR/wiki/Introduction-to-Differential-Photometry*. N.p., 18 Feb. 2013. Web. 29 Sept. 2015.

Observational Plan

- All transit candidates will be observable from Wallace Observatory

Date	Name	Elevation (start, mid, end)	Time (start, mid, end)
10/5/2015	TrES-1 b	53°, 39°, 26°	22:01—23:16—00:31
10/12/2015	Kepler-447 b	64°, 59°, 53°	20:39—21:12—21:45
10/19/2015	TrES-3 b	49°, 41°, 34°	20:19—20:59—21:39
10/19/2015	HAT-P-23 b	46°, 34°, 22°	22:05—23:10—00:15
10/26/2015	TrES-2 b	41°, 33°, 25°	22:18—23:12—00:06
10/26/2015	WASP-33 b	69°, 83°, 78°	23:08—0:28—01:48

Table 1: Observational Circumstances for Exoplanets Observable from Wallace Astrophysical Observatory in September and October

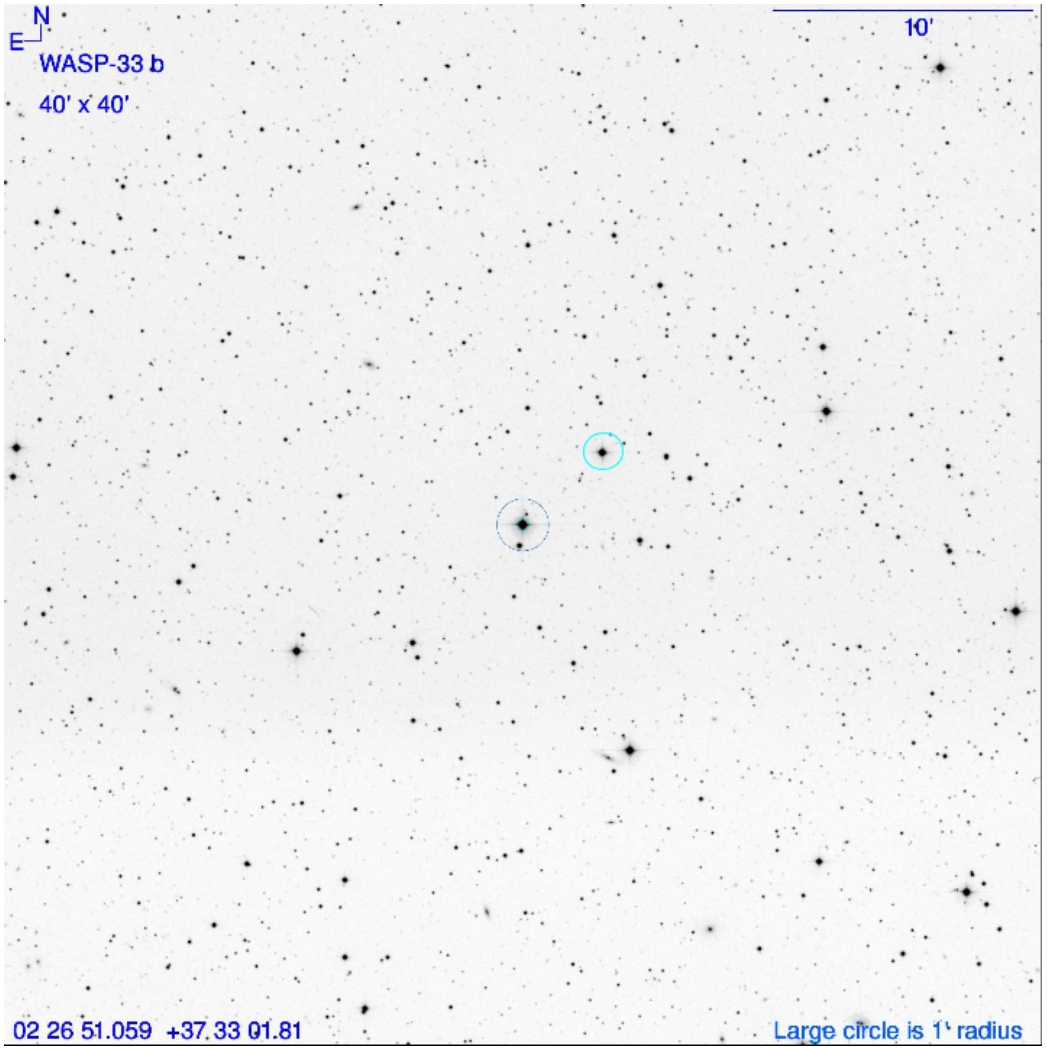
Observational Plan

- All transit candidates observable with 16’’ telescope
- SBIG STL-1001e
- 20s-45s exposures

Date	Name	Apparent Magnitude (R)	Depth of Transit (milimags)
10/5/2015	TrES-1 b	11.2	19.8
10/12/2015	Kepler-447 b	12.6	29.1
10/19/2015	TrES-3 b	12.1	29.3
10/19/2015	HAT-P-23 b	11.94	14.7
10/26/2015	TrES-2 b	11.2	16.9
10/26/2015	WASP-33 b	7.7	12.3

Table 2: Magnitude Specification for Exoplanet Transits Observable from Wallace Astrophysical Observatory in October

Observational Plan



WASP-33 B Finder Chart. Digital image. *Swarthmore Annotated Finding Charts*. N.p., n.d. Web. 29 Feb. 2015.

Transit Candidate	Magnitude of Comparison Star (R)
TrES-1 b	7.5
TrES-2 b	10.8
TrES-3 b	11.7
HAT-P-23 b	8.2
WASP-33 b	9
Kepler-447 b	12

Table 3: Comparison Star Specification for Transit Star Fields

Observational Plan

1. Focus on a bright star
2. Sync the telescope on a bright star
3. Slew to target 1 and star hop using finder charts
4. Observe target 1
5. Slew to target 2 and star hop using finder charts
6. Observe target 2
7. Take 10 dark images
8. Take 10 bias images

Calibrations and Analysis

- Analysis done in AstroImageJ and MATLAB
- Dark, bias, and flat reduction

Analysis Procedure

1. Reduce and calibrate images
2. Convert relative flux into magnitude using MATLAB
3. Plot magnitude vs time
4. Locate transit dip
5. Measure dip and time to full transit
6. Make calculations