

The Role of Amateur Astronomers in Exoplanet Research

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Overview

- What roles do amateur astronomers play in exoplanet research?
- How do we do exoplanet observations?
- What does the future hold?

(See paper in the SAS Proceedings for details on background, best practices, techniques, etc.)

The Night Sky

Q: Which stars host one or more planets?

A: Most of them!



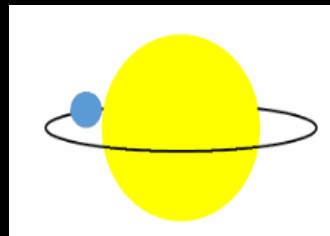
Roles of Amateur Astronomers

1. Confirm Exoplanet Candidates

CONFIRMED

2. Refine Exoplanet Ephemeris

3. Discover

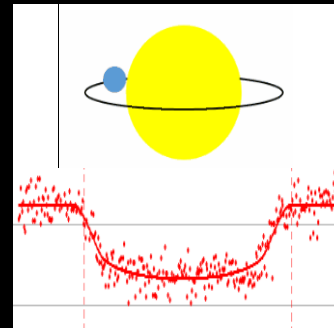


New!

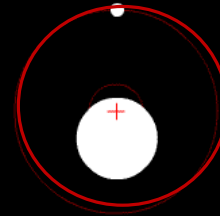
4. Help characterize other “Exo-Objects”

Exoplanet Detection Methods

- Transit Method:
 - the dominant method used by amateur astronomers



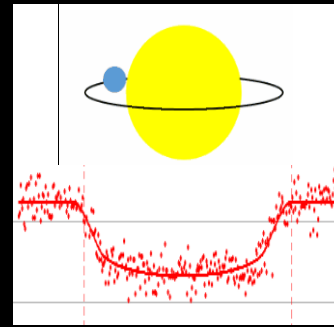
- Radial Velocity Method
- Microlensing



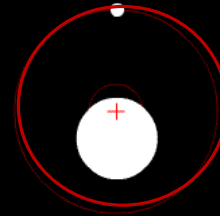
- Direct Imaging

Exoplanet Detection Methods

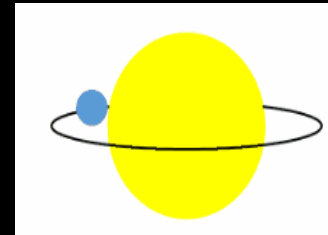
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- Radial Velocity Method



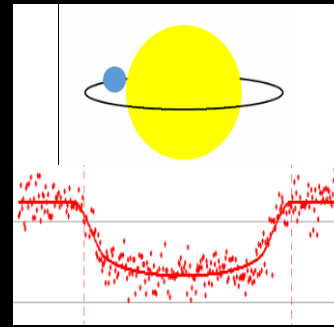
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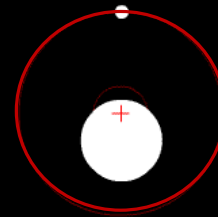
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Exoplanet Detection Methods

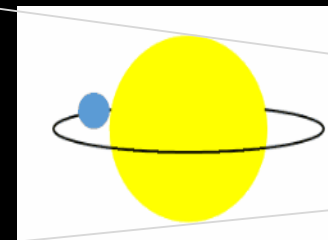
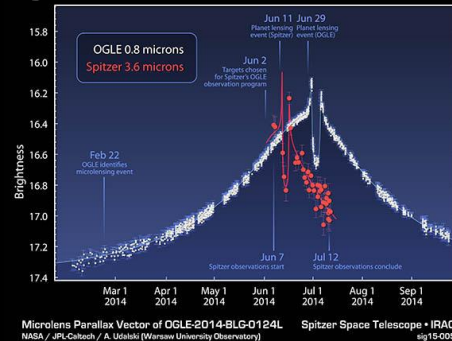
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- Radial Velocity Method



- Microlensing



- Direct Imaging

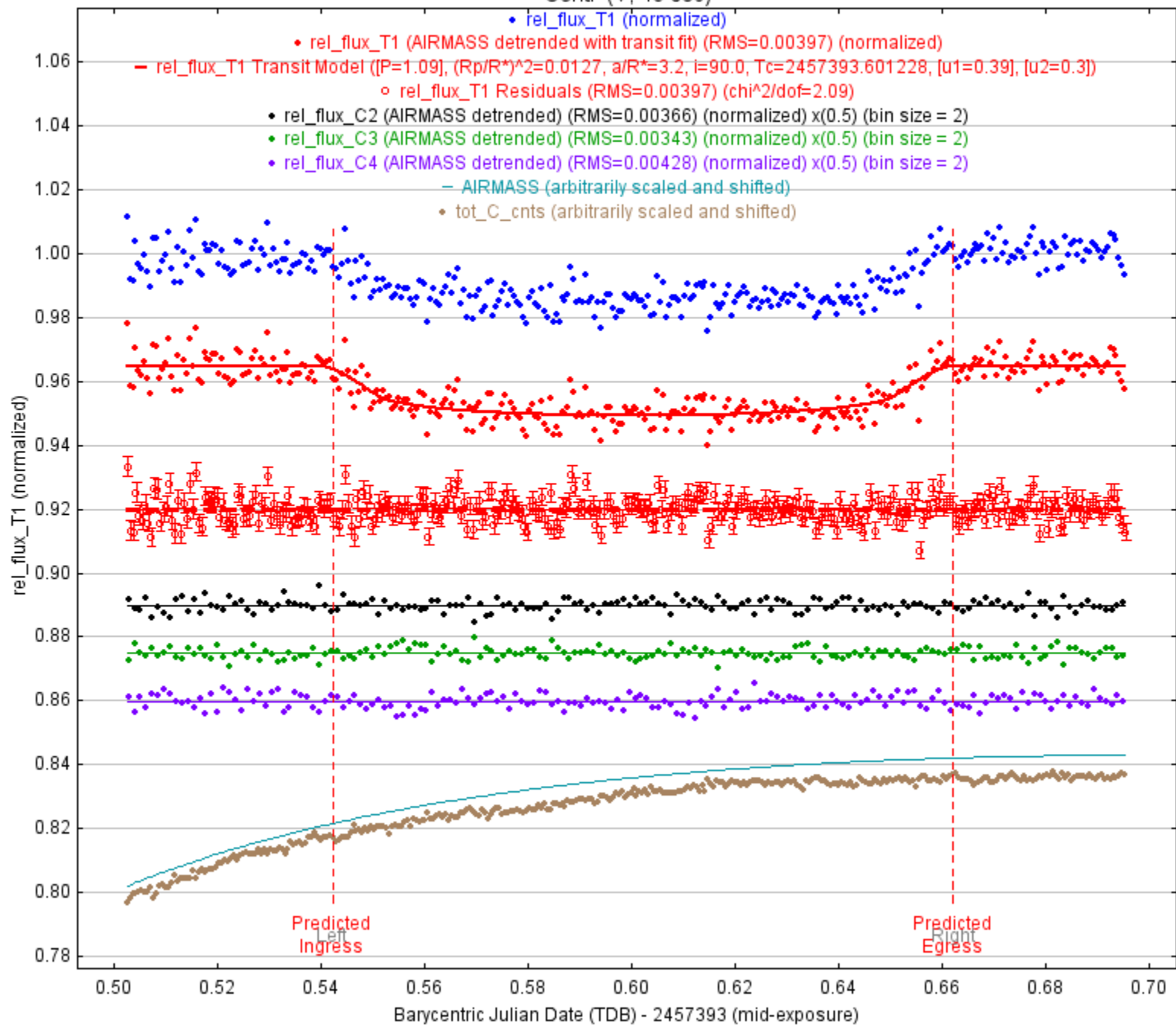
Examples of Pro/Am Collaborations

- KELT Follow-up Network
- Hubble Near-Infrared Study of 15 Exoplanet Atmospheres
- Study of WD1145+017

Sample Observations

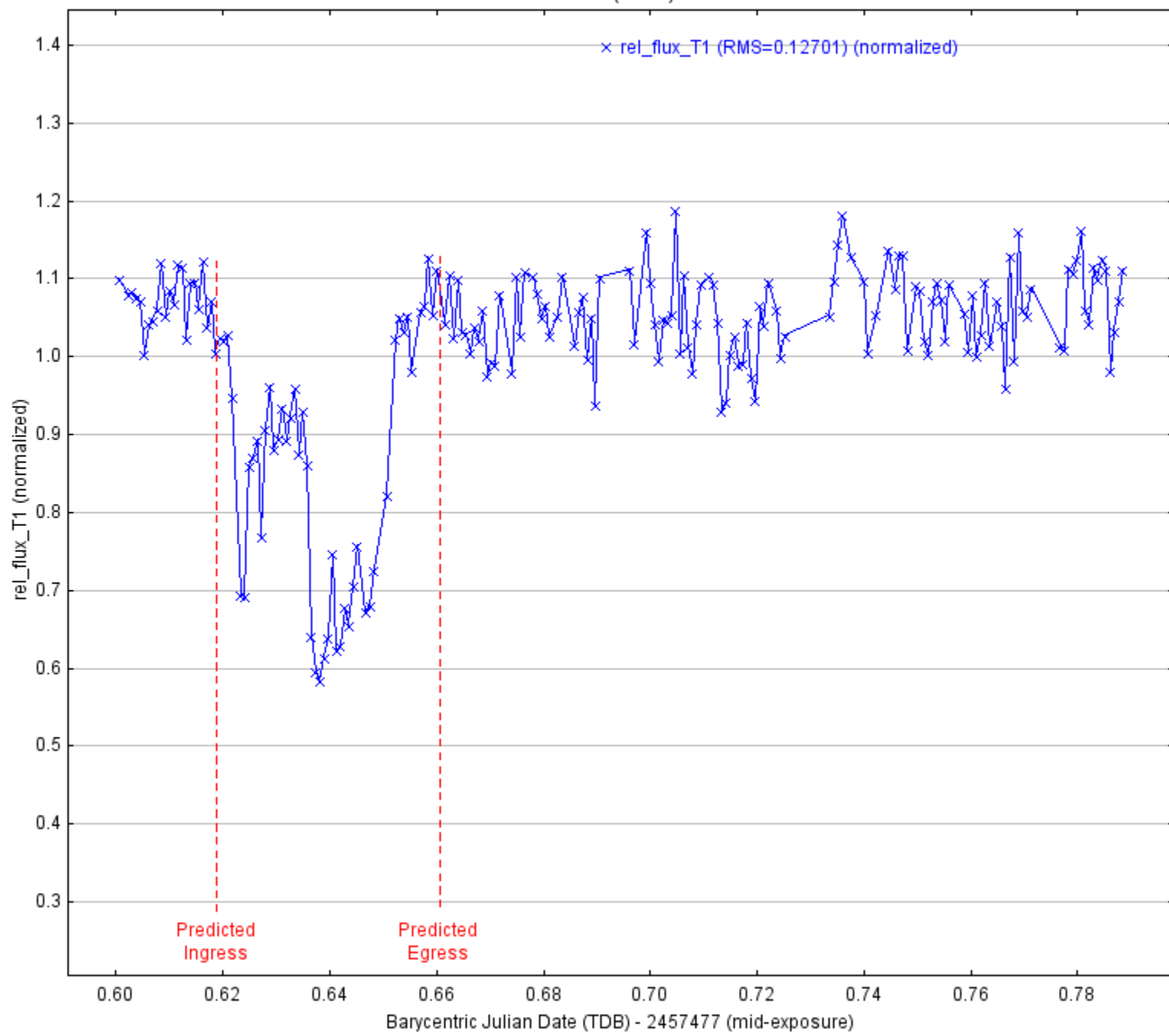
WASP-12b on UT2016-01-06

Conti (V, 45 sec)

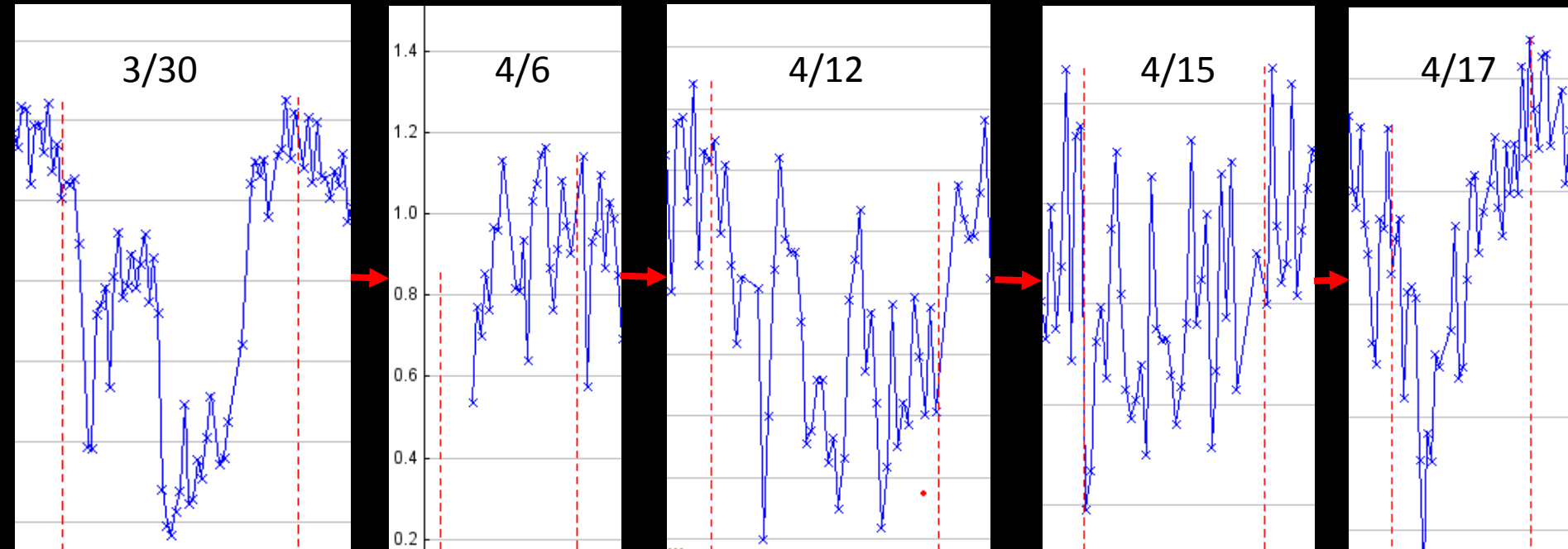


WD1145 UT2016-03-30

MarioMotta (clear)-60sec



WD-1145+017 Observations



Courtesy of Mario Motta

Observational Considerations

- Use virtually the same equipment as for deep sky imaging

However:

- Need accurate timing
- Want minimal image movement on the CCD detector
- Need to stay within the linearity of the CCD detector
- Need FWHM to span multiple pixels

The Future

Exoplanet Missions



Courtesy NASA

Summary

- Amateur astronomers are able to conduct exoplanet transit observations with amazing accuracy
- Their contribution to exoplanet research continues to be of value to professional astronomers
- The need for such observations in the near future will continue to grow
- Amateur astronomers' contribution to exoplanet research beyond just the transit method is promising

Resources

- www.aavso.org/exoplanet-section
- www.astrodennis.com
 - “A Practical Guide to Exoplanet Observing”
 - Worksheets
 - Other presentations, tutorials