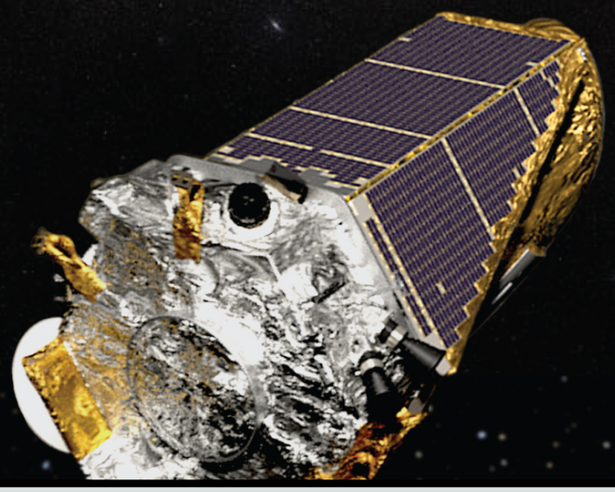
Chasing K2 Exoplanets with Ground-Based Near-Infrared Transit Photometry*

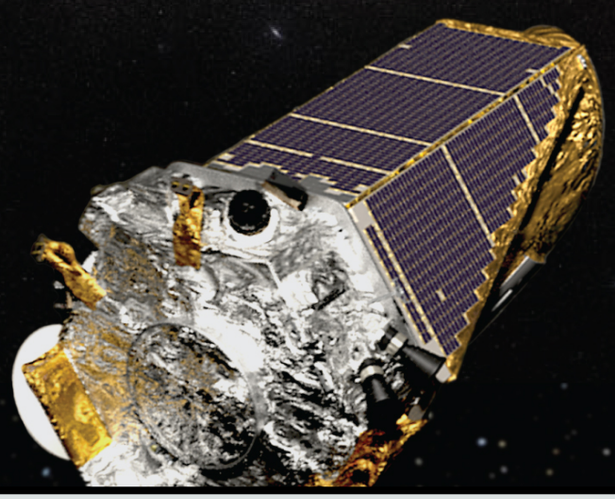


Knicole Colón (NASA GSFC)
Know Thy Star — 2017 October 12

***NASA-NSF Exoplanet Observational Research Program (NN-EXPLORE)**

Chasing K2 Exoplanets with Ground-Based Near-Infrared Transit Photometry*

Thank You!
Geert Barentsen, Ze Vinicius
Andrew Vanderburg

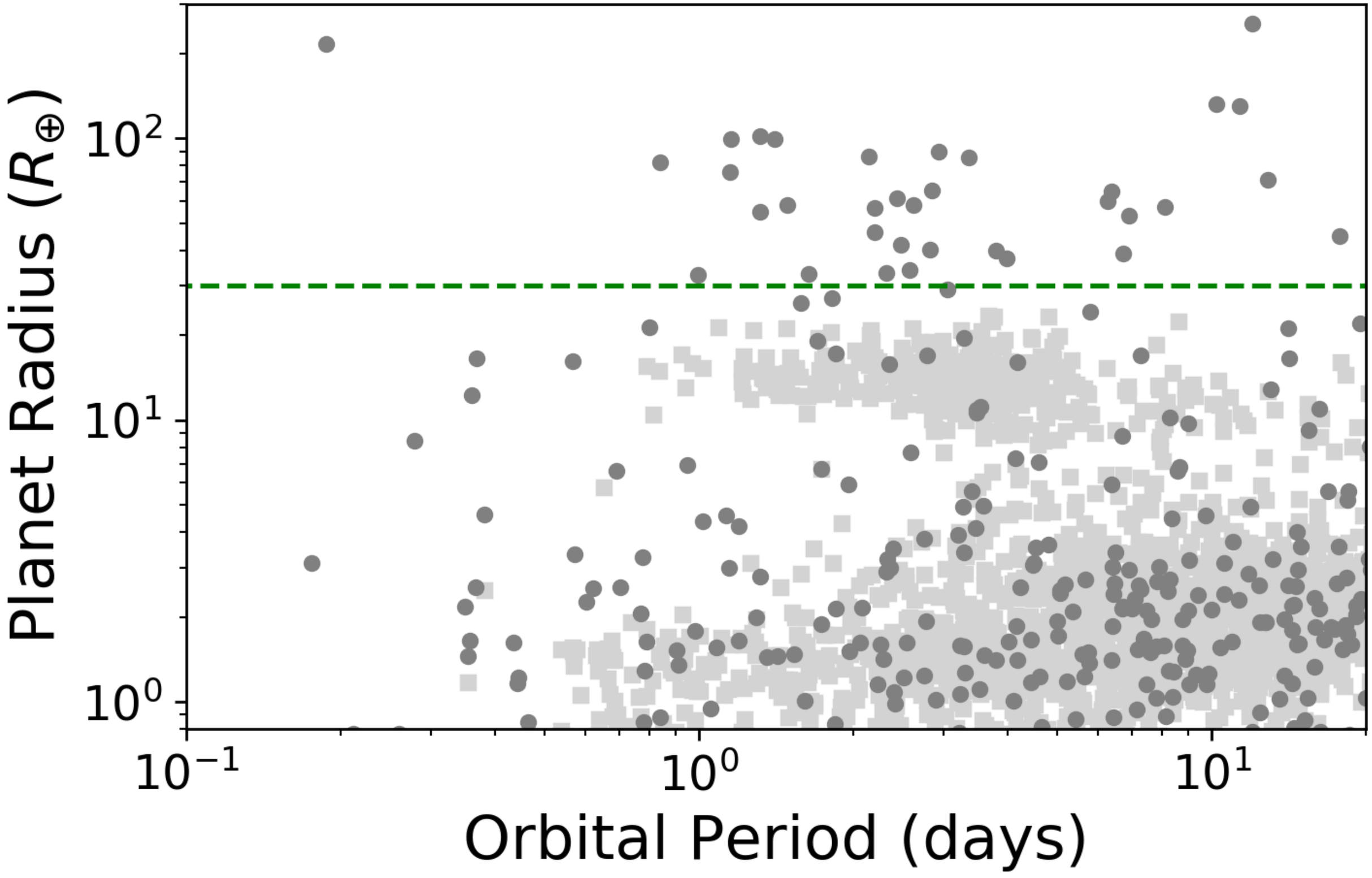


Knicole Colón (NASA GSFC)
Know Thy Star — 2017 October 12

***NASA-NSF Exoplanet Observational Research Program (NN-EXPLORE)**

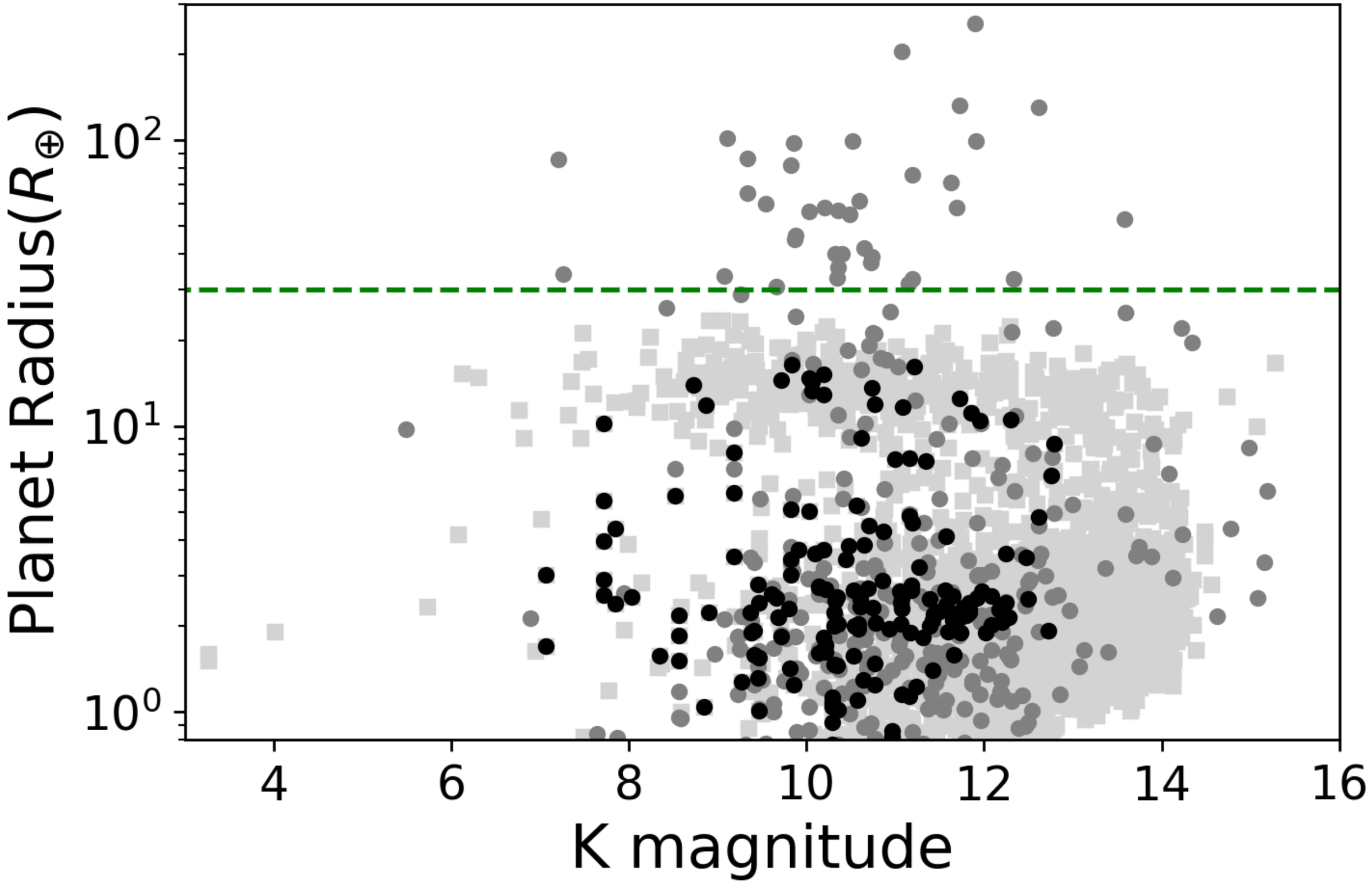
Transiting Exoplanet Discoveries

NASA Exoplanet Archive



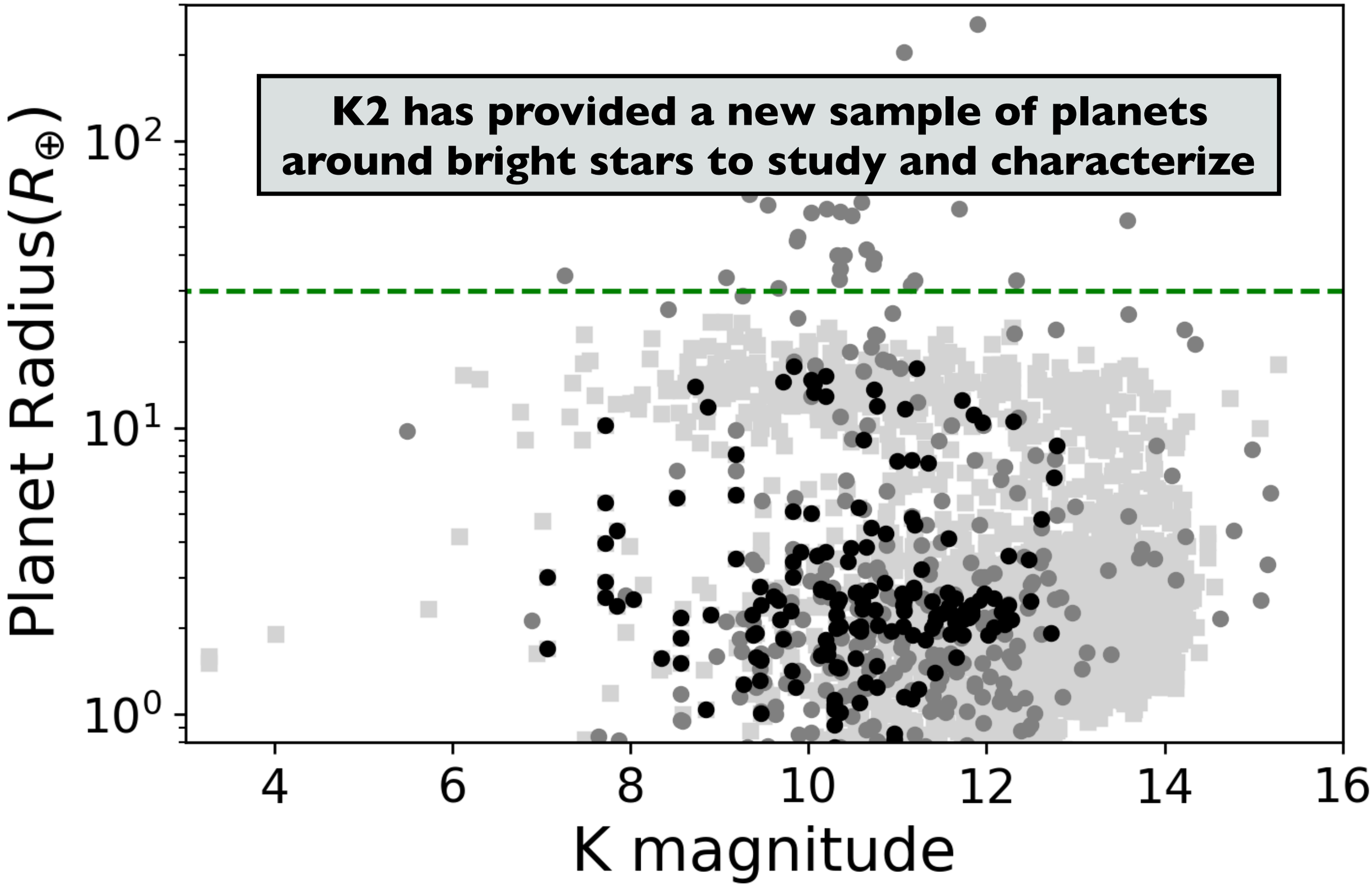
Transiting Exoplanet Discoveries

NASA Exoplanet Archive



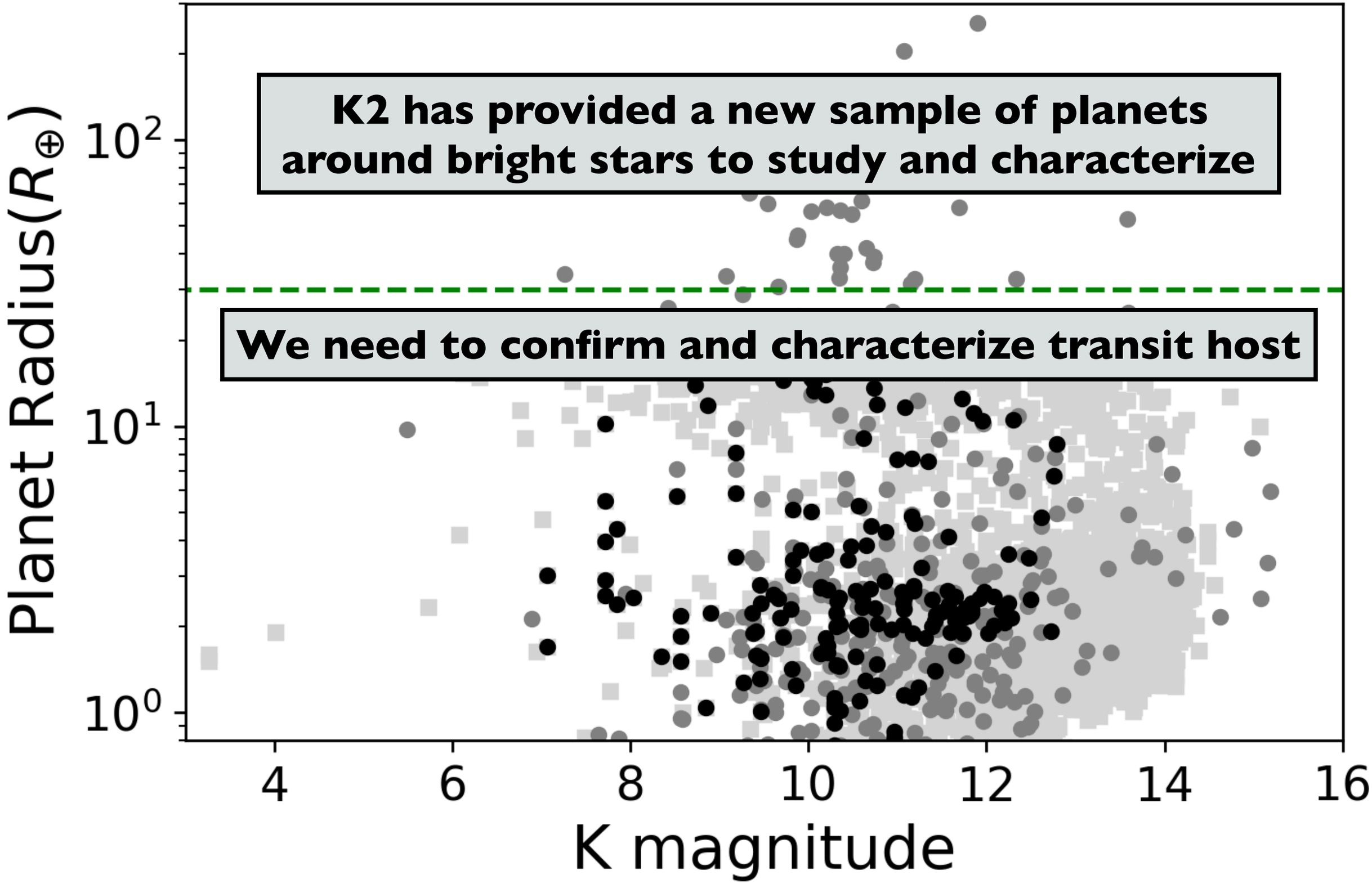
Transiting Exoplanet Discoveries

NASA Exoplanet Archive



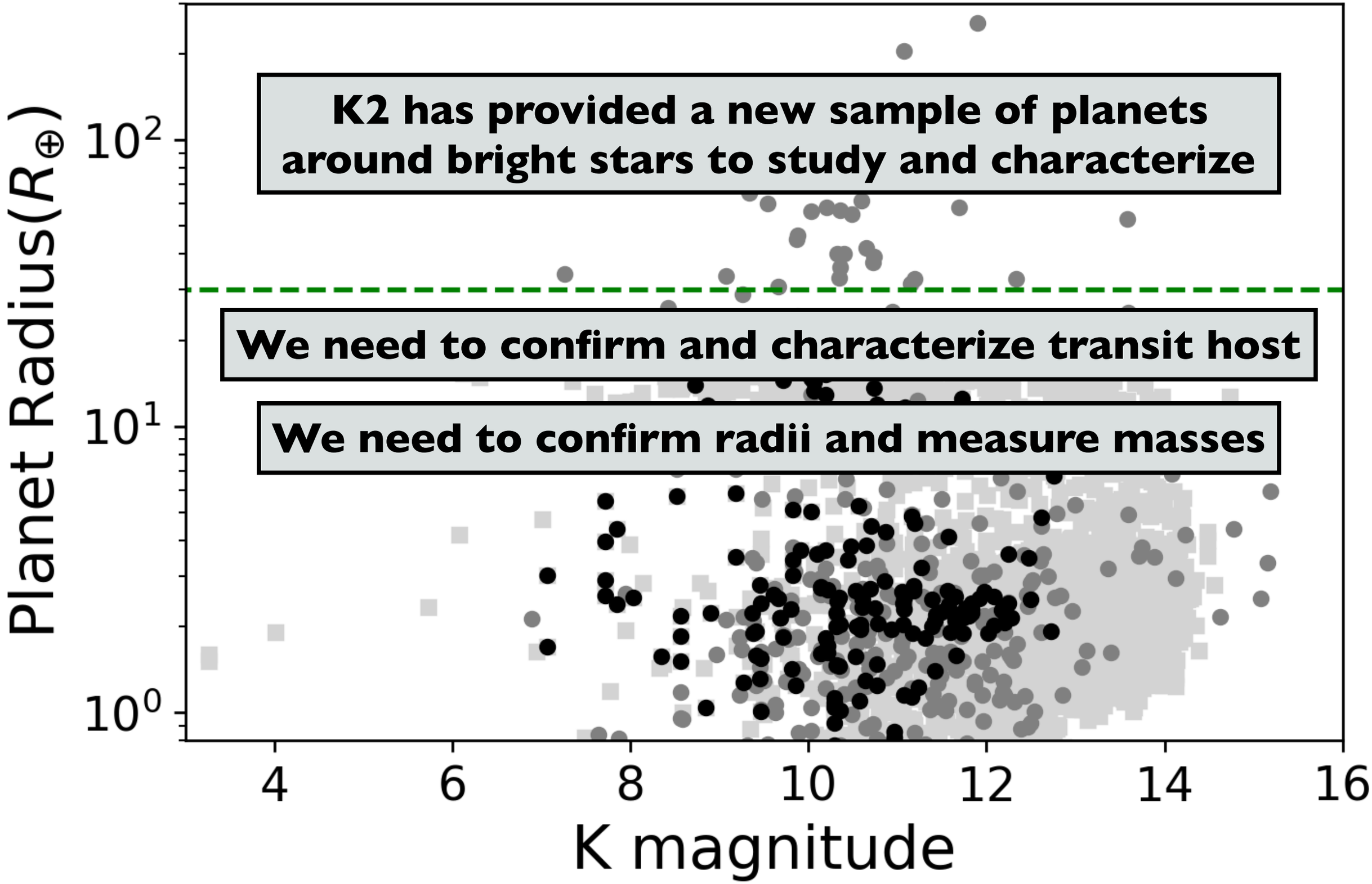
Transiting Exoplanet Discoveries

NASA Exoplanet Archive



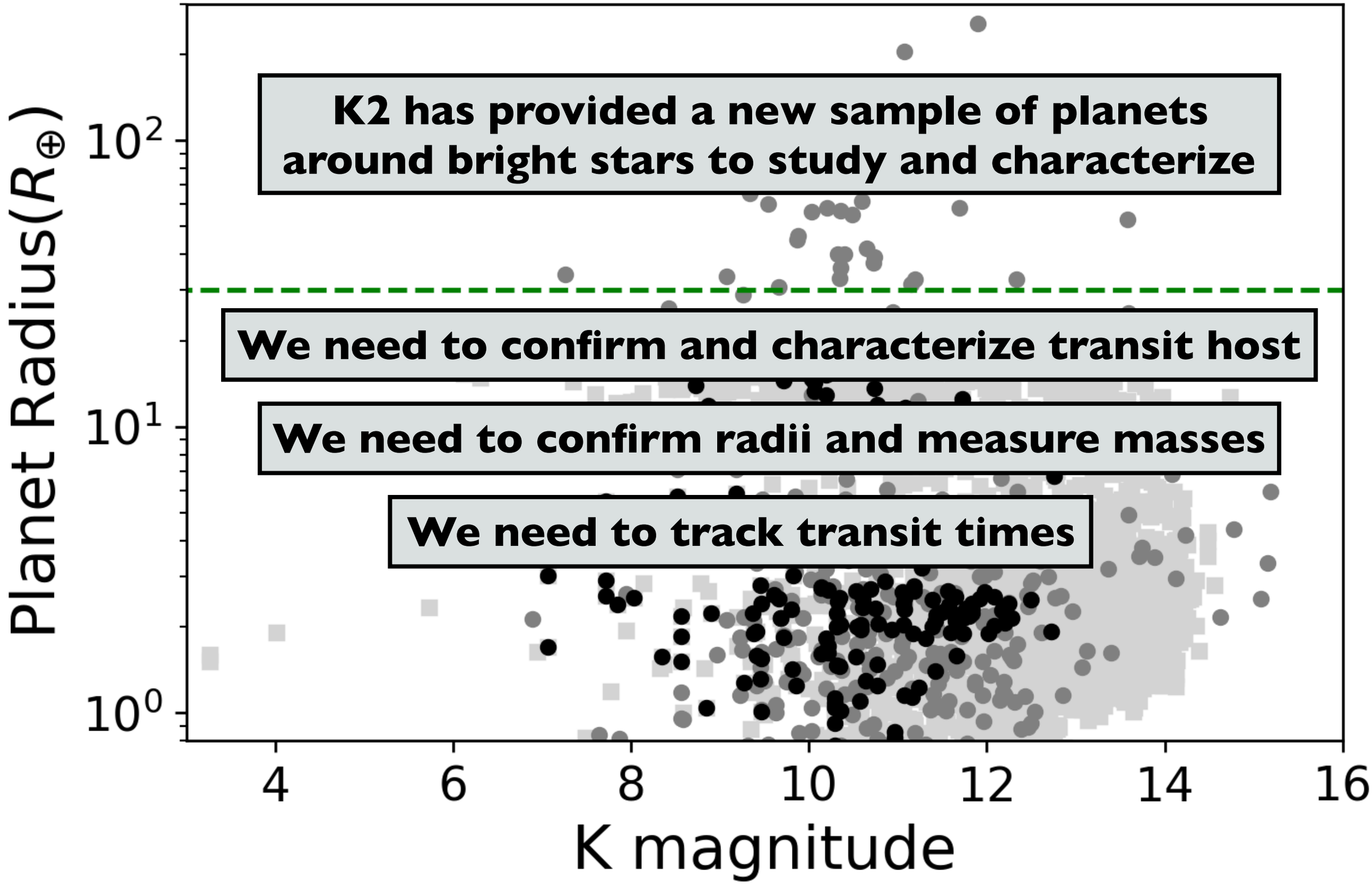
Transiting Exoplanet Discoveries

NASA Exoplanet Archive



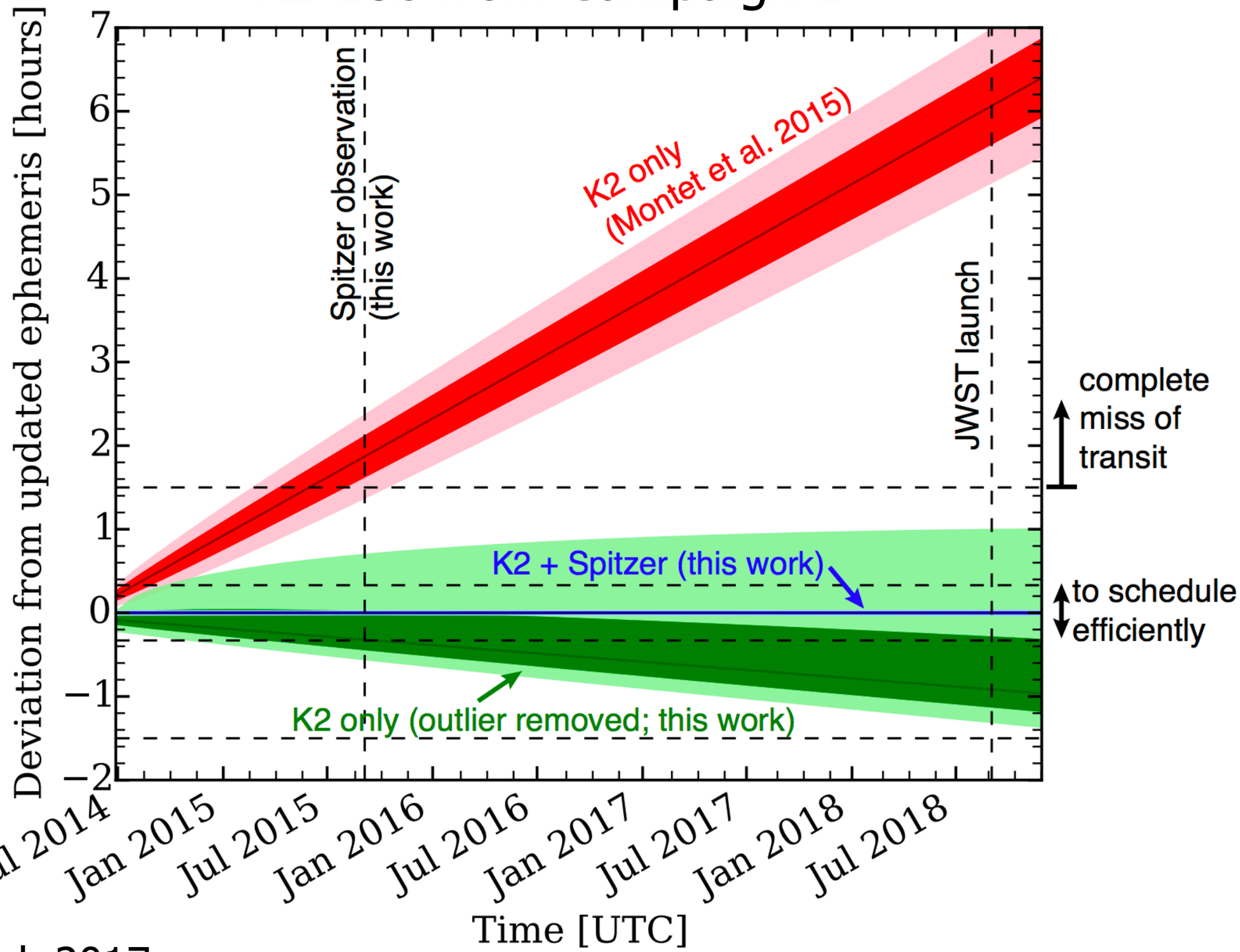
Transiting Exoplanet Discoveries

NASA Exoplanet Archive



Tracking Transit Times

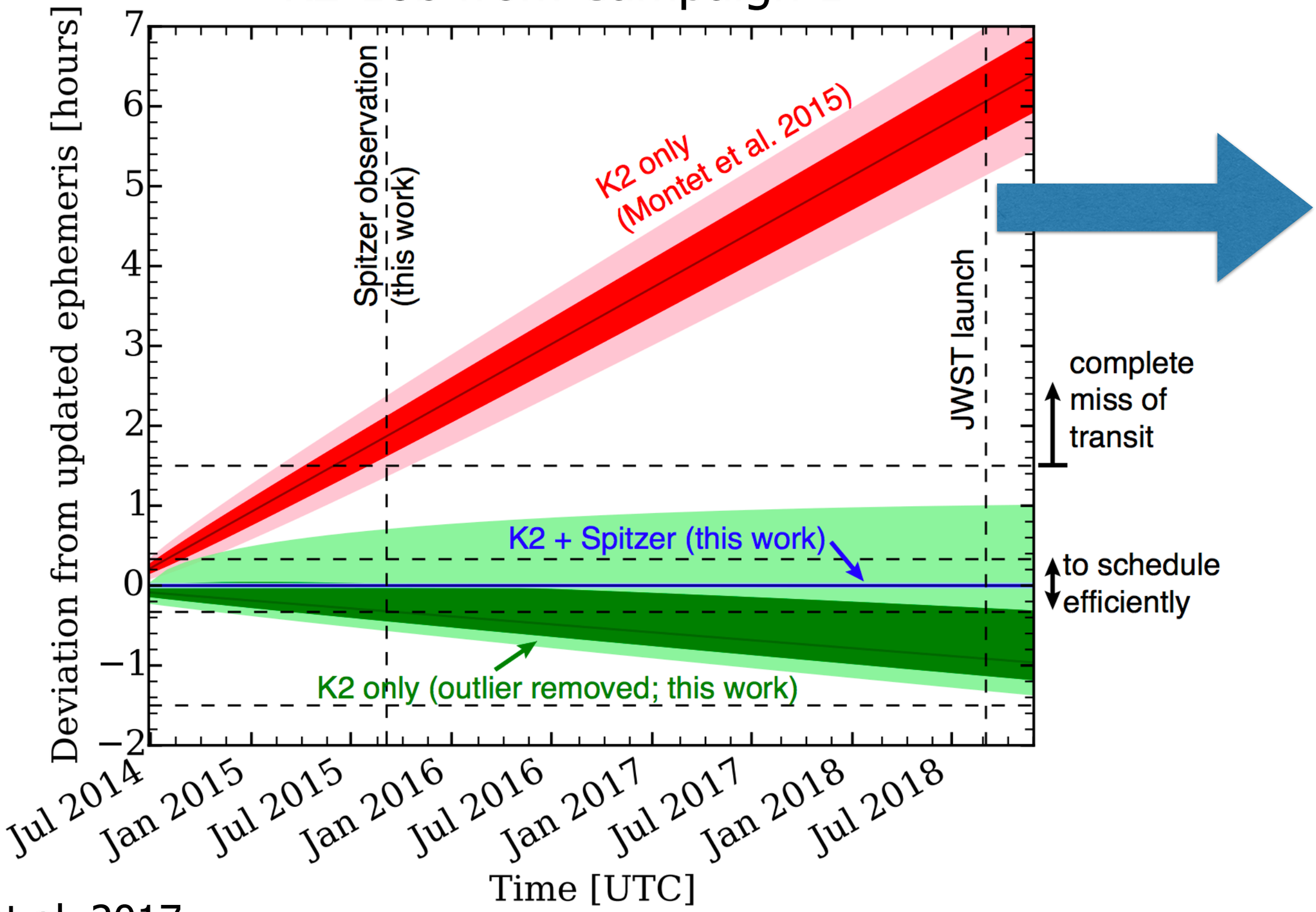
K2-18b from Campaign 1



Benneke et al. 2017

Tracking Transit Times

K2-18b from Campaign 1



Benneke et al. 2017

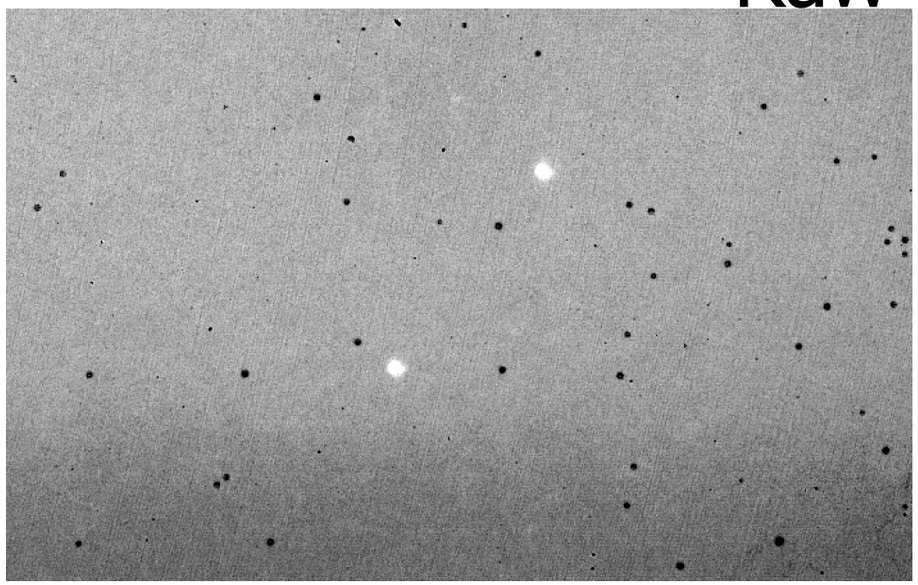
WIYN + WHIRC

- WIYN: Wisconsin-Indiana-Yale-NOAO 3.5-meter telescope located at Kitt Peak
- WHIRC: WIYN High-Resolution Infrared Camera
- 0.9 - 2.5 μm wavelength coverage
- 3 x 3 arcmin field of view
- 0.1 arcsec pixel scale

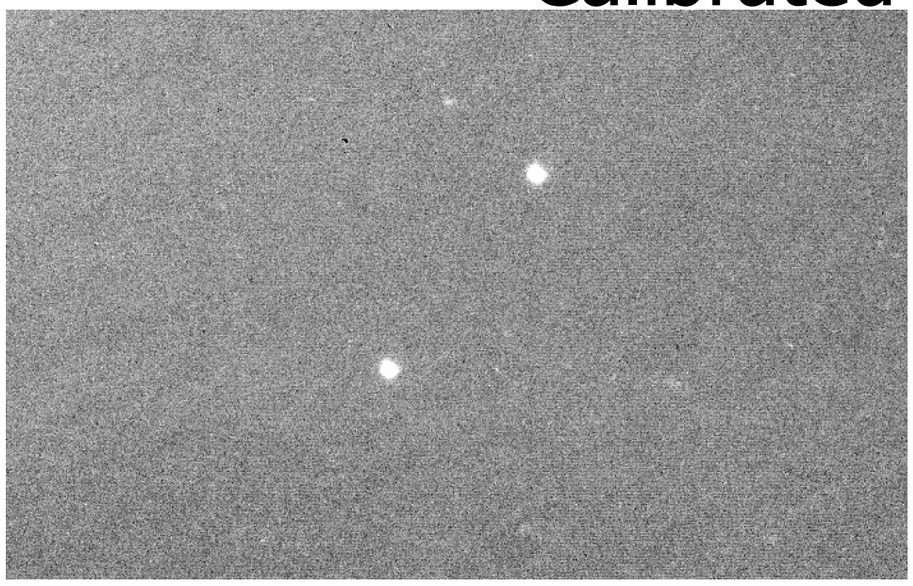
Observing Program

- Awarded 24 nights (2016-2018)
- Observed 25 K2 planets and candidates over 18 nights in either J or Ks bands
- Planets and candidates are located in K2 Campaigns 0 to 10

Raw



Calibrated

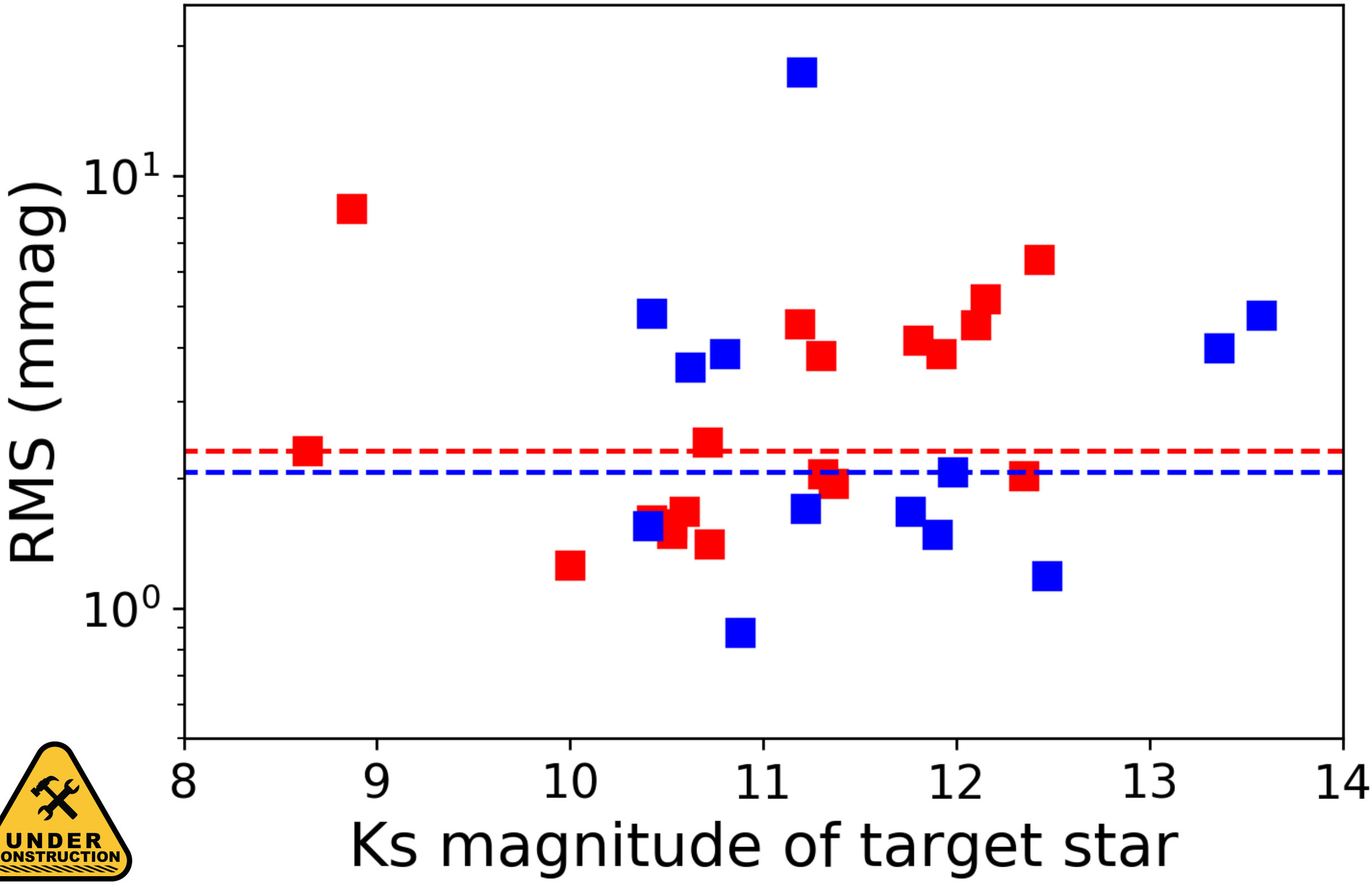


*K*now Thy Star, *K*now Thy Planet

*K*now Thy Star, *K*now Thy Planet

PI: *K*nicole Colón

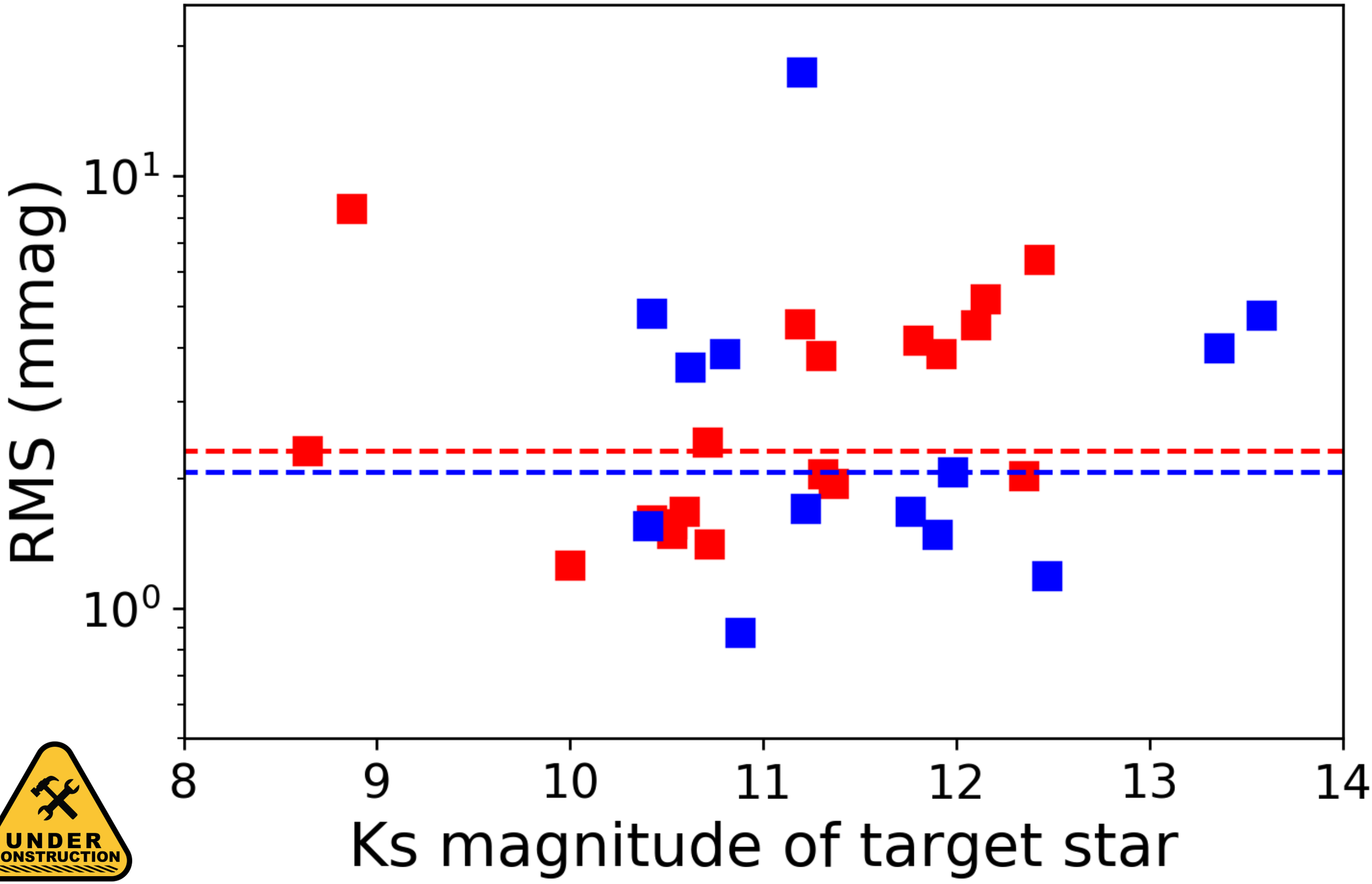
KNITS:
The K2 Near-Infrared Transit Survey



UNDER CONSTRUCTION

Median J-band RMS = 2.1 mmag

KNITS:
The K2 Near-Infrared Transit Survey

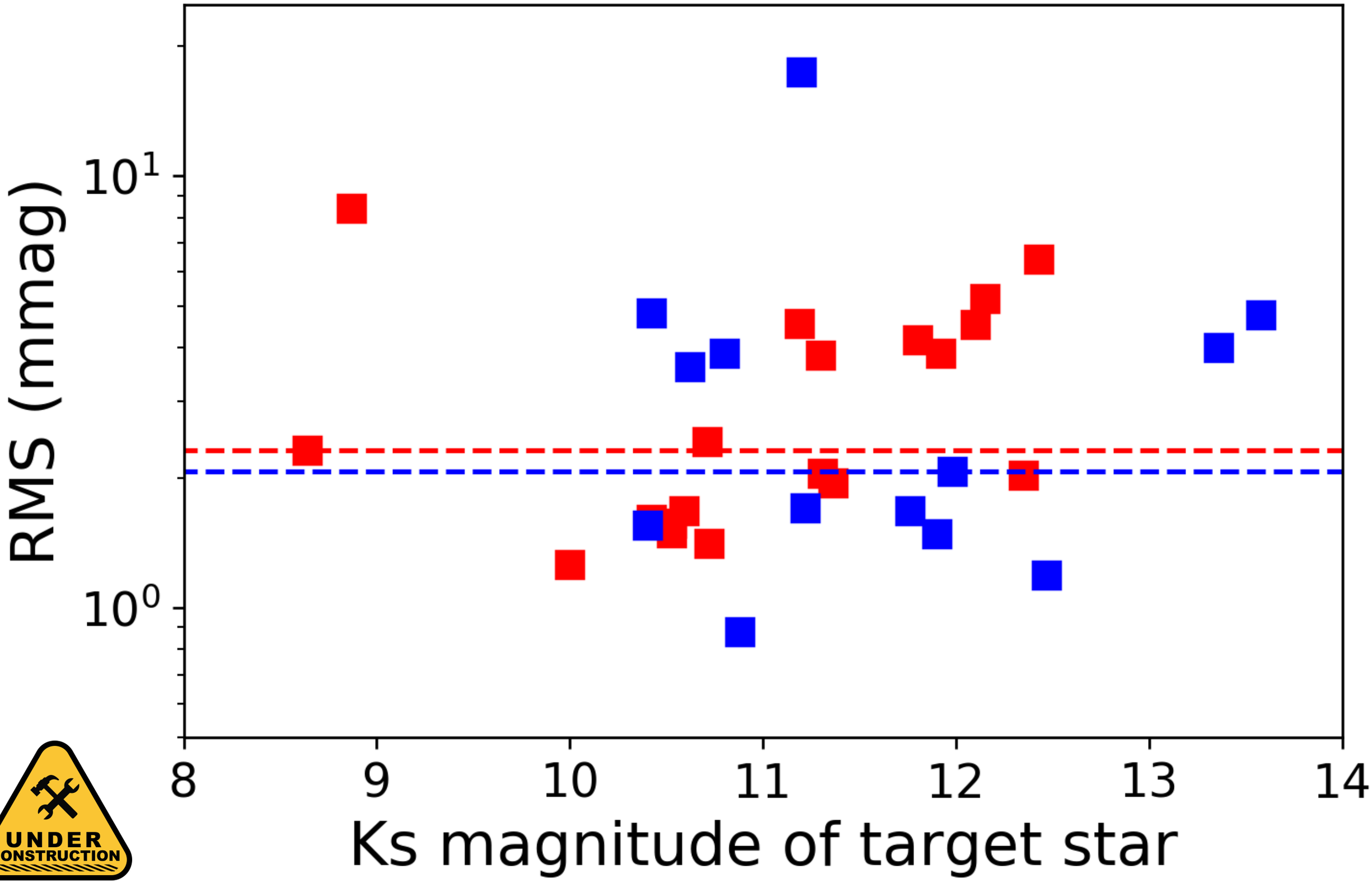


UNDER CONSTRUCTION

Median J-band RMS = 2.1 mmag

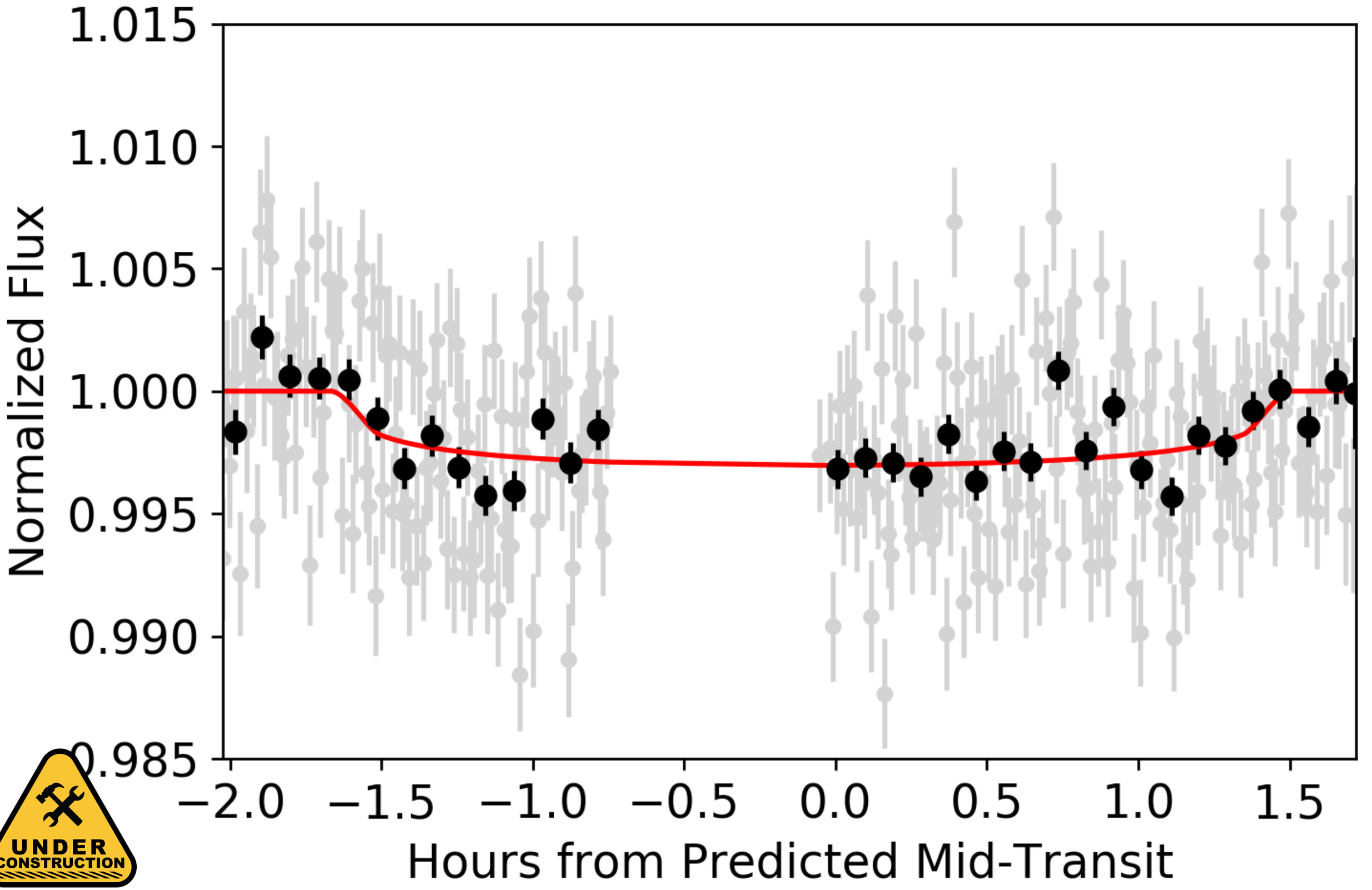
Median Ks-band RMS = 2.3 mmag

KNITS:
The K2 Near-Infrared Transit Survey



UNDER CONSTRUCTION

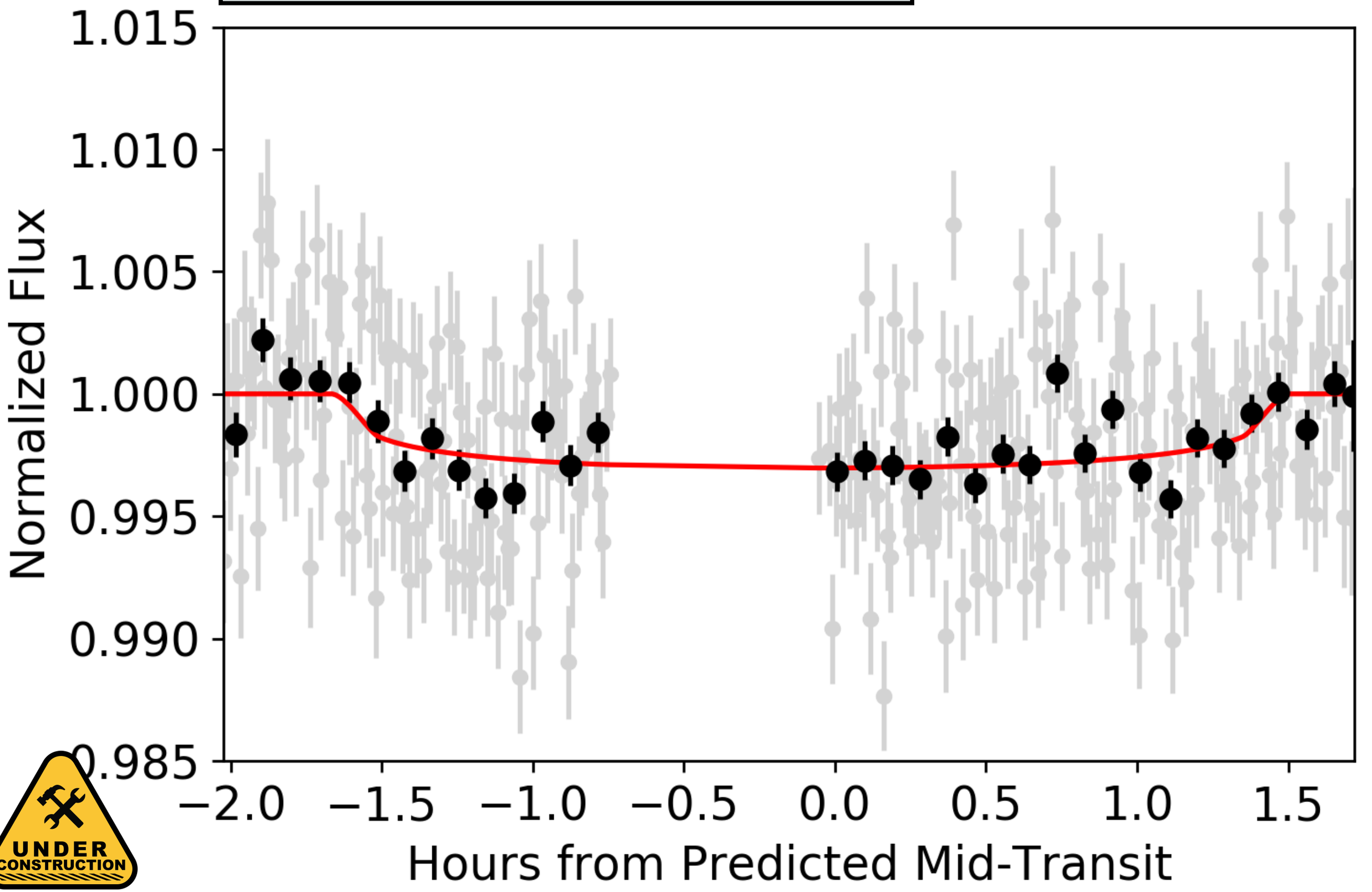
KNITS:
The K2 Near-Infrared
Transit Survey



UNDER CONSTRUCTION

KNITS:
The K2 Near-Infrared
Transit Survey

Kepler-252c in J-band



K2-WIYN Gallery

KNITS:
The K2 Near-Infrared Transit Survey

K2-WIYN Gallery

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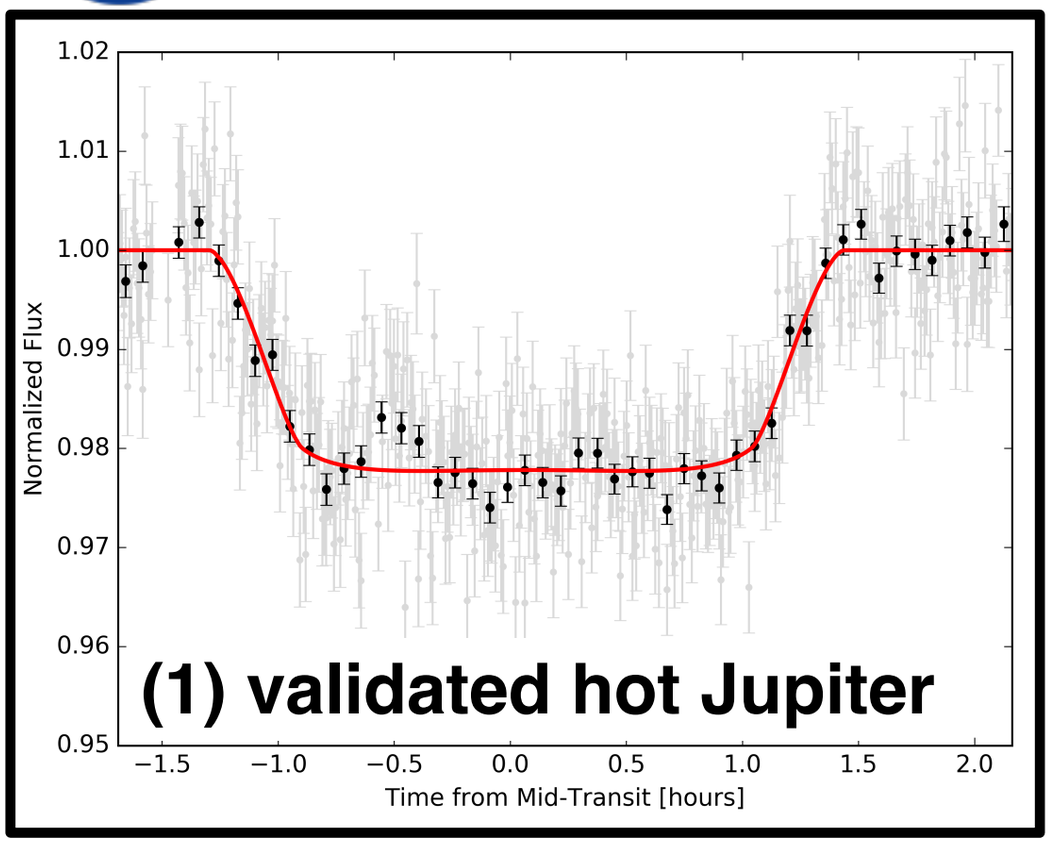
The K2 Near-Infrared Transit Survey



K2-WIYN Gallery

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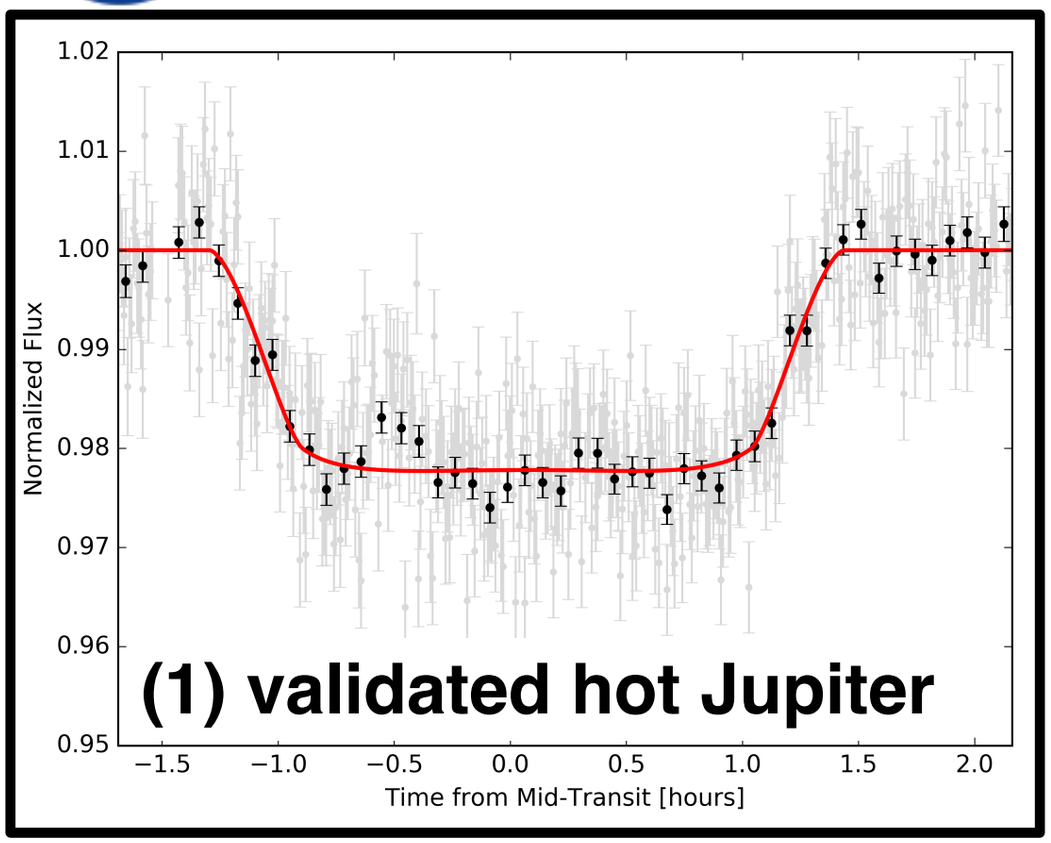

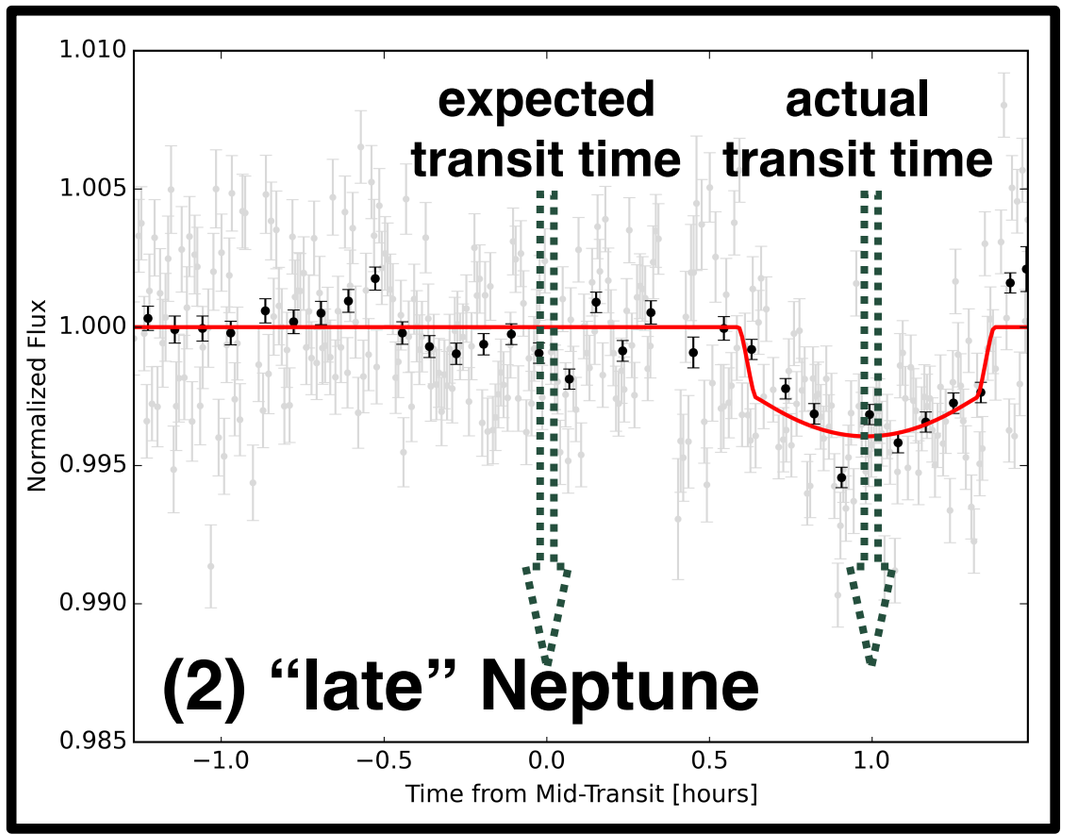

K2-WIYN Gallery

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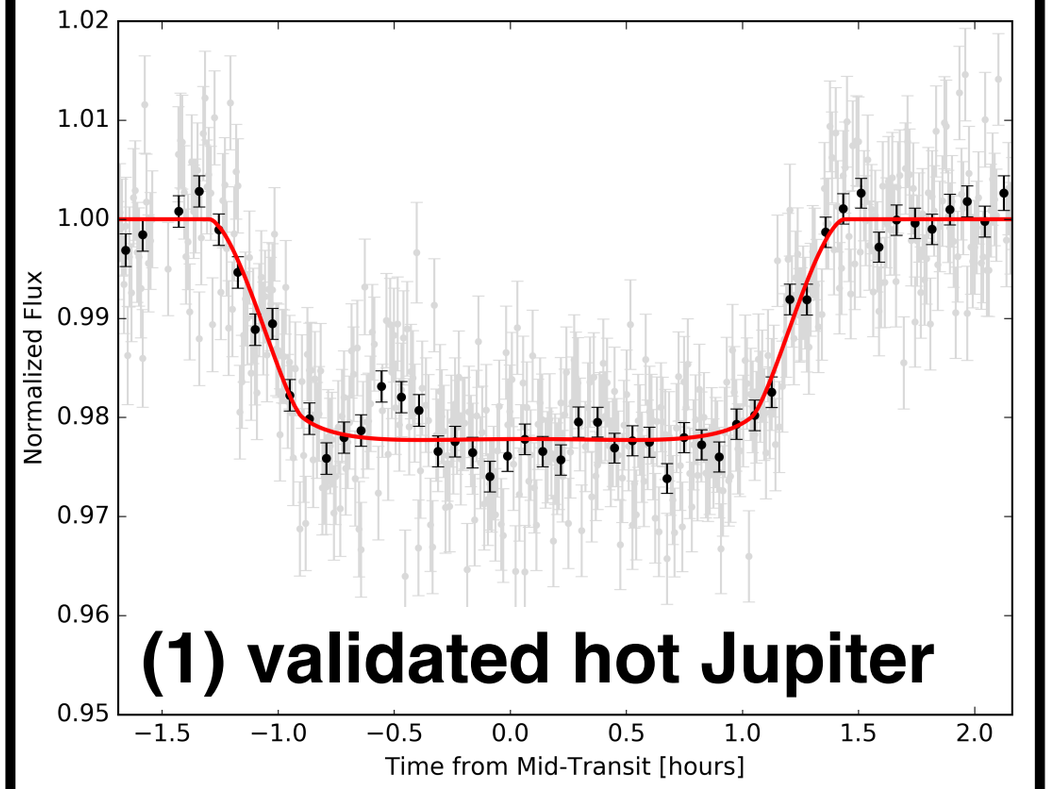

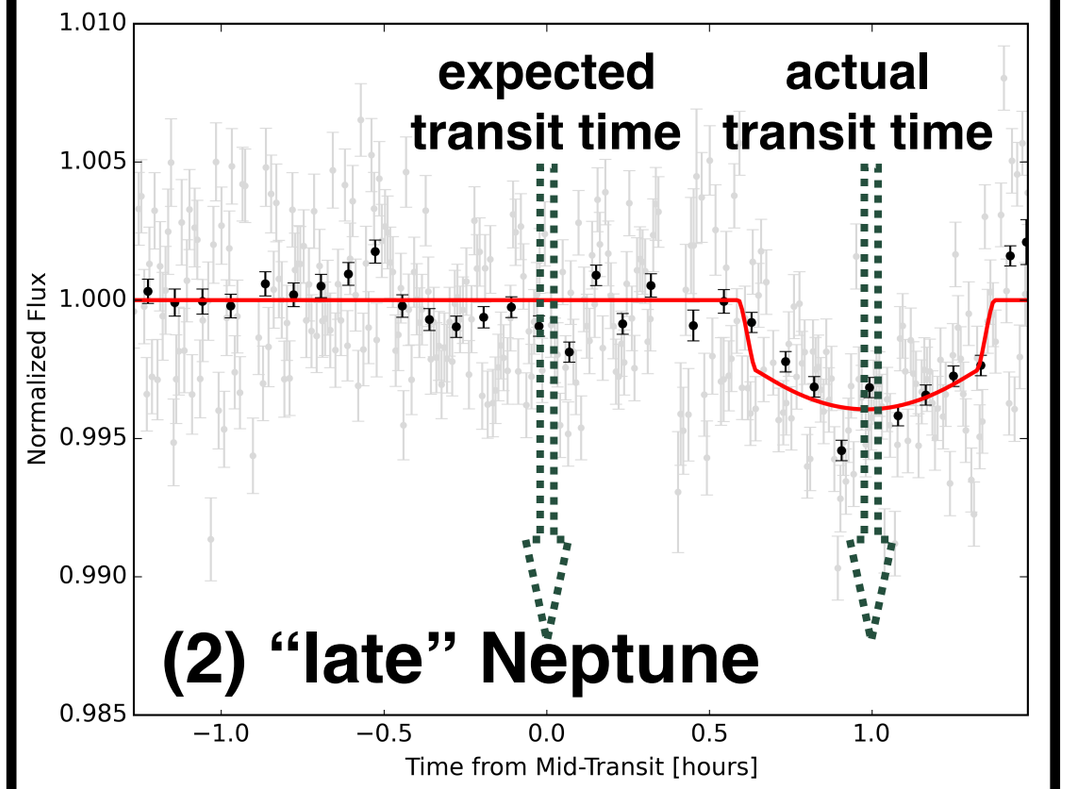

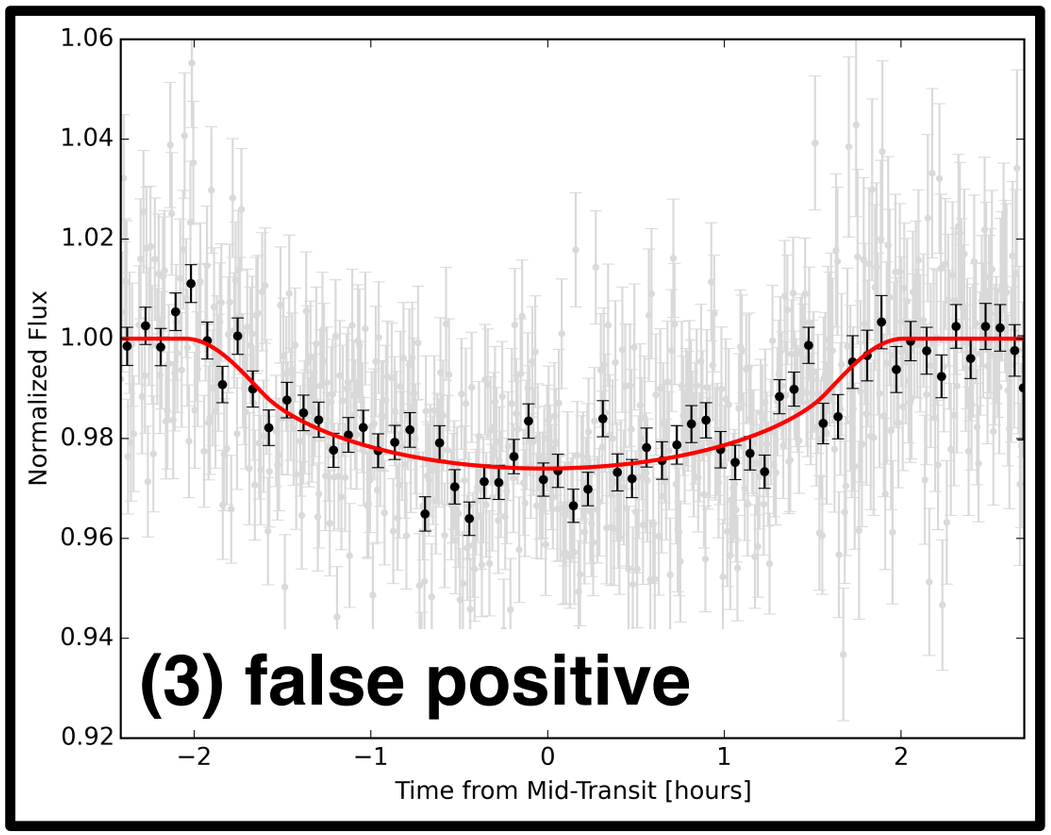

K2-WIYN Gallery

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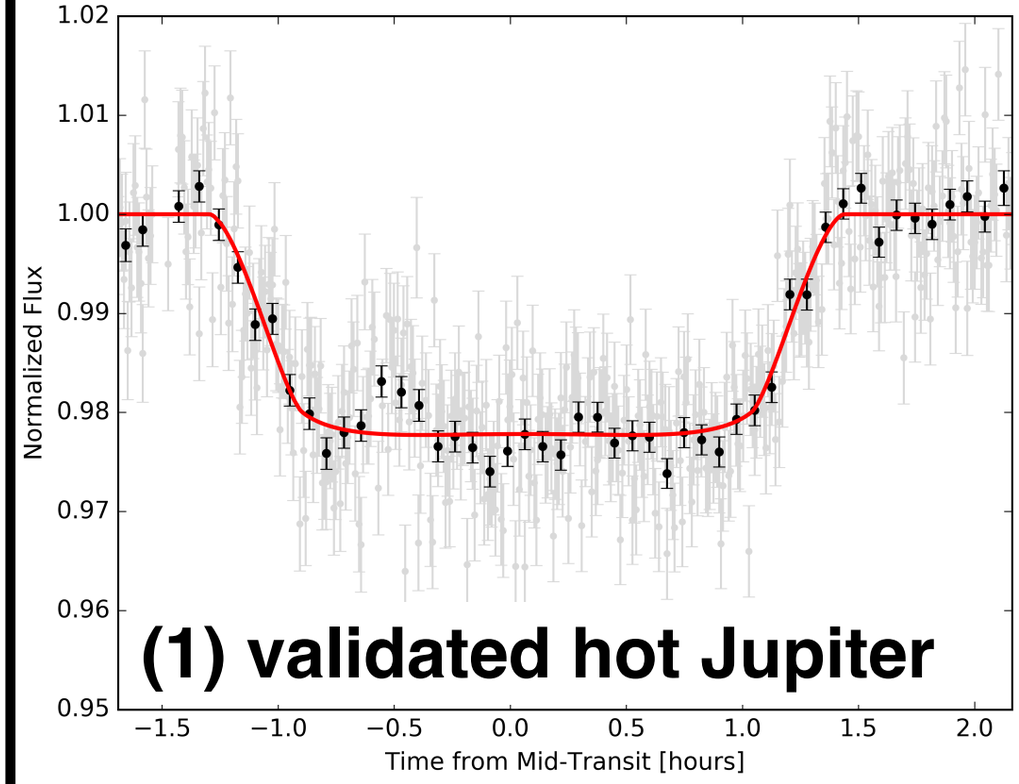
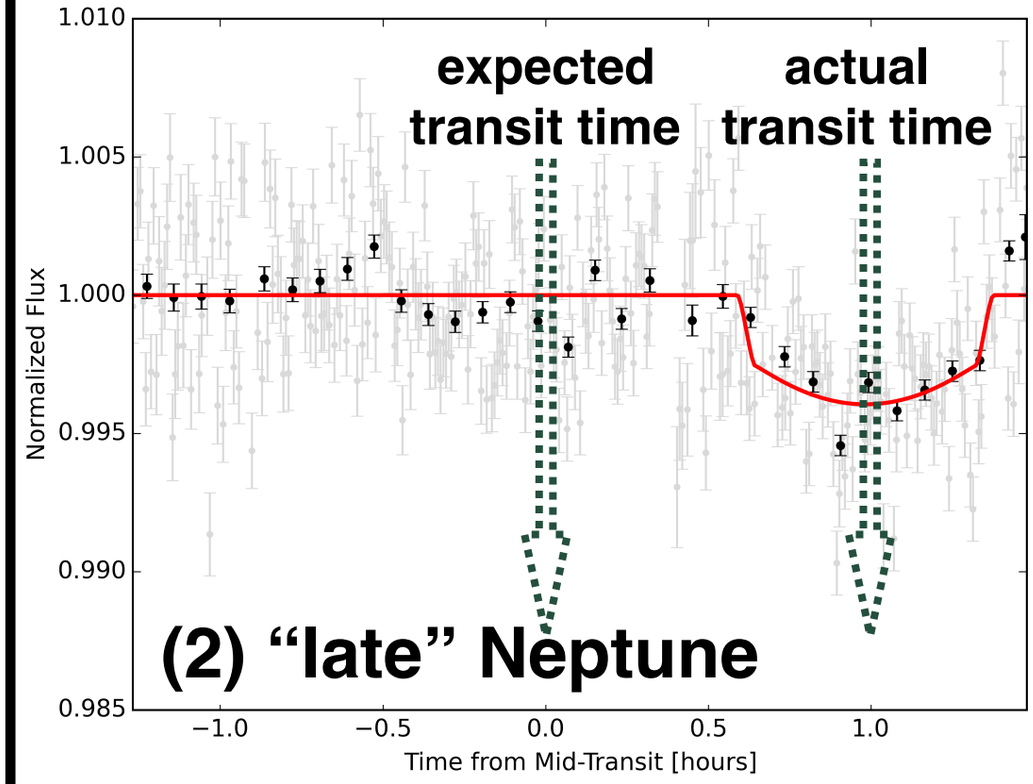
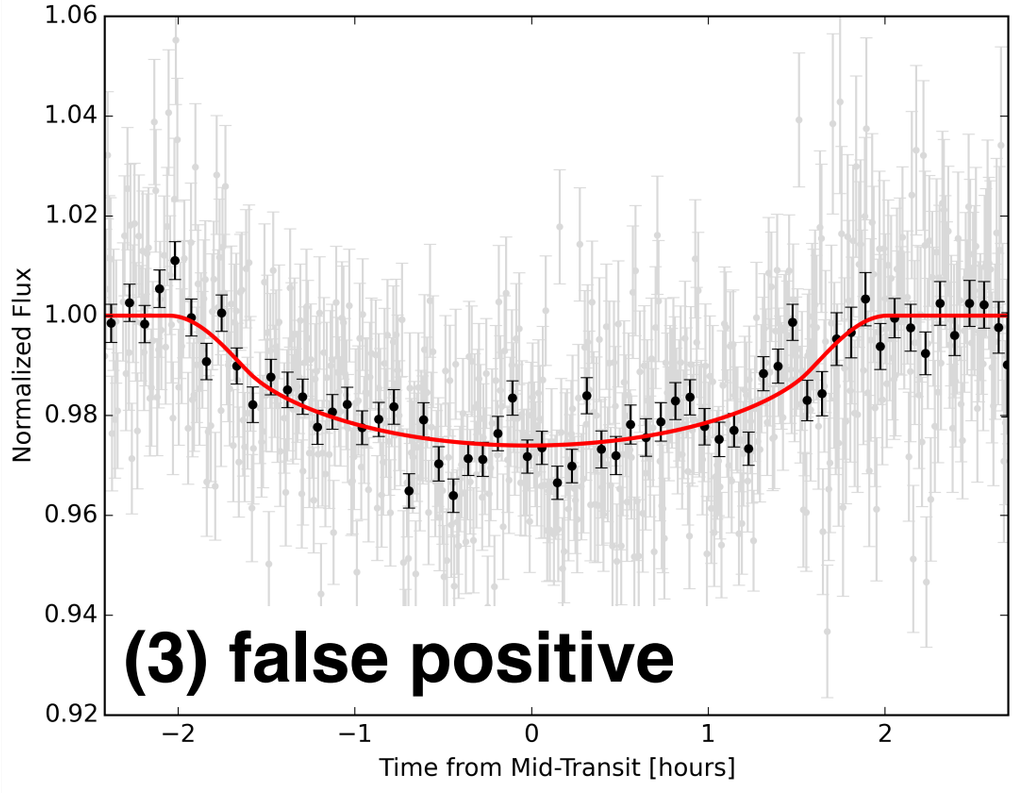
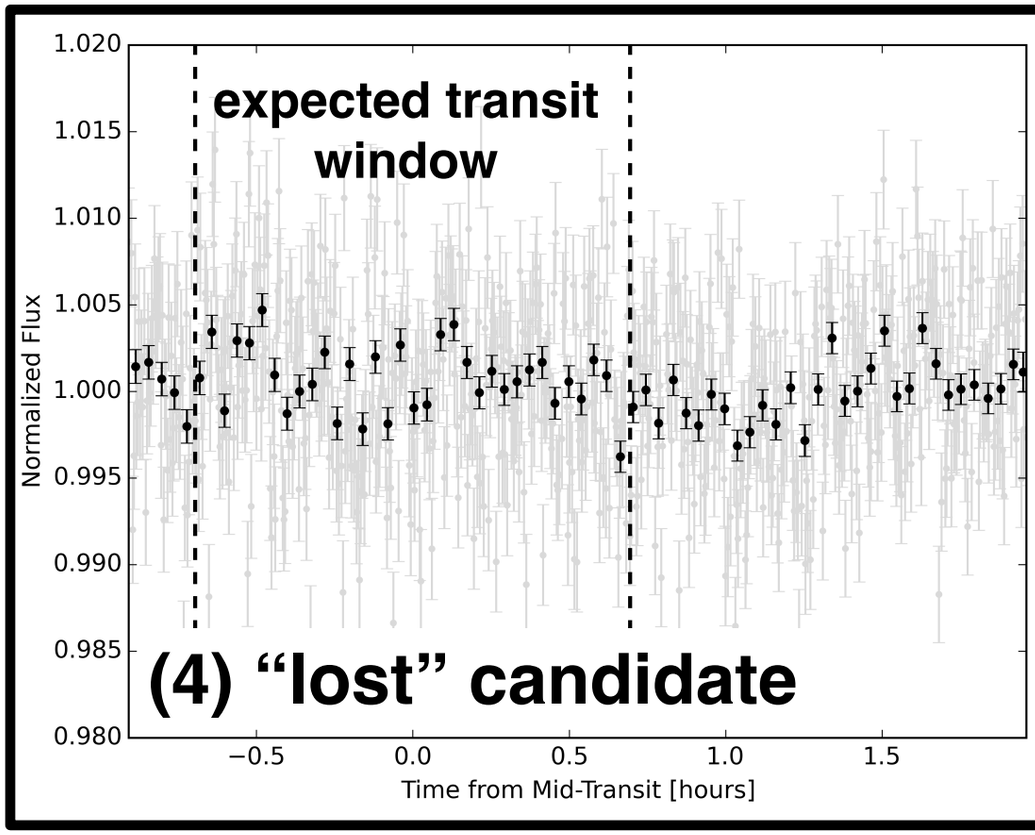








Sorting K2 Targets

KNITS:
The K2 Near-Infrared Transit Survey

validated planets

false positives

to be determined

inconclusive

Sorting K2 Targets

KNITS:
The K2 Near-Infrared Transit Survey

validated planets

false positives

to be determined

inconclusive

Sorting K2 Targets

KNITS:
The K2 Near-Infrared Transit Survey

validated planets

false positives

to be determined

inconclusive

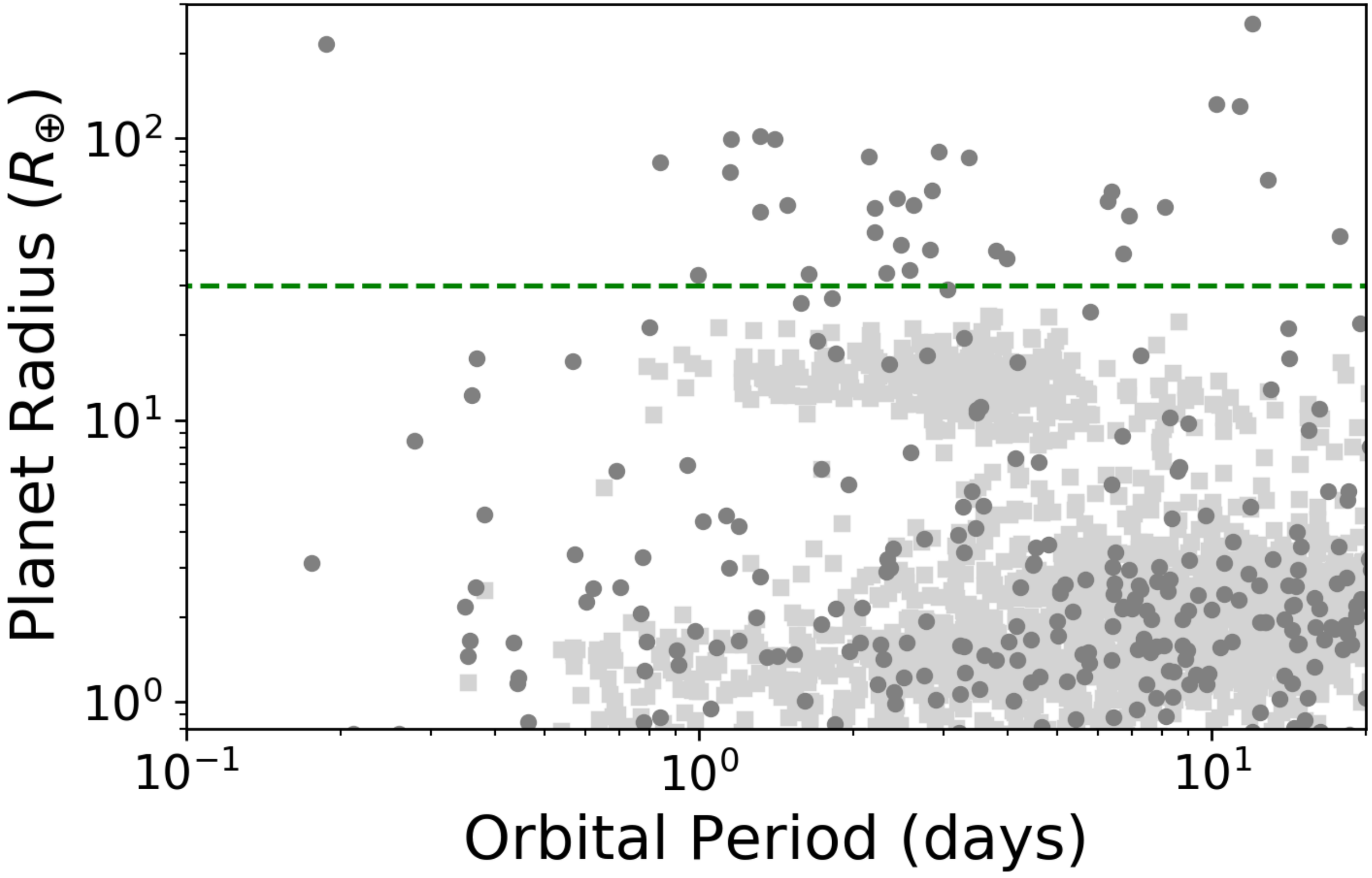
Gryffindor

Slytherin

Hufflepuff

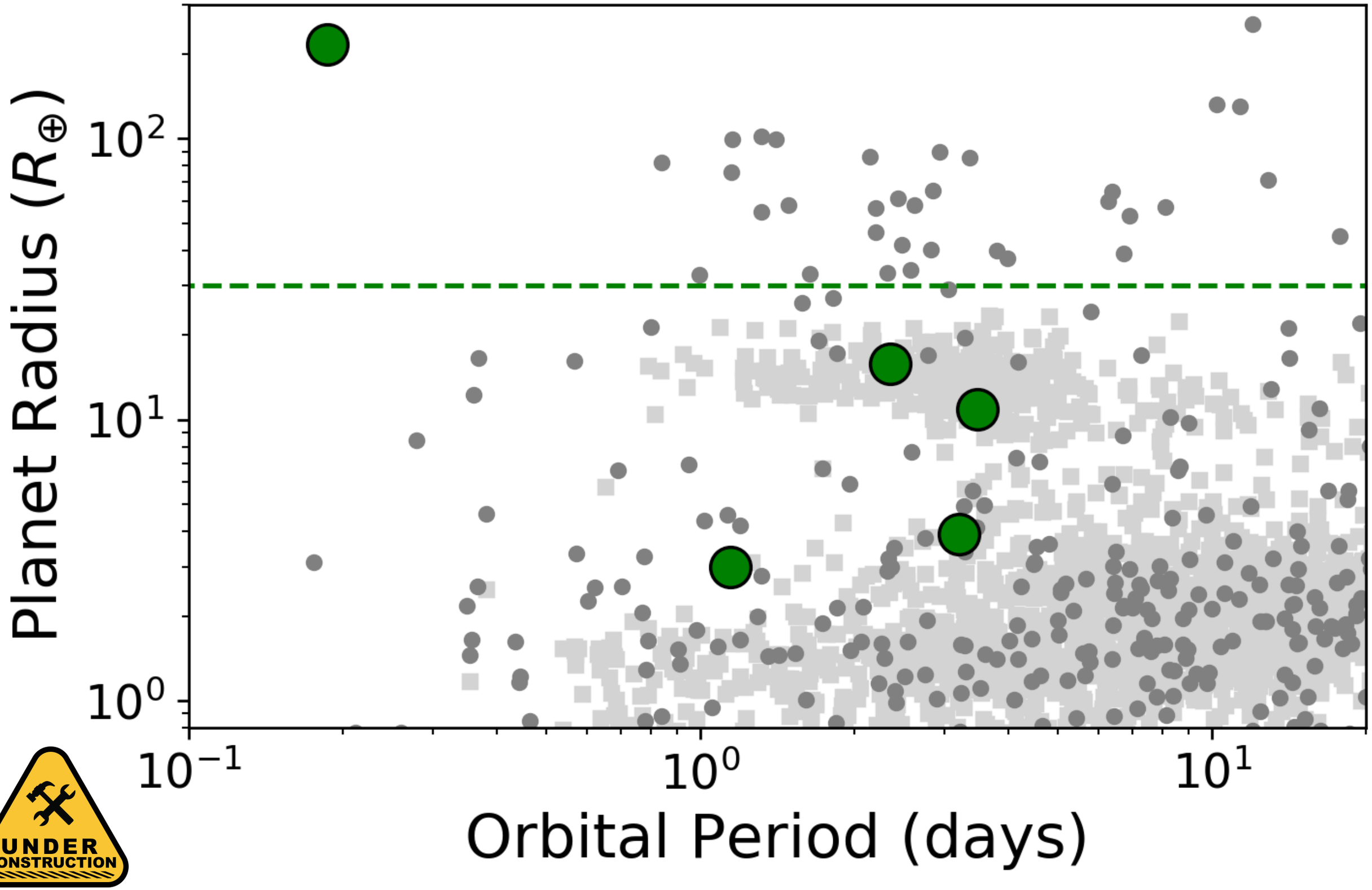
Ravenclaw

KNITS:
The K2 Near-Infrared
Transit Survey



KNITS:
The K2 Near-Infrared Transit Survey

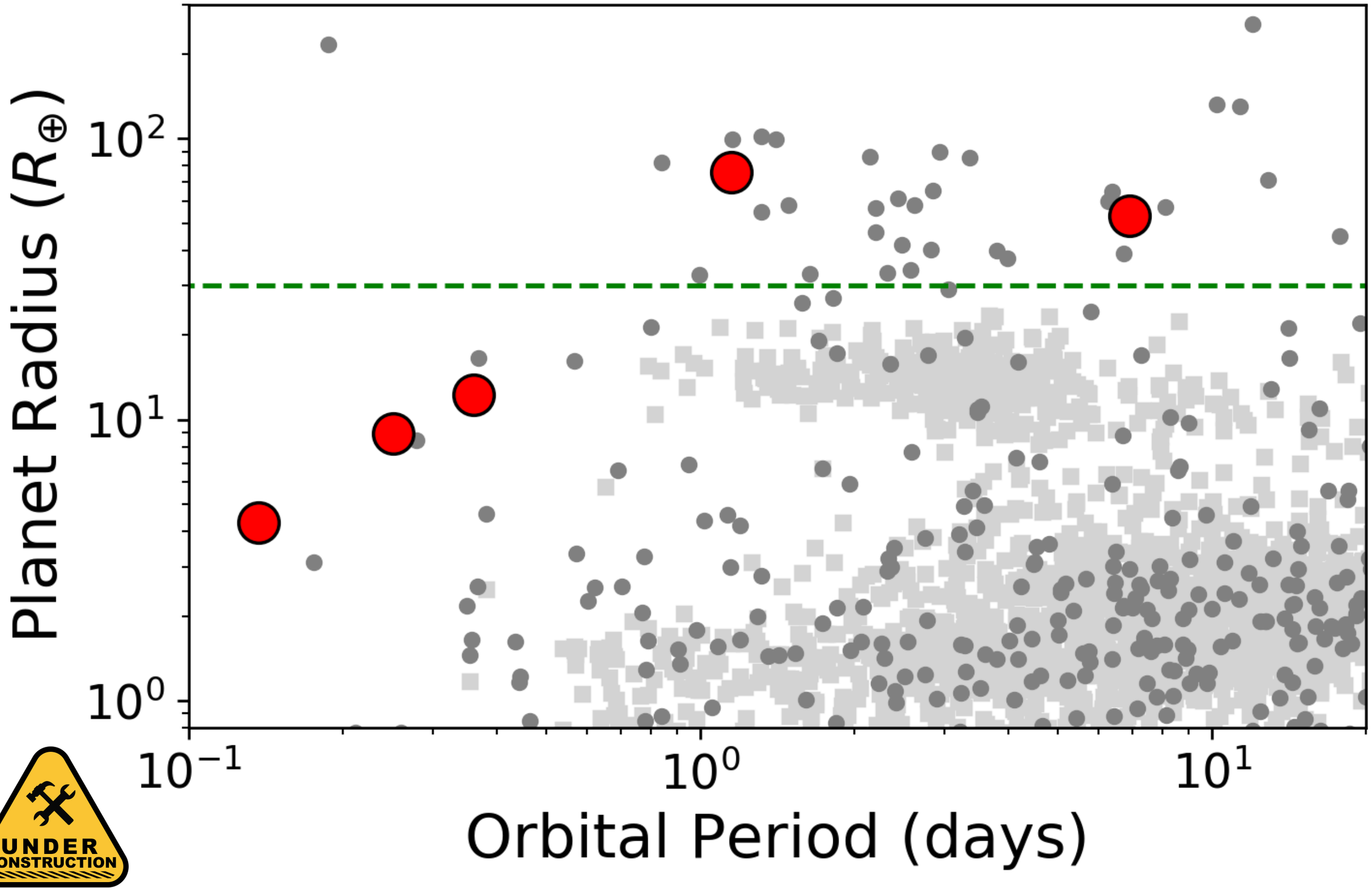
validated planets



UNDER CONSTRUCTION

KNITS:
The K2 Near-Infrared Transit Survey

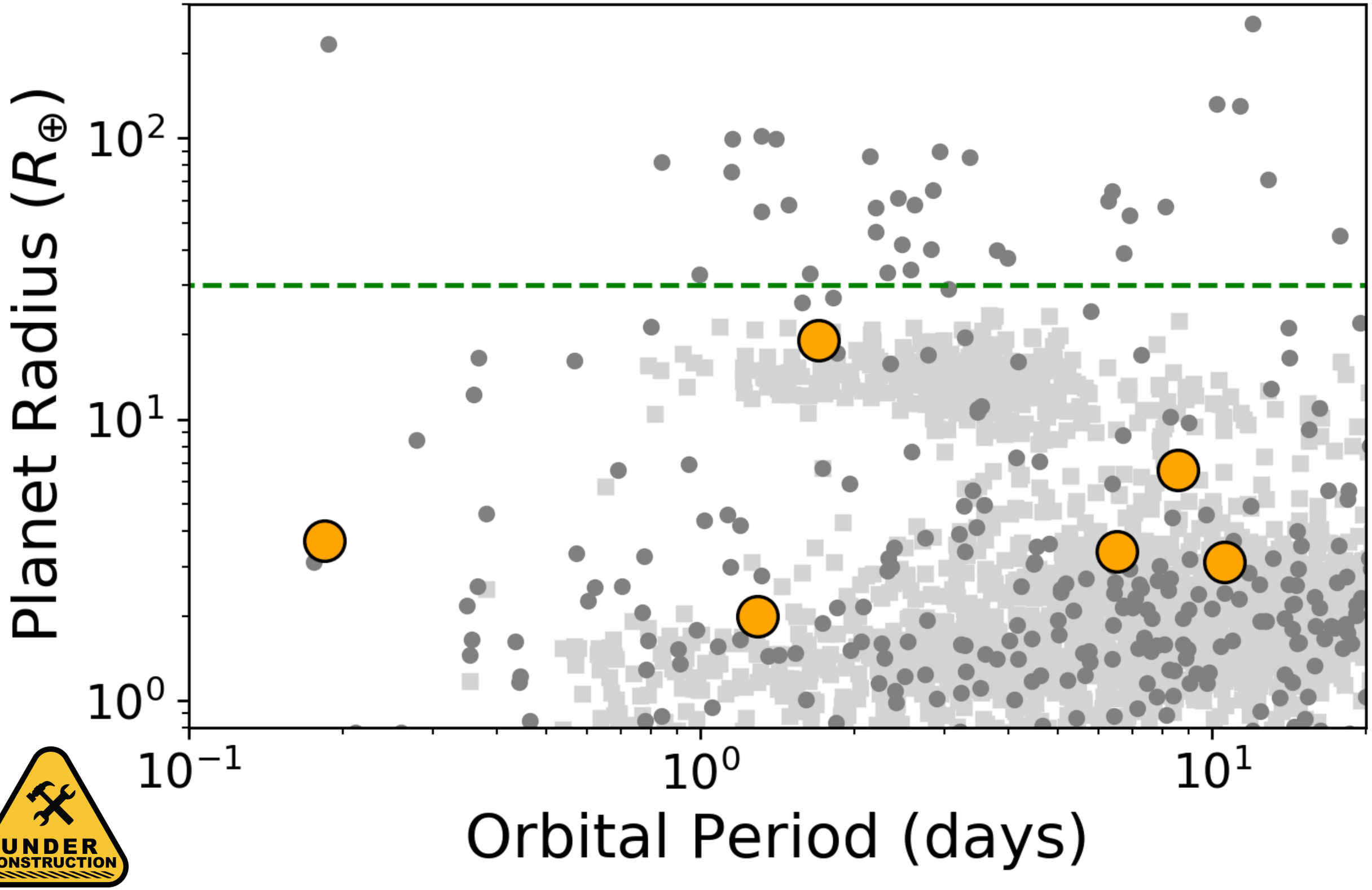
false positives



UNDER CONSTRUCTION

KNITS:
The K2 Near-Infrared Transit Survey

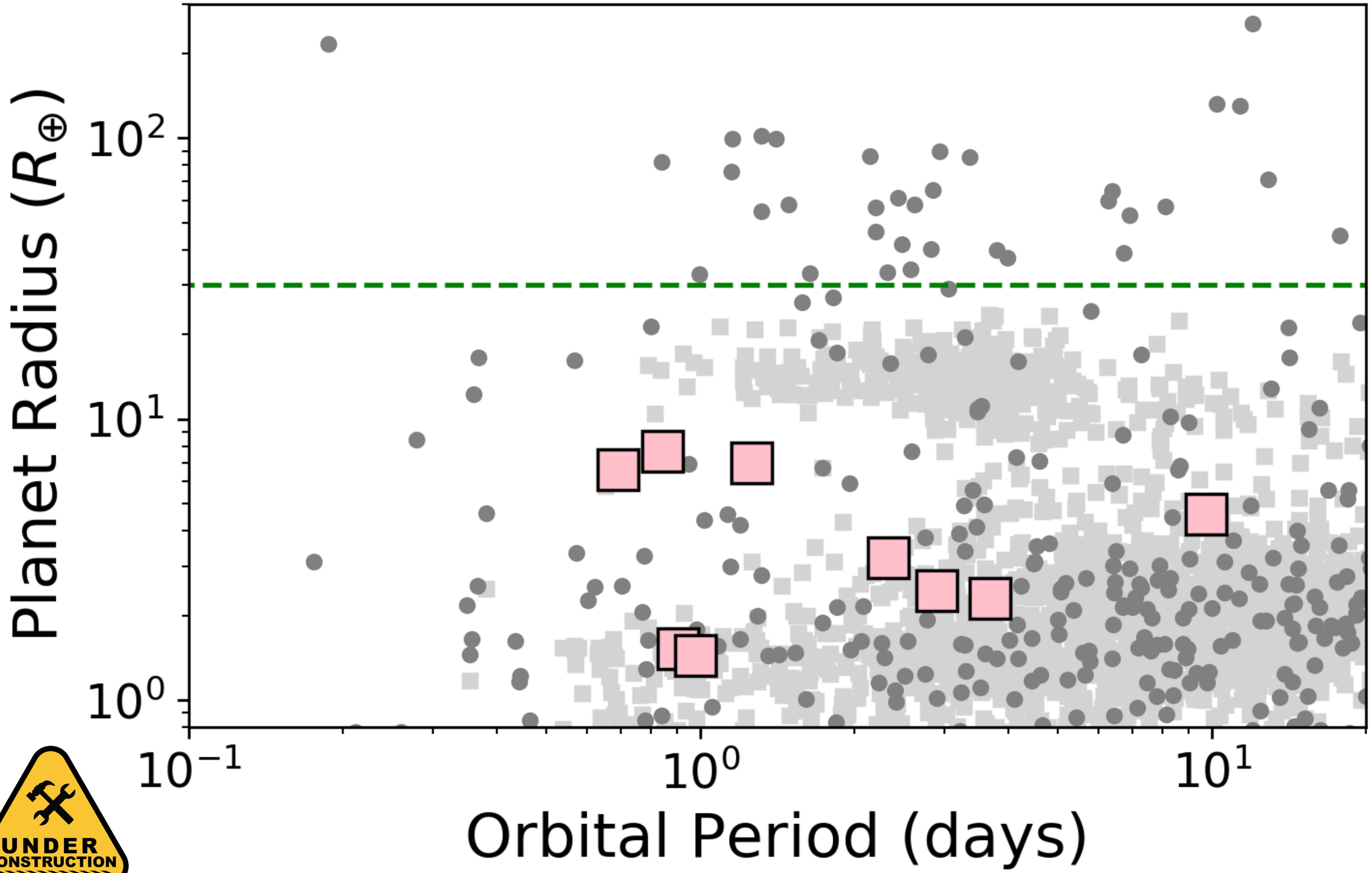
to be determined



UNDER CONSTRUCTION

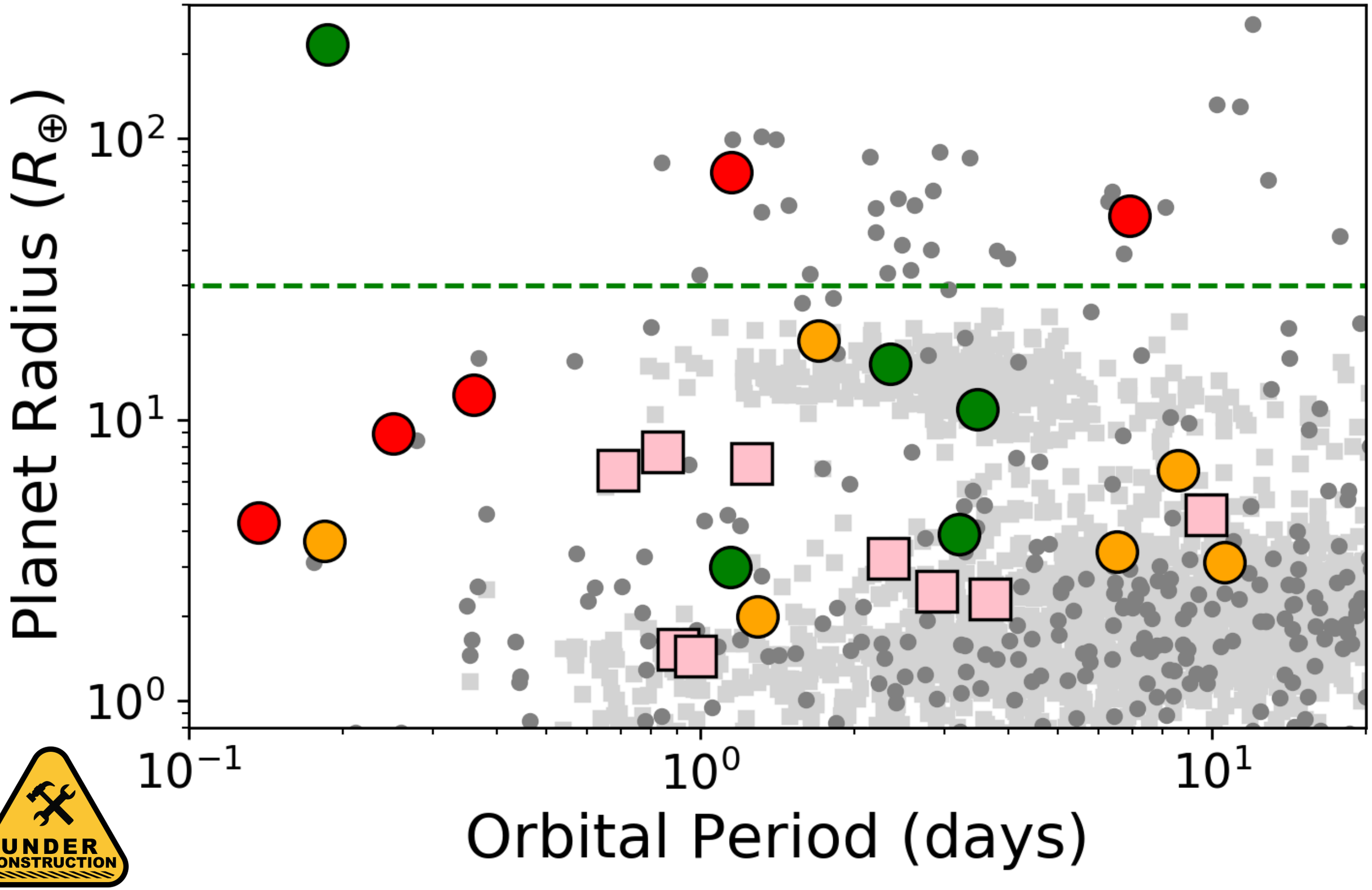
KNITS:
The K2 Near-Infrared Transit Survey

inconclusive



KNITS:
The K2 Near-Infrared Transit Survey

all 25 K2 targets from WIYN

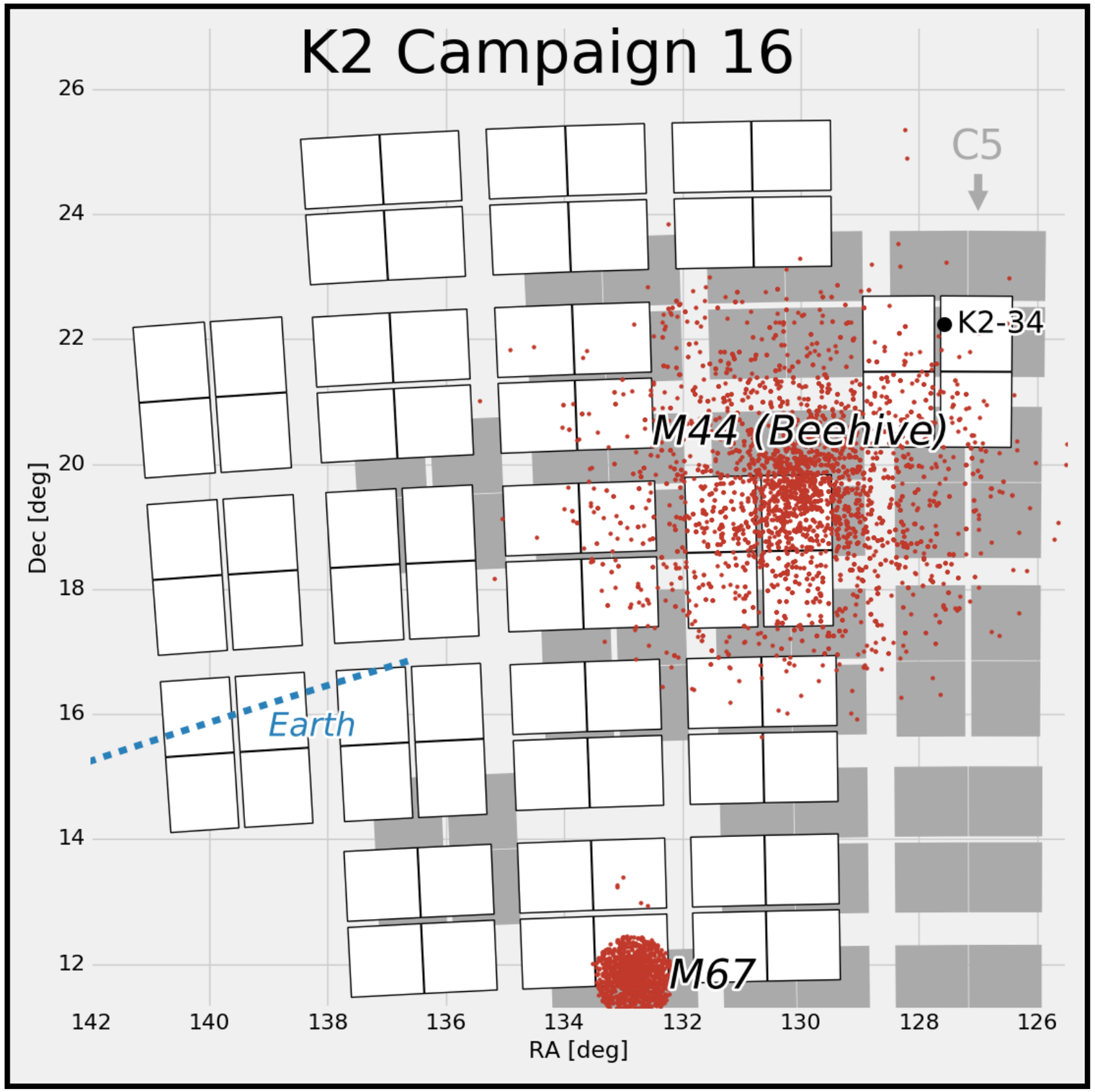


UNDER CONSTRUCTION

Simultaneous Observations with K2 + WIYN + ?

KNITS: The K2 Near-Infrared Transit Survey

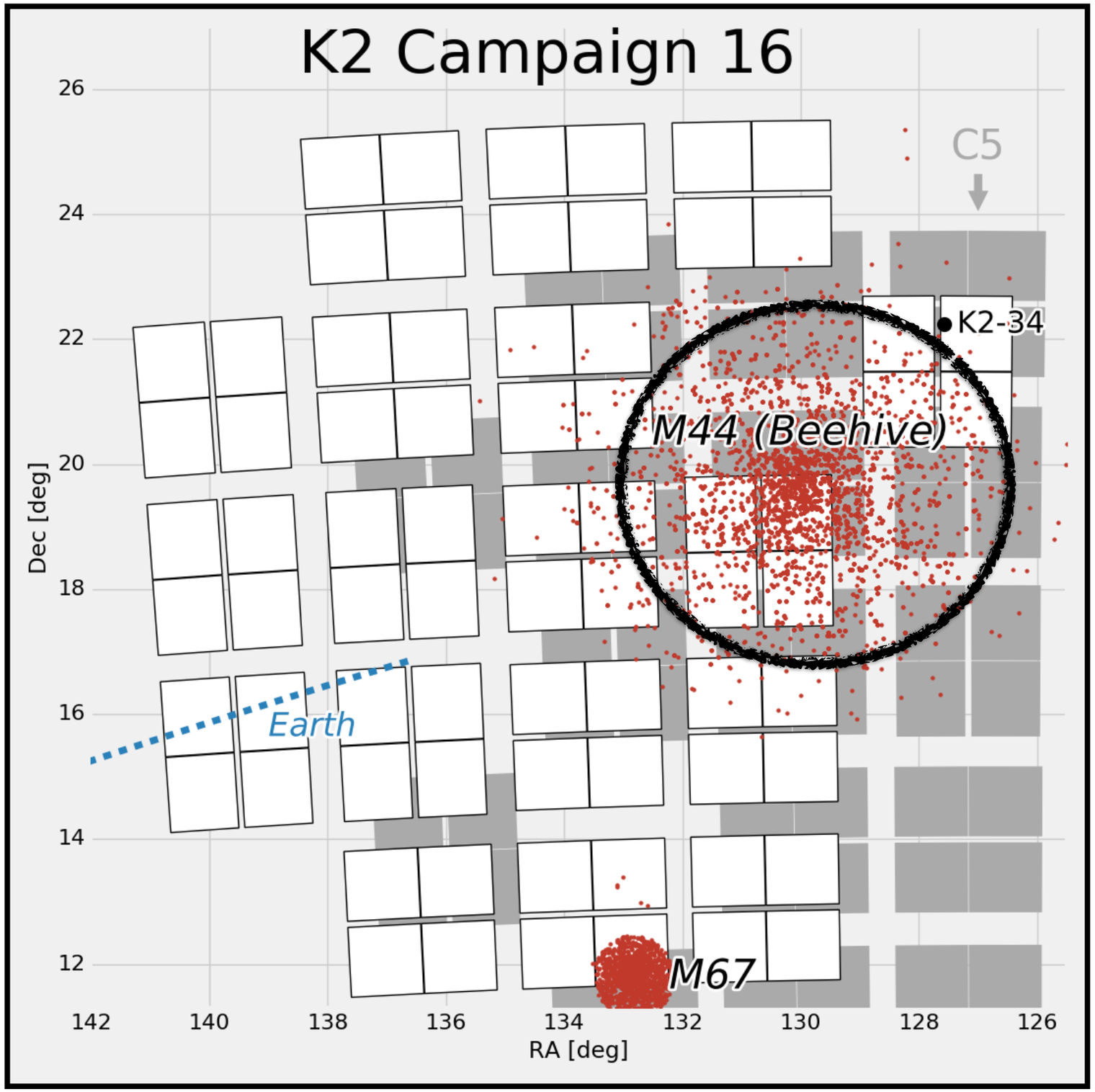
January 2018



Simultaneous Observations with K2 + WIYN + ?

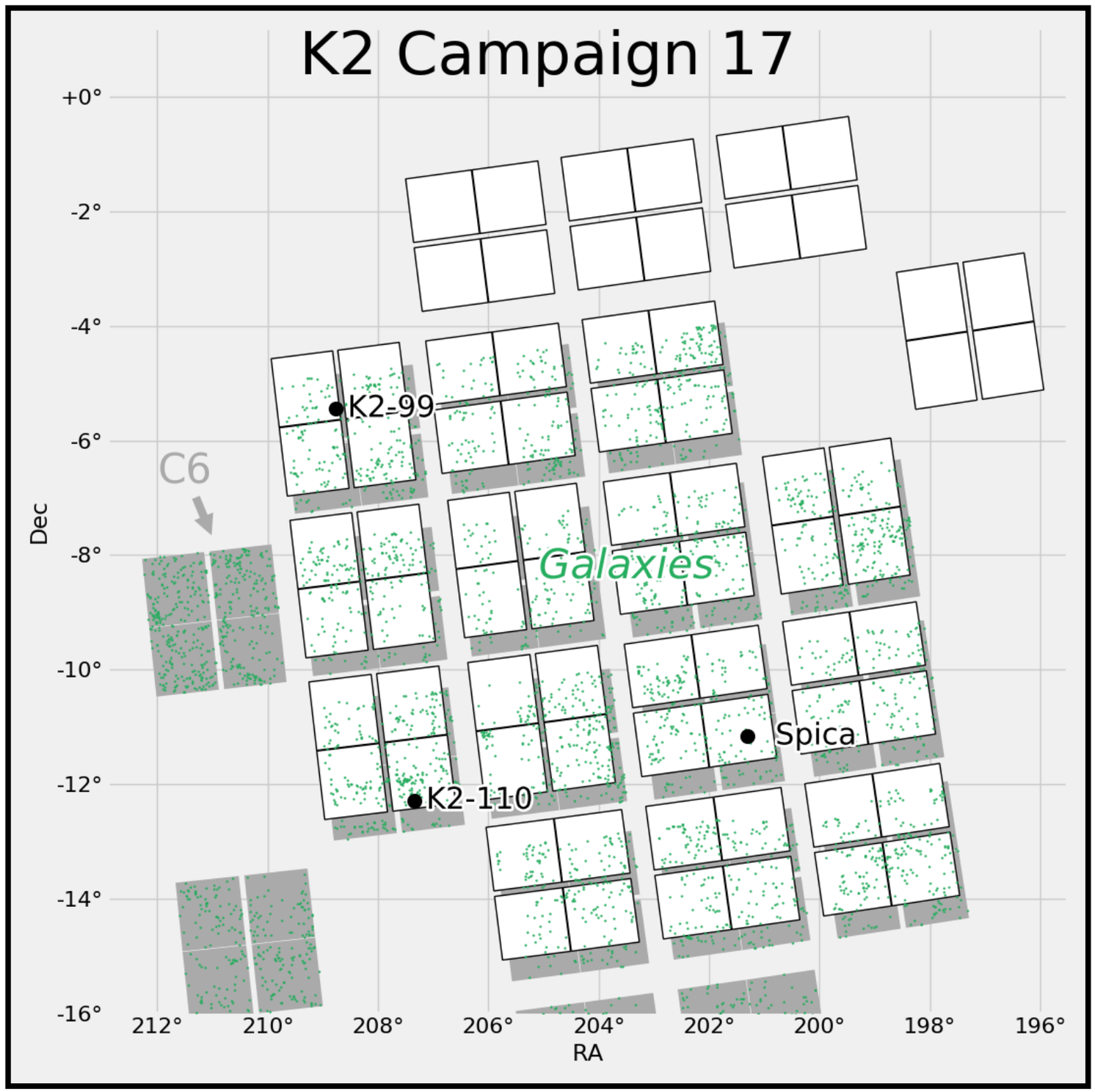
KNITS: The K2 Near-Infrared Transit Survey

January 2018



Simultaneous Observations with K2 + WIYN? + ?

KNITS: The K2 Near-Infrared Transit Survey



> February 2018

Take Home Points

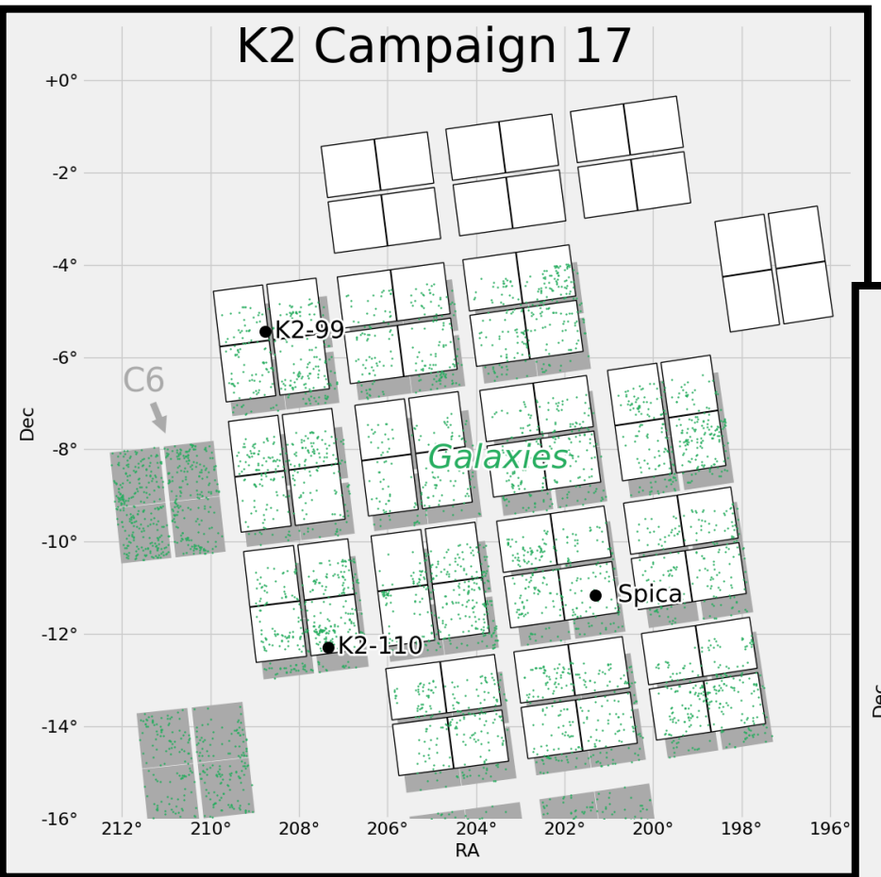
KNITS: The K2 Near-Infrared Transit Survey

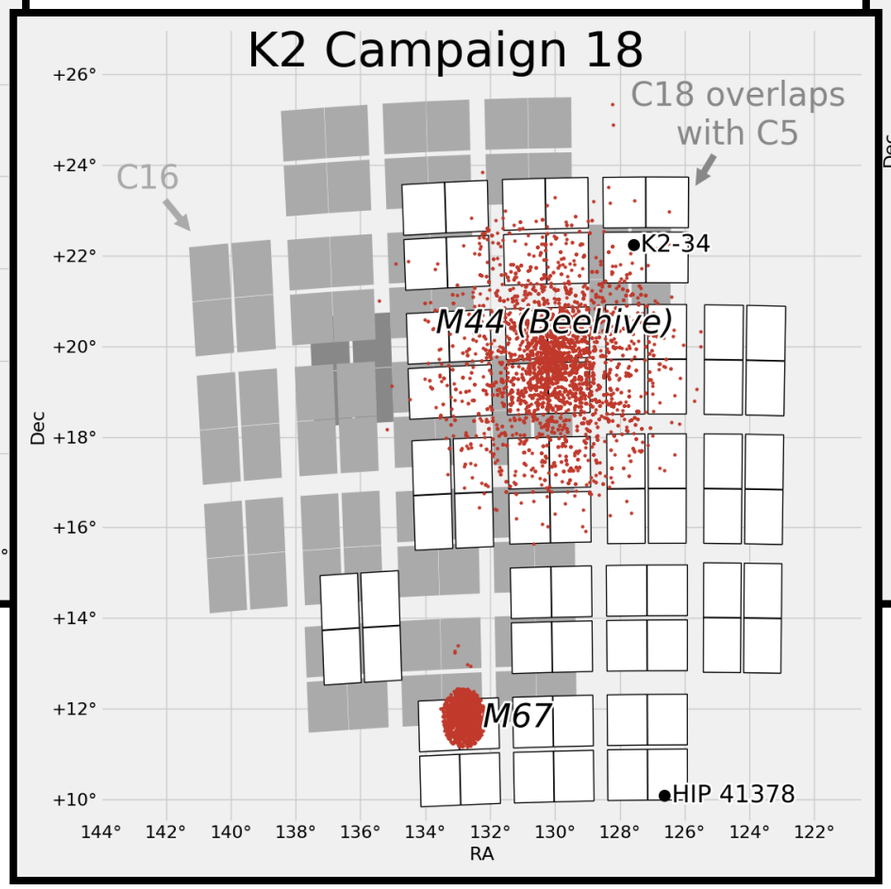
- We are actively **vetting** and **characterizing** K2 planets and candidates with WIYN to enable future detailed characterization with facilities like JWST
- We regularly reach **~2 mmag photometric precisions** with WHIRC for **Ks < 14**
- This is **one of the largest photometric follow-up programs** for K2 planets and candidates and complements K2 follow-up with Spitzer
- If you are interested in **NIR light curves of C16 targets simultaneous with K2** contact me @ knicole.colon@nasa.gov

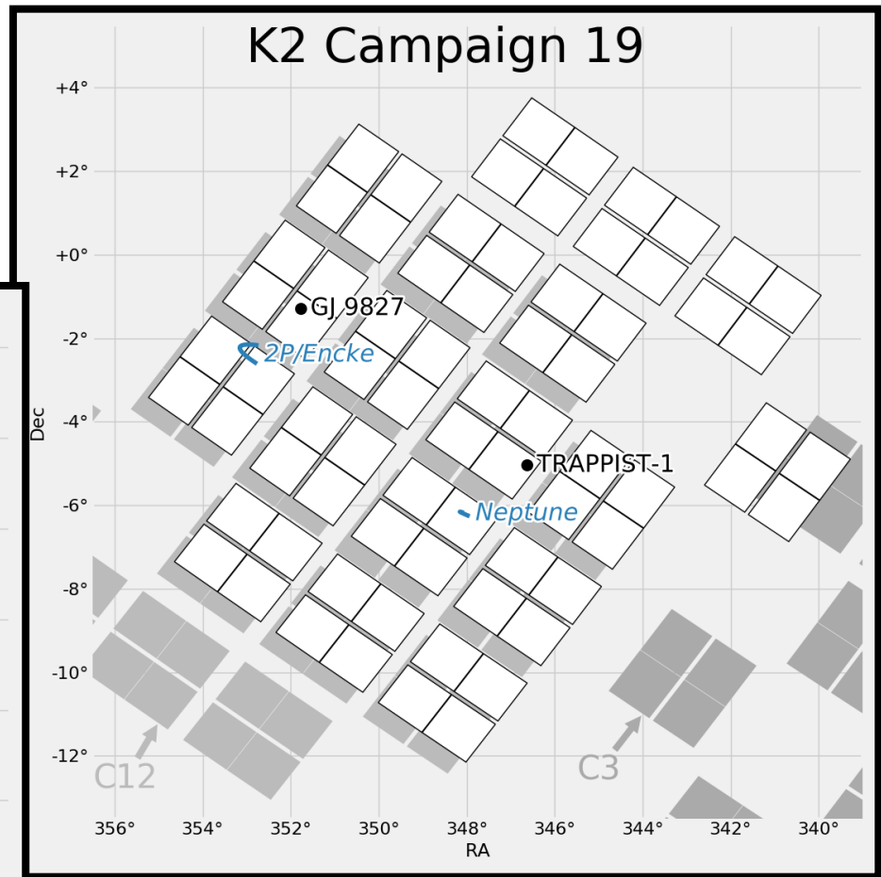
K2 GO Cycle 6 Target Proposals
DUE TODAY < 23:59 EDT

keplerscience.arc.nasa.gov

FINAL NOTICE







Extra Slides


NASA
POSTDOCTORAL PROGRAM
Administered by USRA
NASA Postdoctoral Program
NASA


NASA
POSTDOCTORAL PROGRAM
Administered by USRA
NASA Postdoctoral Program
NASA

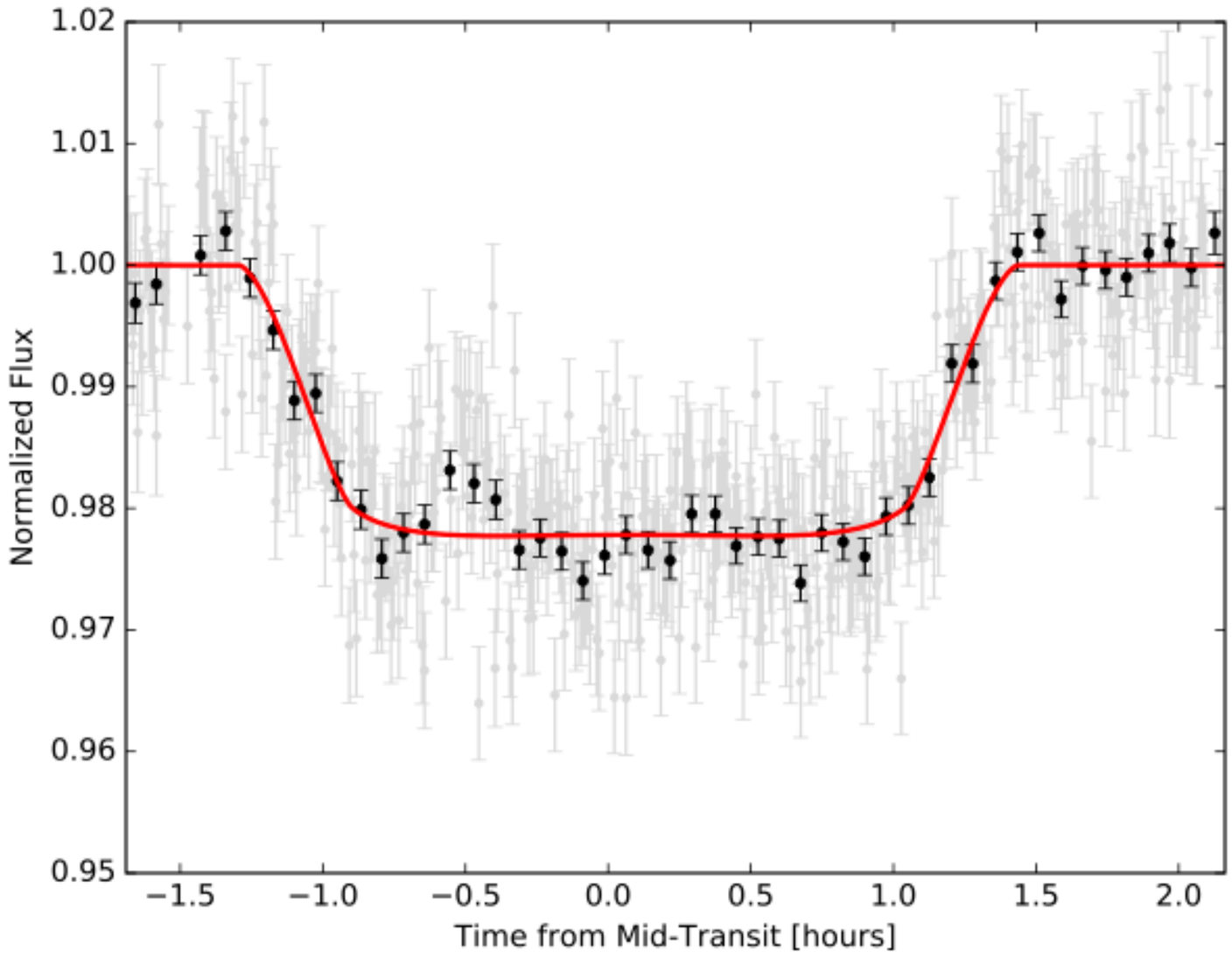
npp.usra.edu

npp.usra.edu

next application deadline - Nov 1

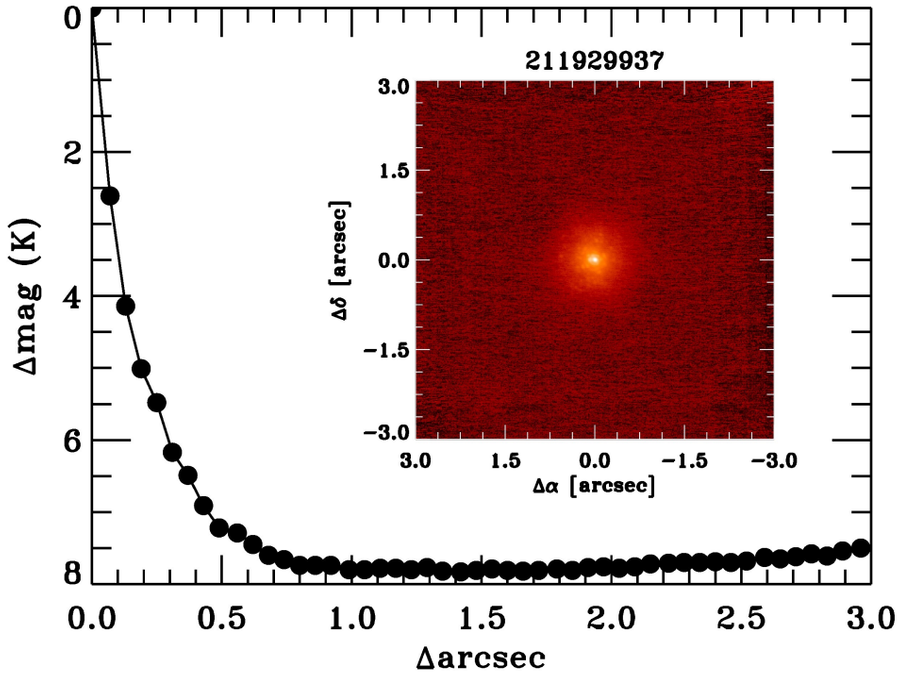
EPIC 211929937

validated hot Jupiter around solar-type star



Kp = 14.2 / Ks = 12.4

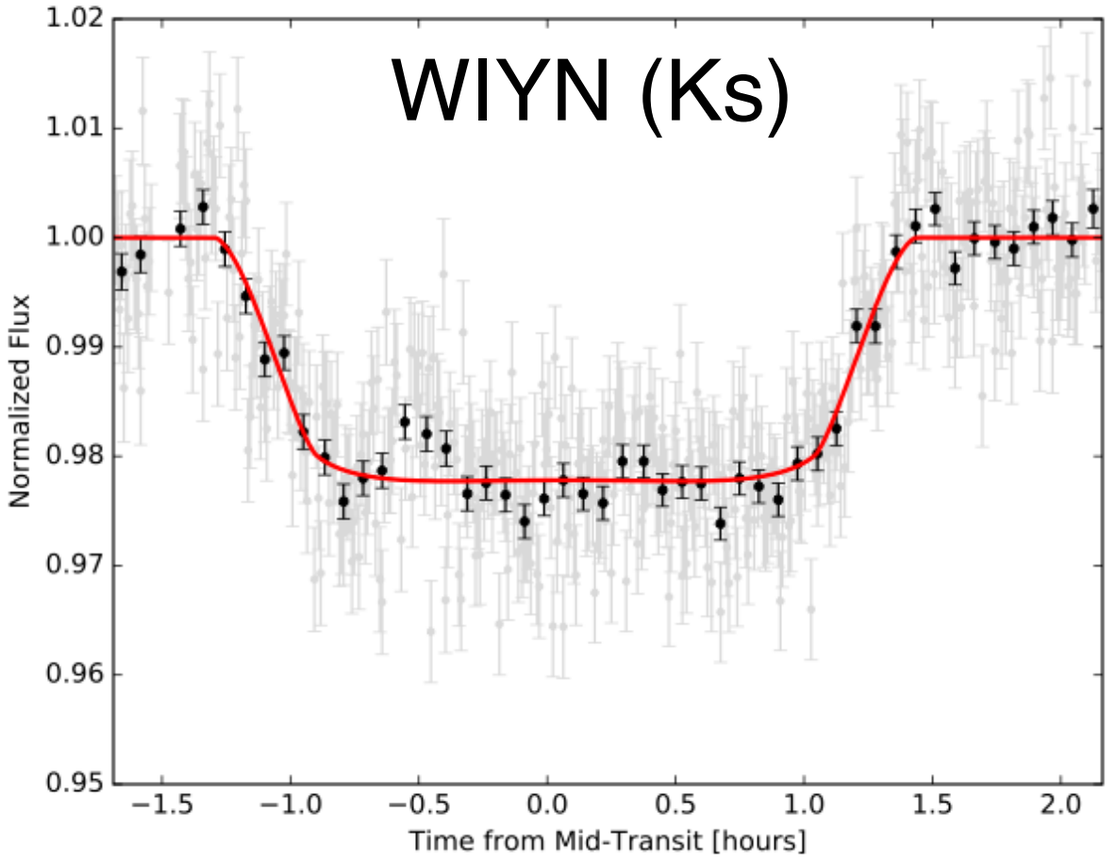
P = 3.48 days / Rp = 11 Re

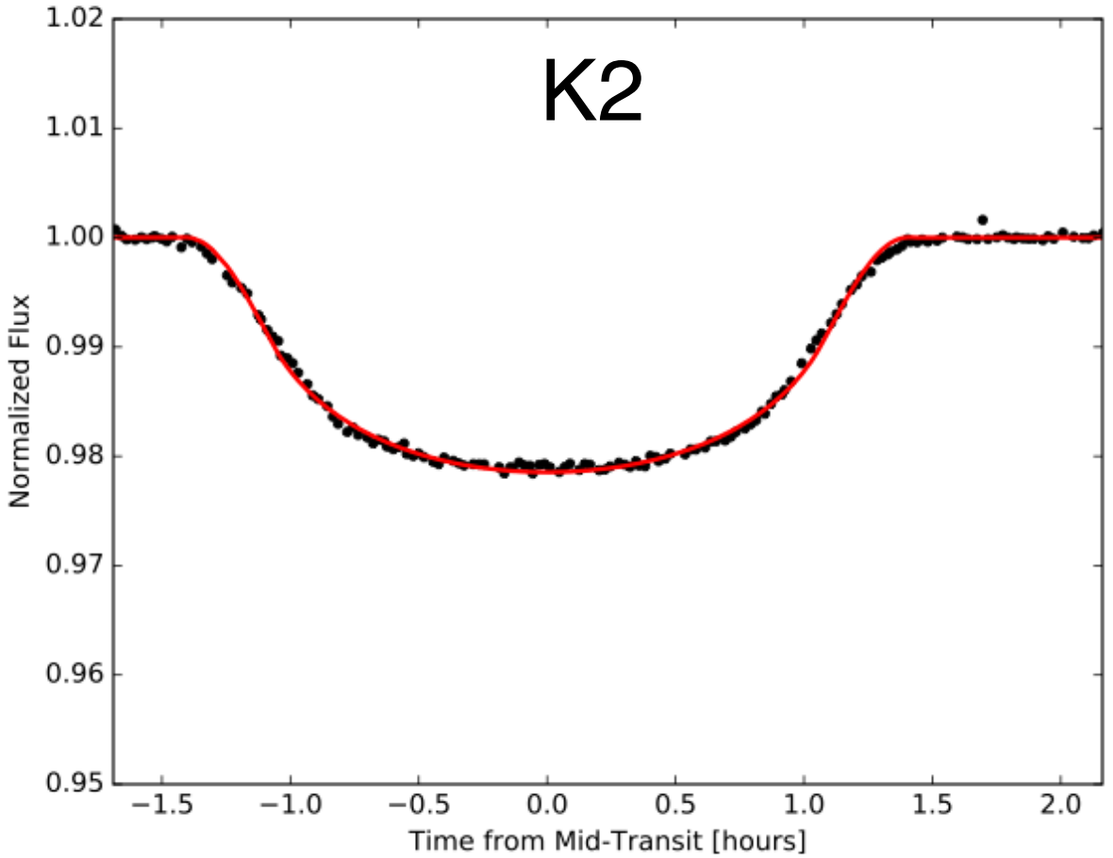


ExoFOP / Ciardi

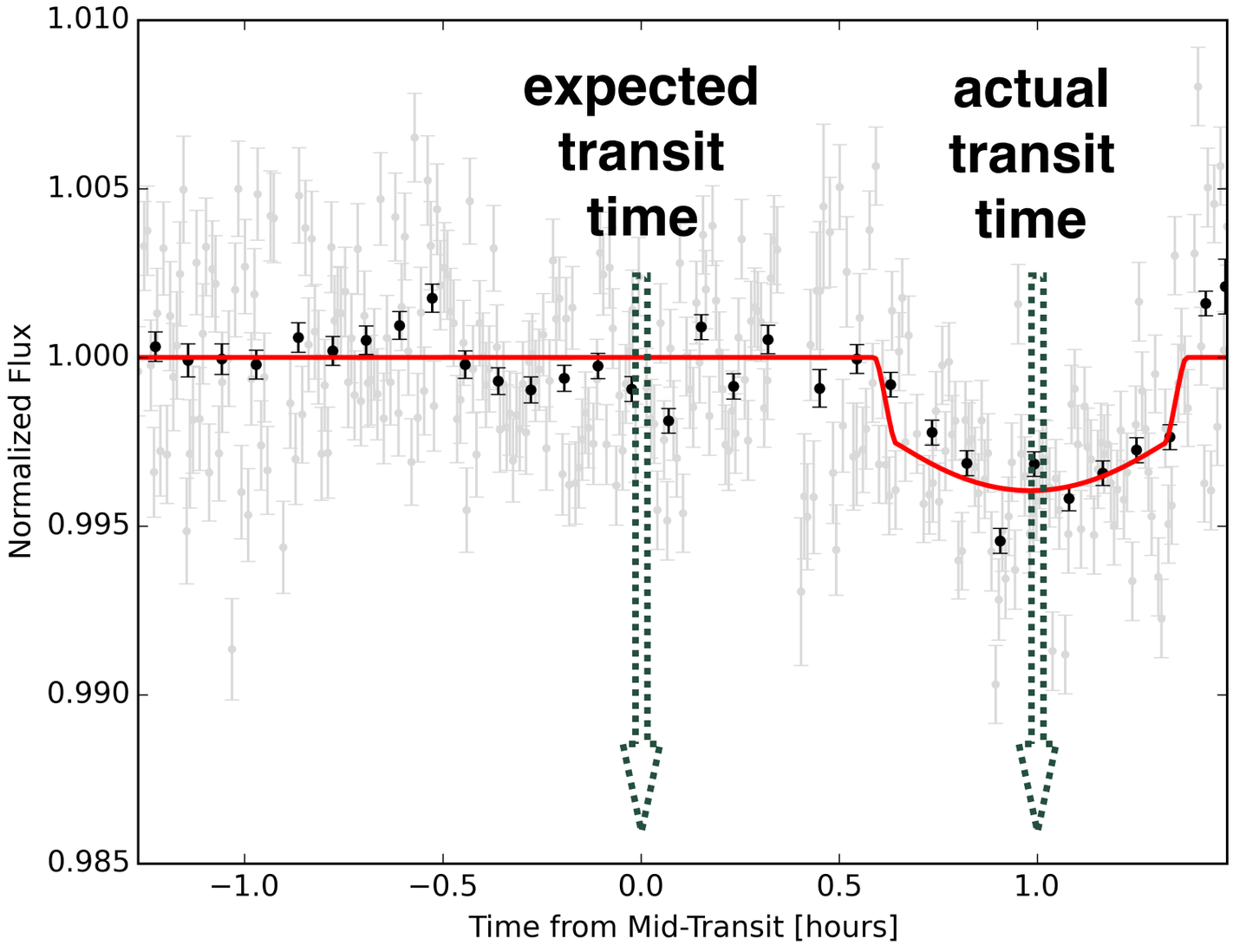
Colón et al., in prep

EPIC 211929937





EPIC 212138198



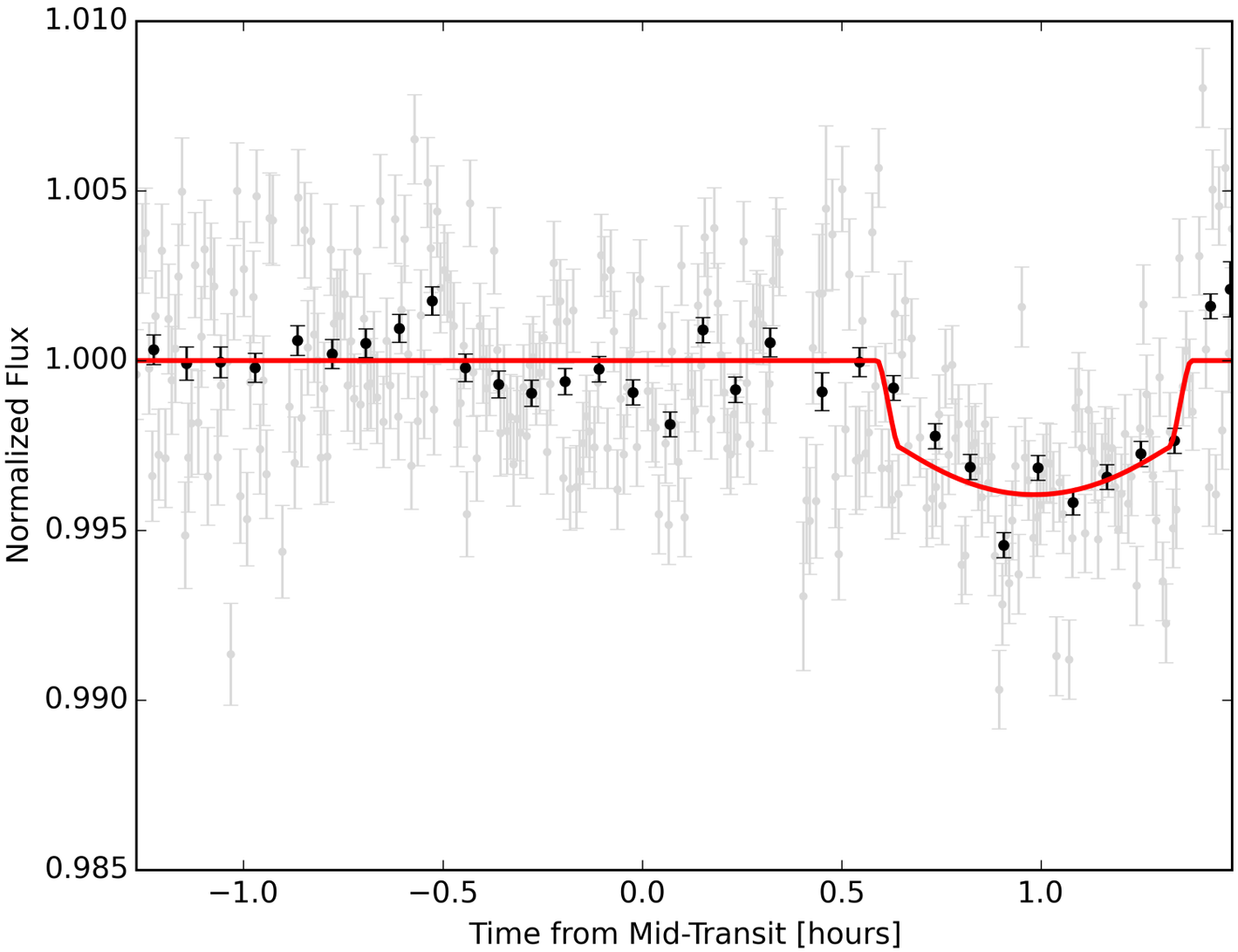
Kp = 12.9 / J = 11.5

P = 3.2 days / Rp = 4 Re

Colón et al., in prep

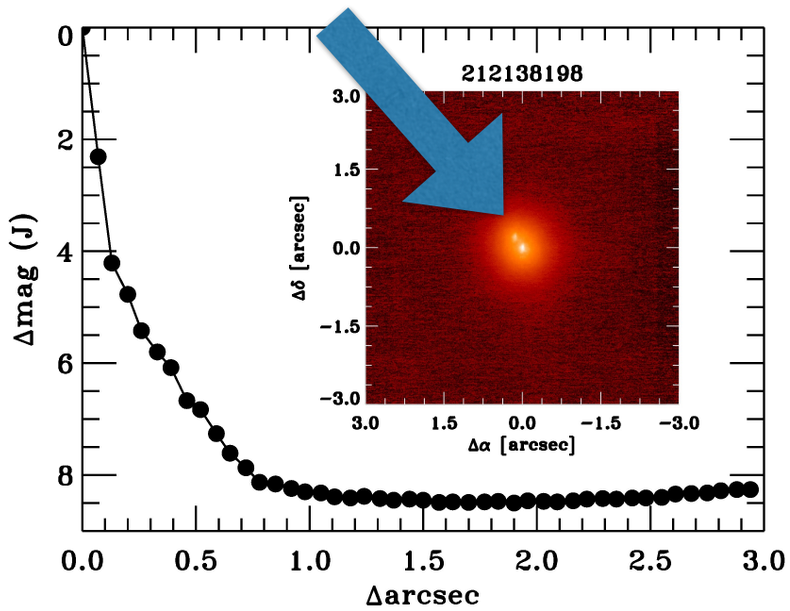
EPIC 212138198

“late Neptune”



Kp = 12.9 / J = 11.5

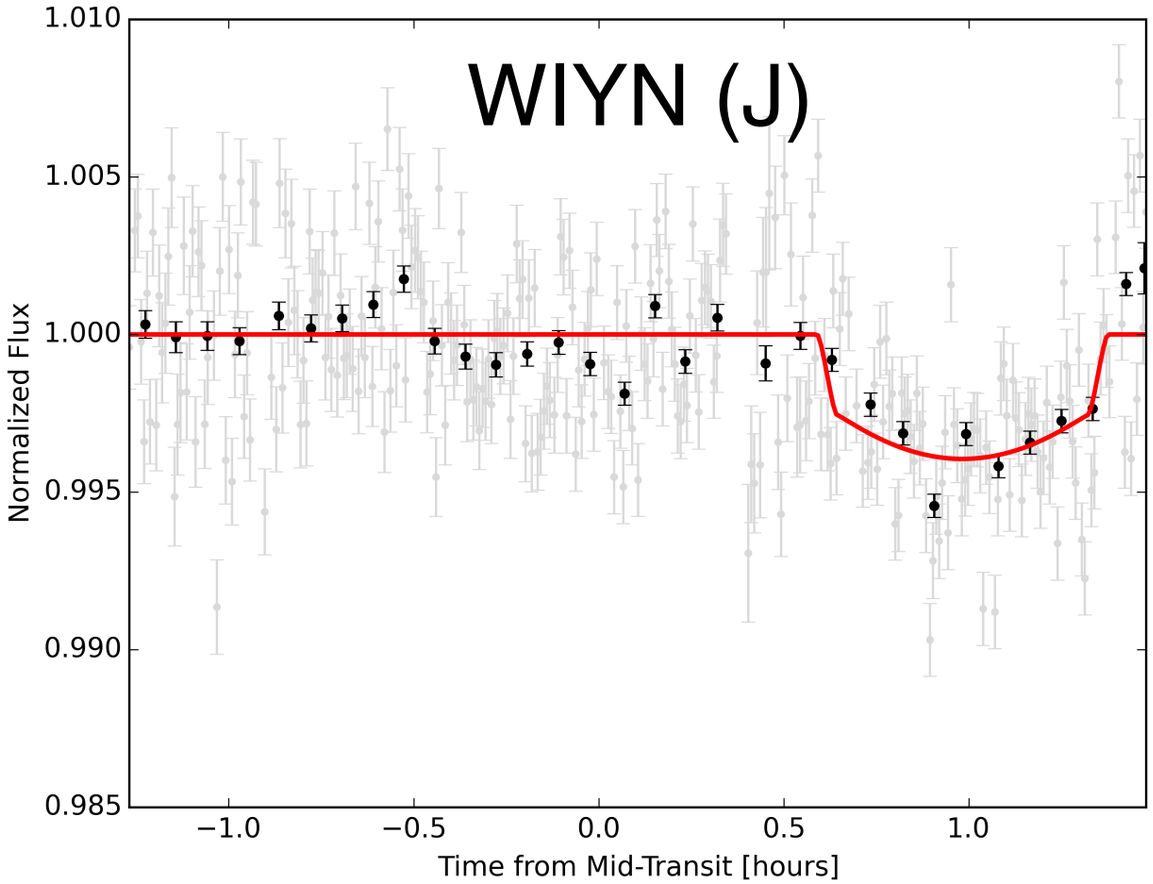
P = 3.2 days / Rp = 4 Re

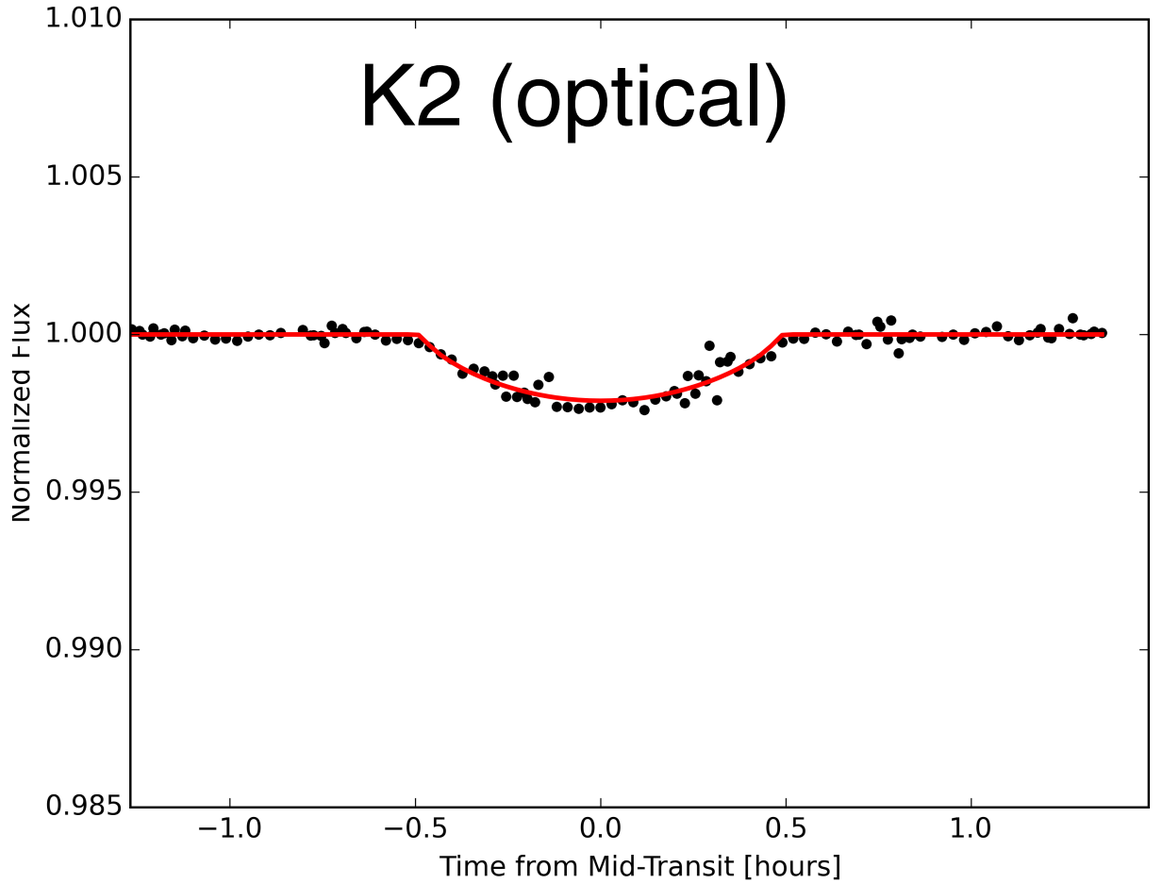


ExoFOP / Ciardi

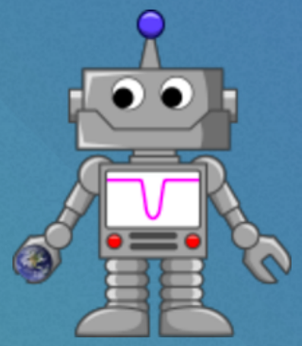
Colón et al., in prep

EPIC 212138198





Colón et al., in prep



Welcome to DAVE:
Discovery and Vetting of K2 Exoplanets

Below are our latest K2 planet candidate dispositions.

keplertcert.seti.org/DAVE

Susan Thompson

SETI Institute / NASA Ames

Jeff Coughlin

SETI Institute

Fergal Mullally

SETI Institute

Knicole Colón

BAER / NASA Ames

Geert Barensten

BAER / NASA Ames

Elisa Quintana

SETI Institute / NASA Ames

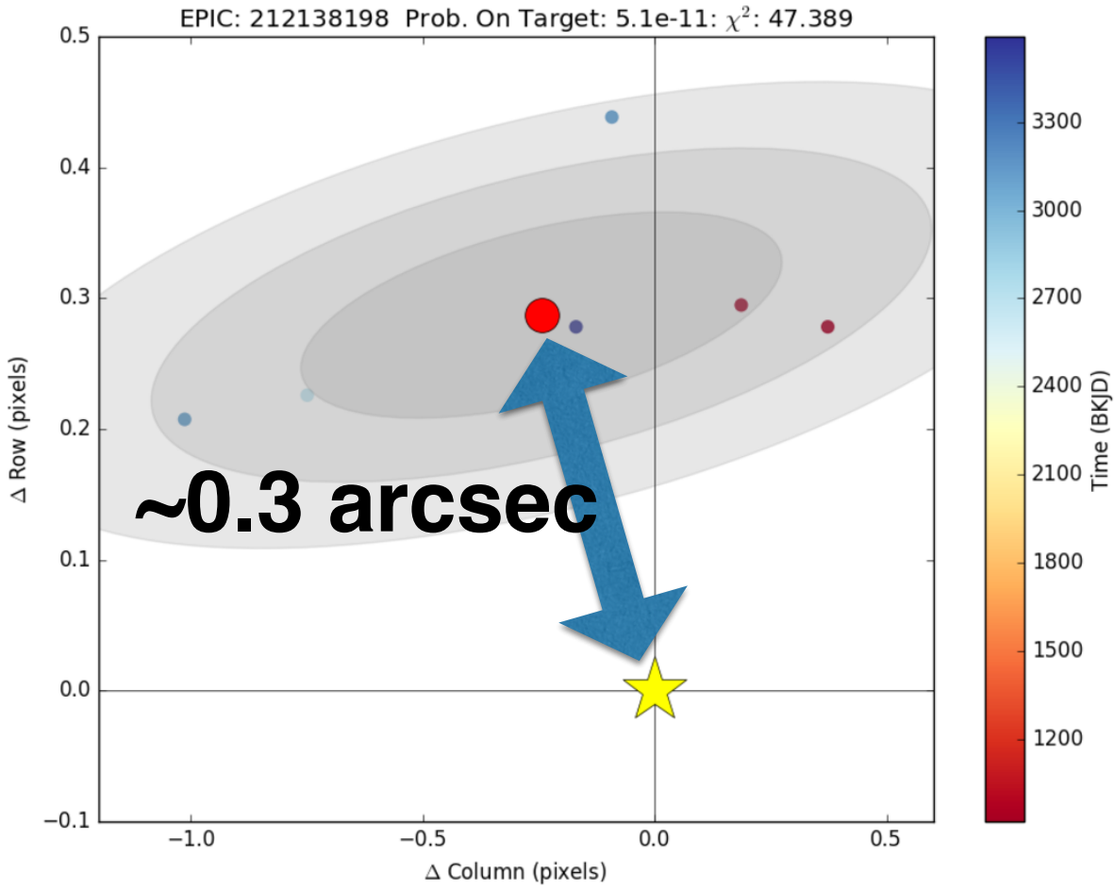
Tom Barclay

BAER / NASA Ames

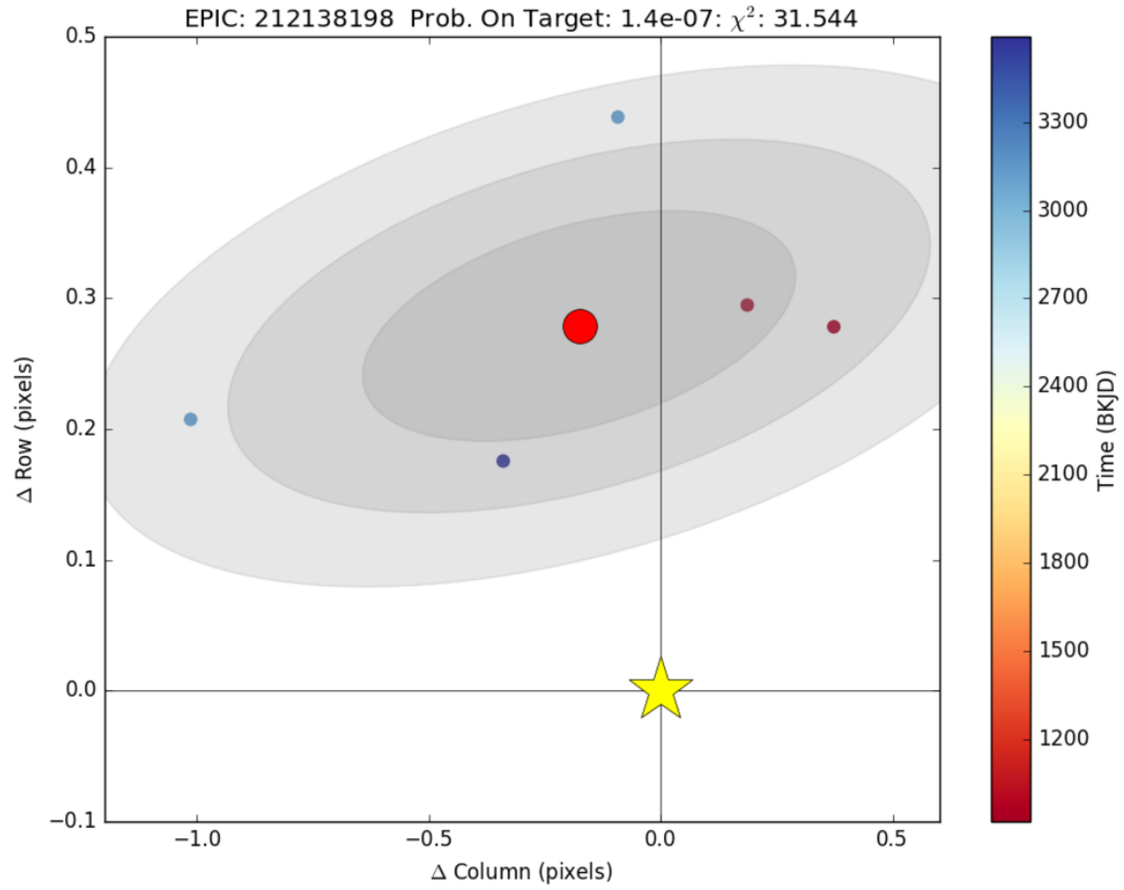
Chris Burke

SETI Institute / NASA Ames

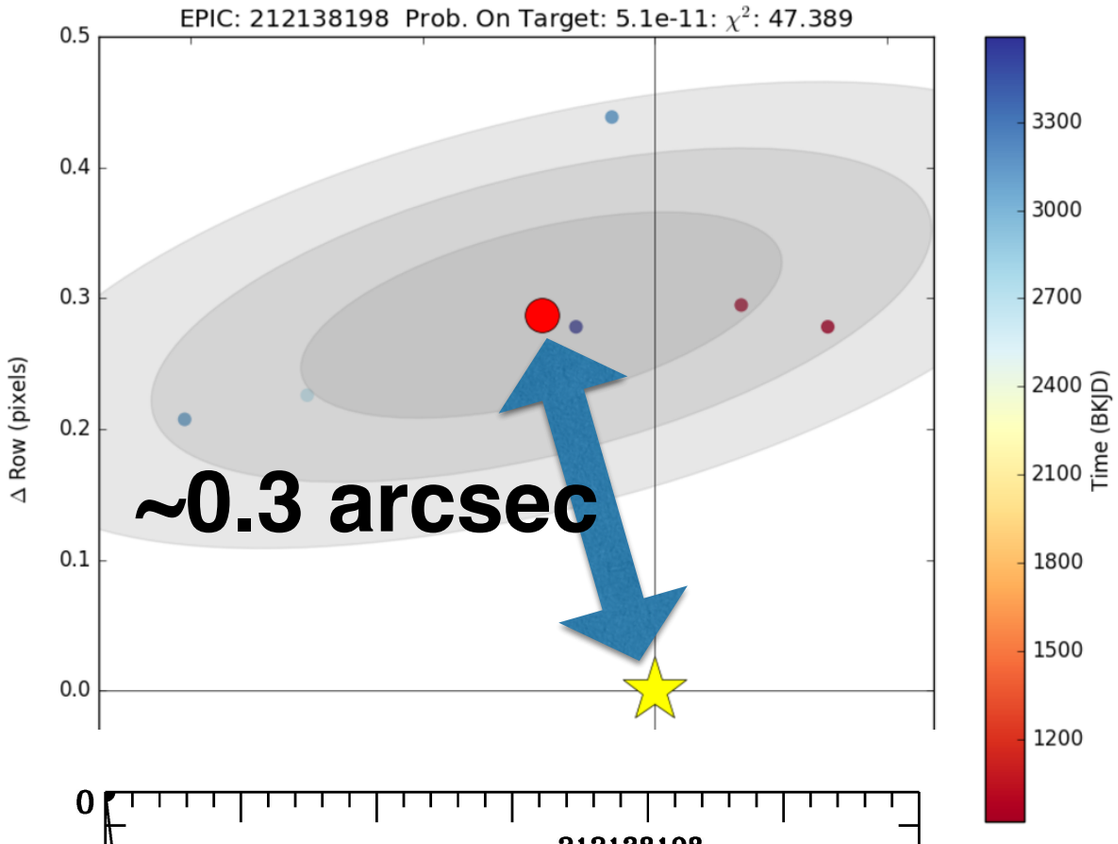
PDC Detrending

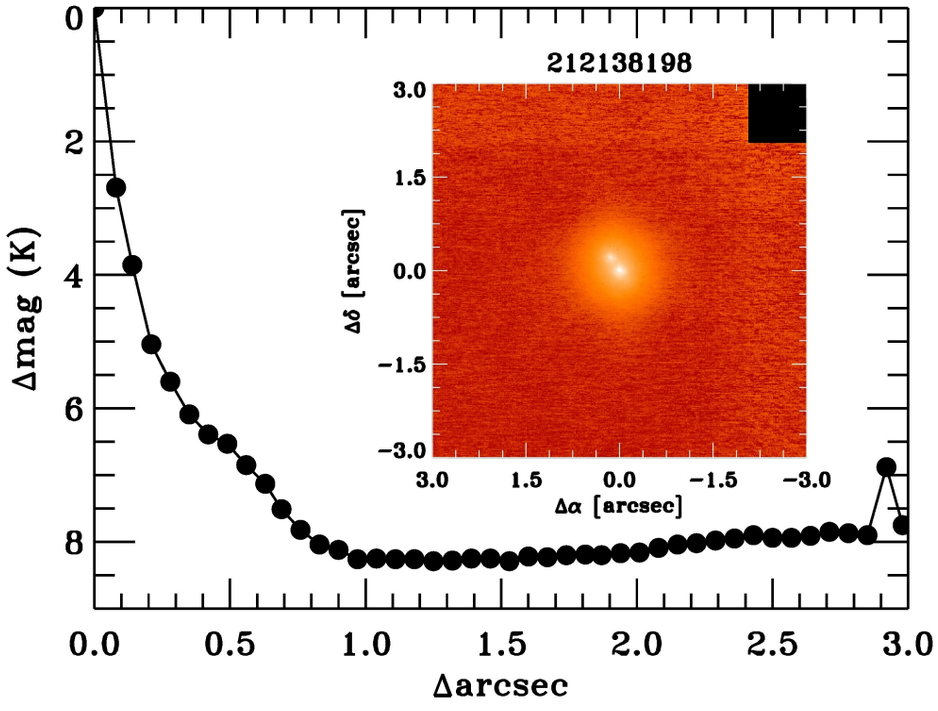


SFF Detrending

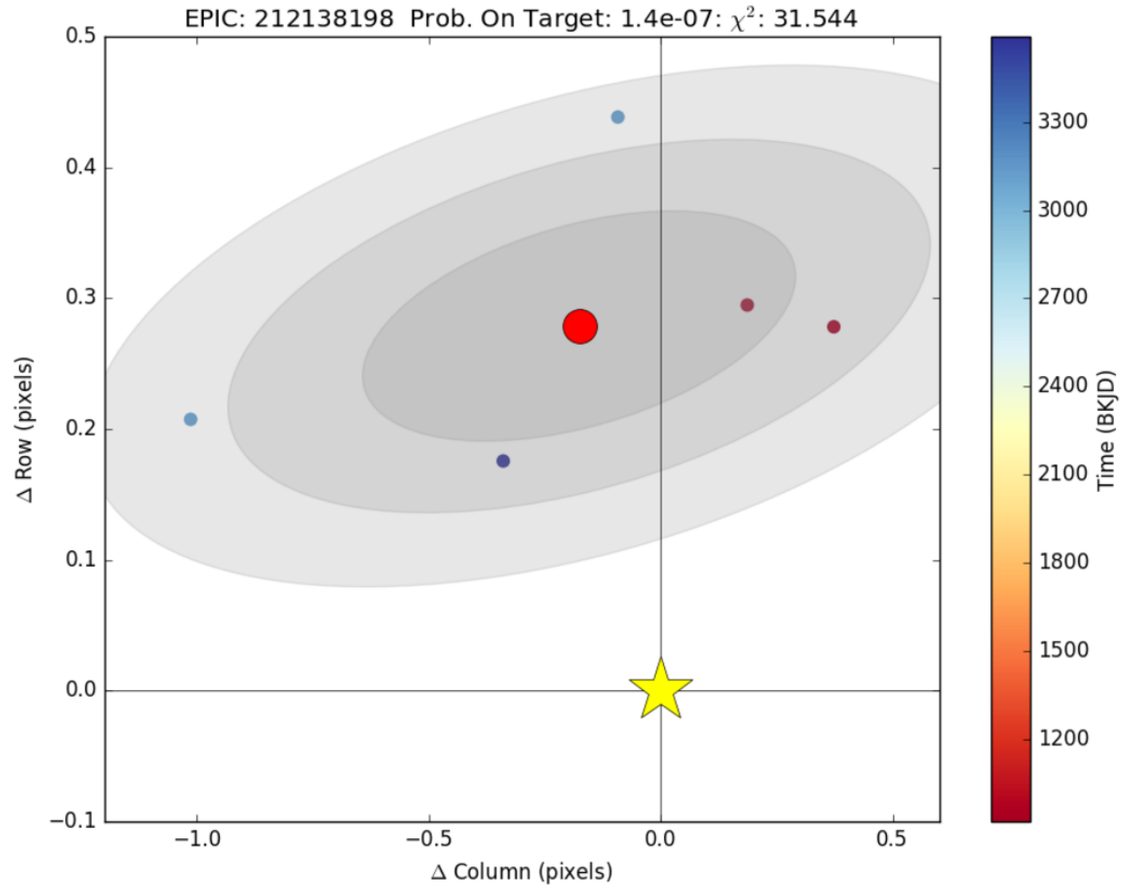


PDC Detrending

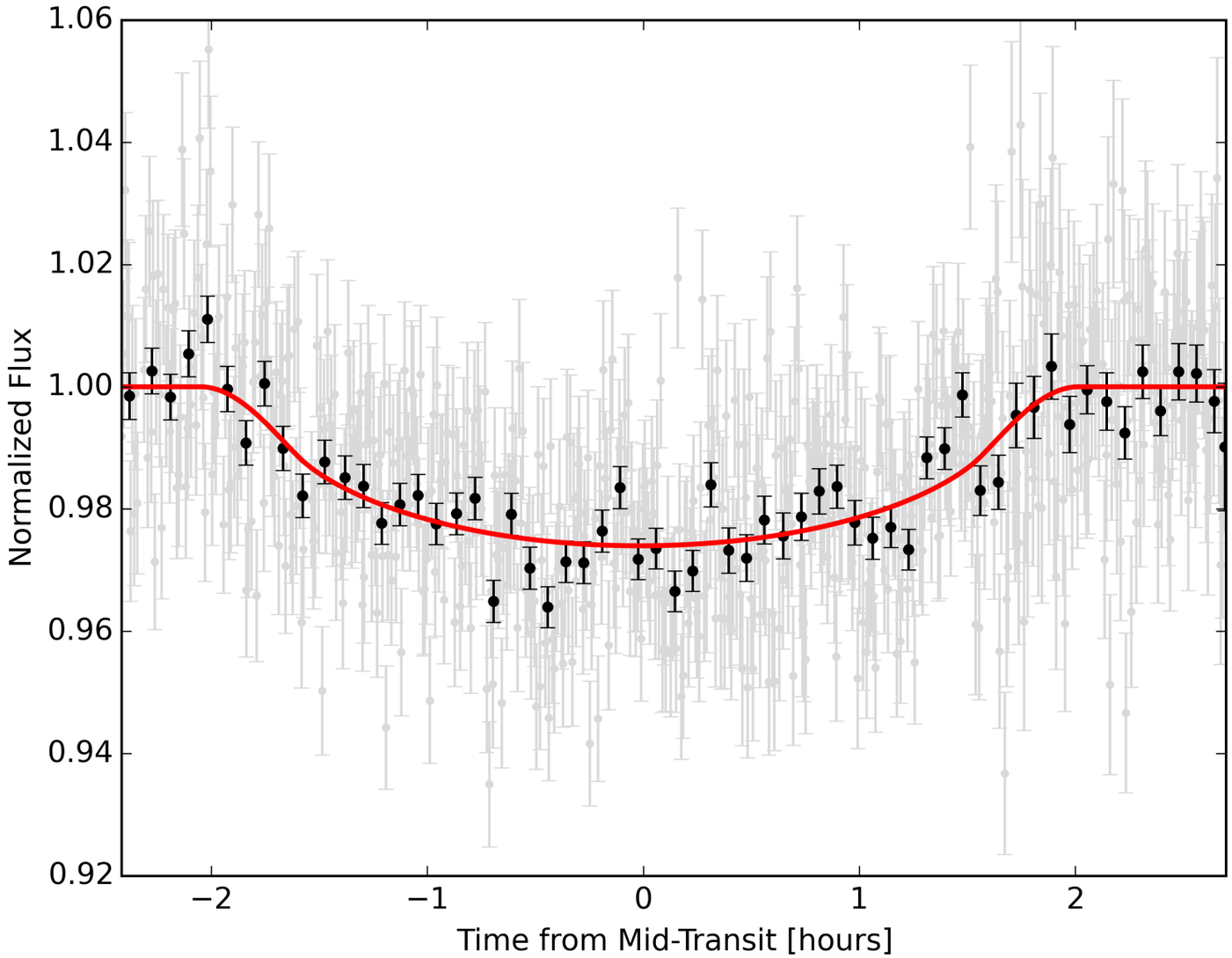




SFF Detrending



EPIC 211713099



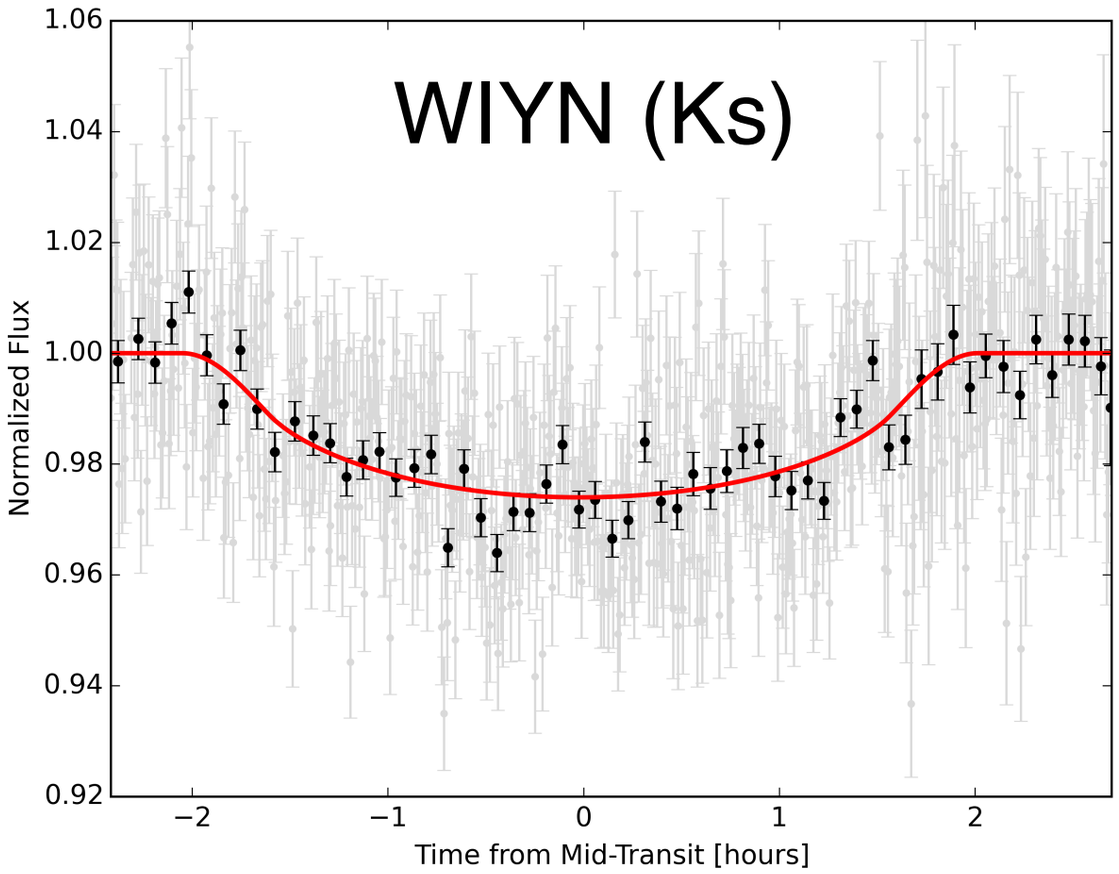
Kp = 13.6 / Ks = 12.2

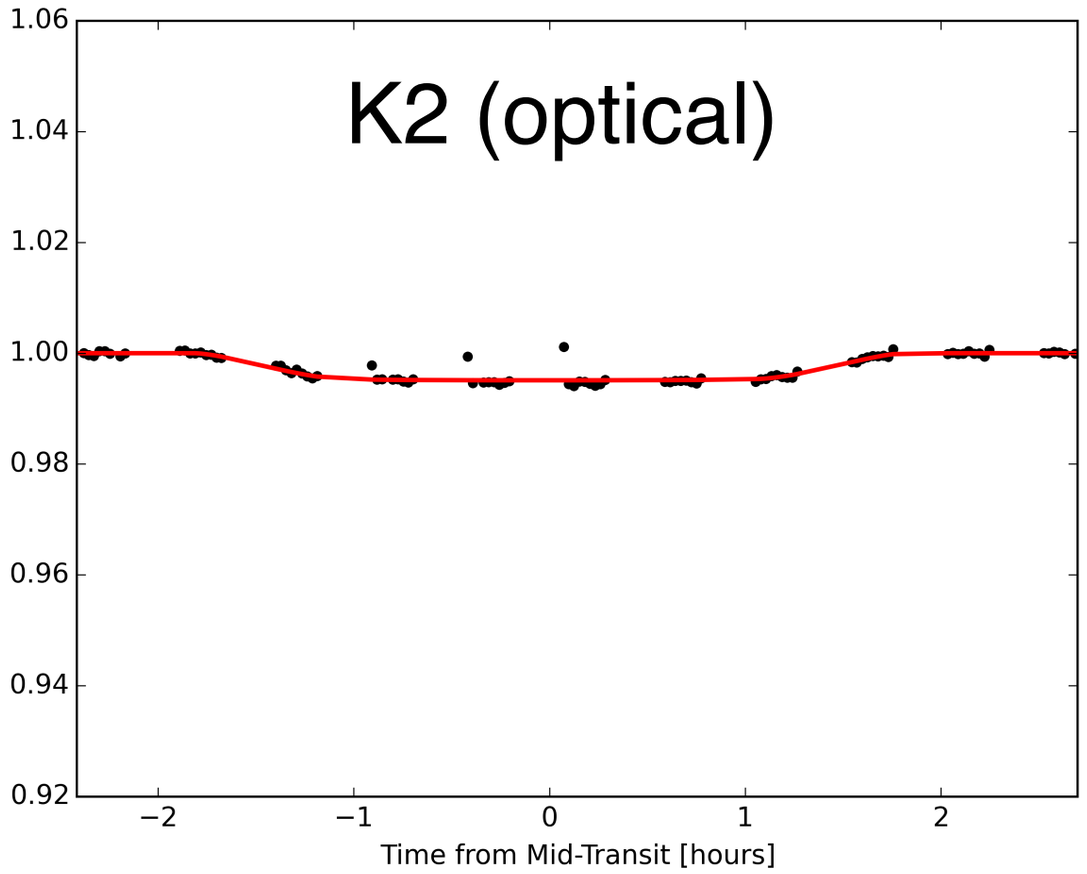
P = 8.56 days / Rp = 7 Re

Colón et al., in prep

EPIC 211713099

false positive

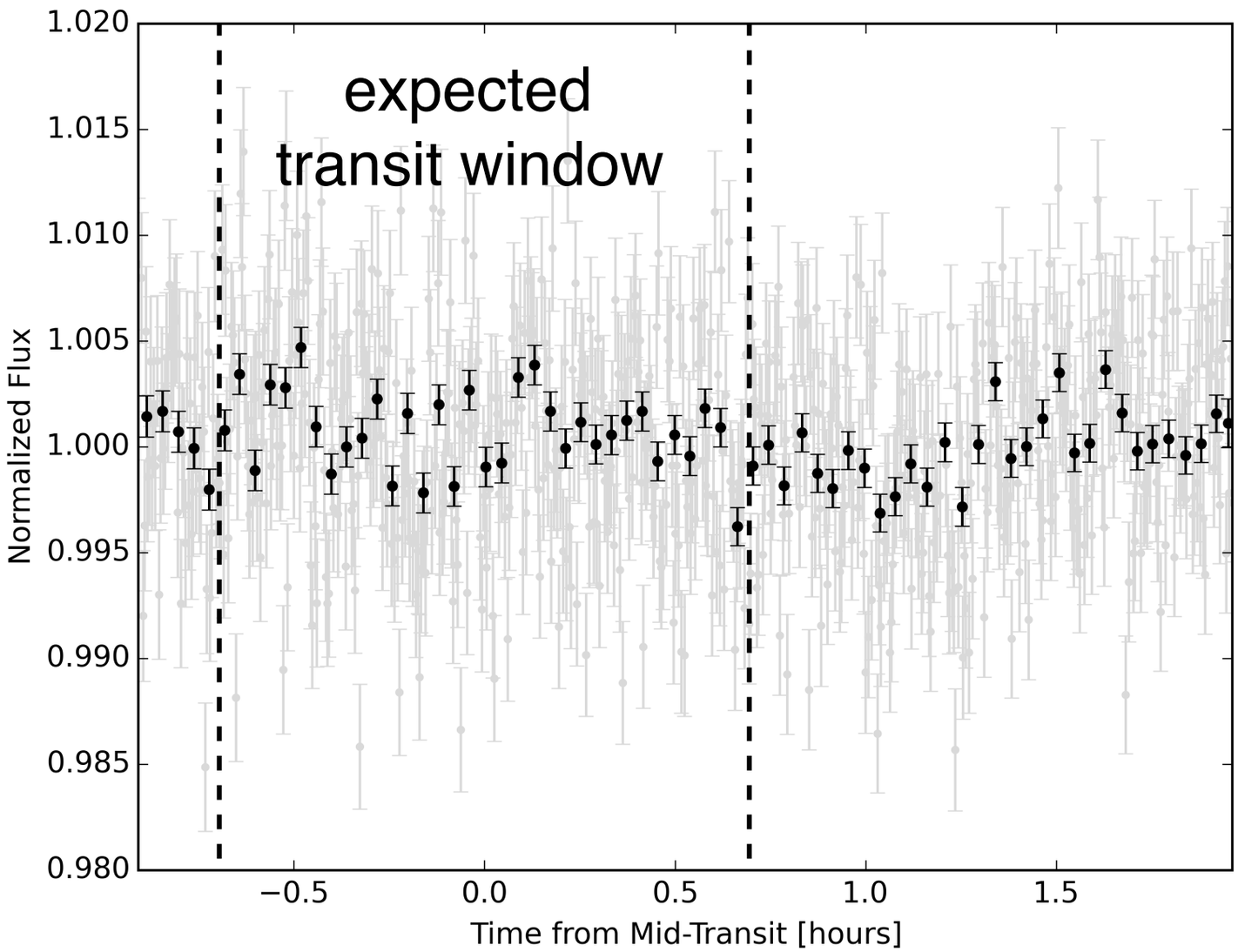




Colón et al., in prep

EPIC 202094740

“lost” candidate from Campaign 0



Kp = 11.5 / Ks = 10.4

P = 0.69 days / Rp = 6.6 Re

Colón et al., in prep

EPIC 202094740