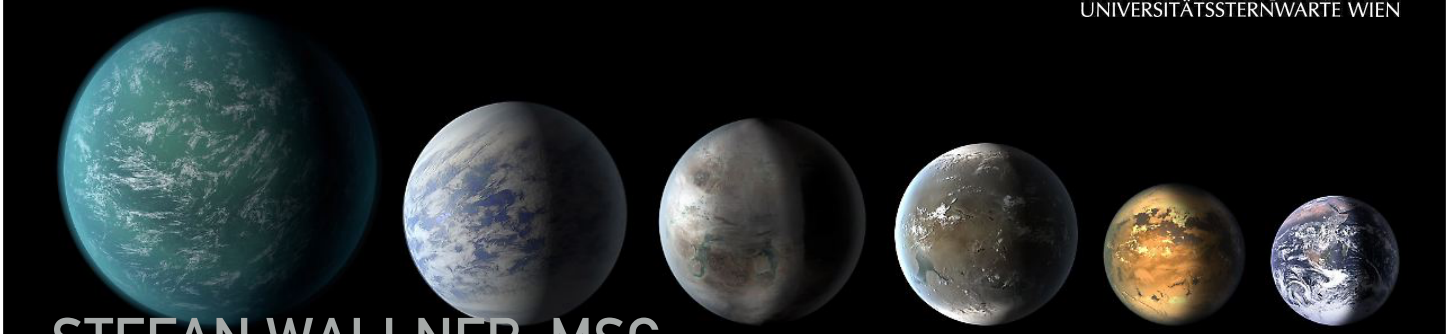
institut für astrophysik
UNIVERSITÄTSSTERNWARTE WIEN



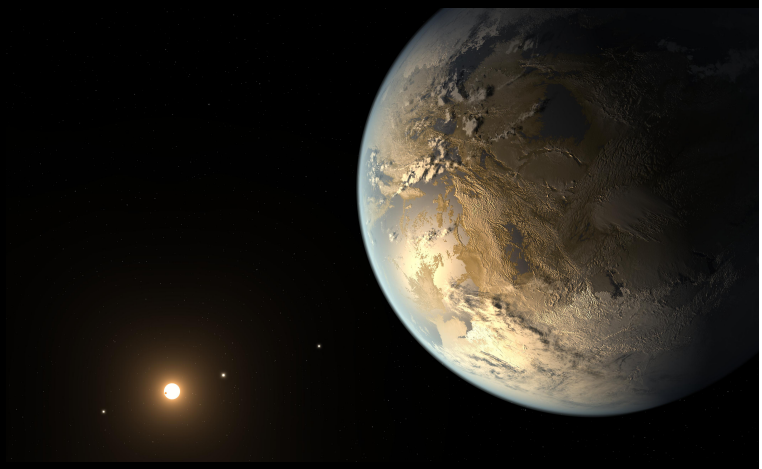
STEFAN WALLNER, MSC

EXOPLANETEN

DEFINITION

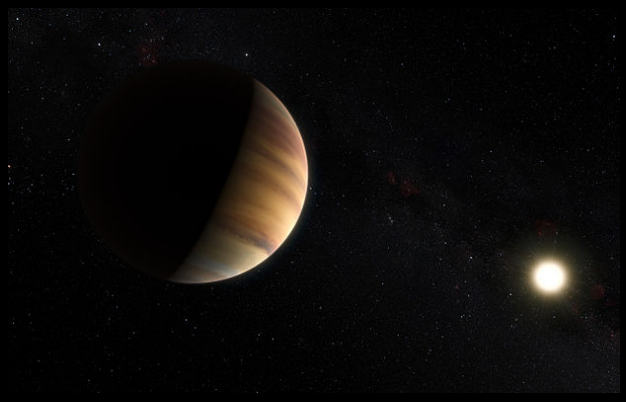
Planetarer Himmelskörper
außerhalb des
Einflussbereiches der Sonne

–> anderes Sonnen- bzw.
Planetensystem



DER ERSTE - DIMIDIUM (51 PEGASI B)

- 6. Oktober 1995
- Messungen der Radialgeschwindigkeit des Sterns (Wackeln)
- $M = 0.46\ M_{Jupiter}$
- r ~ 45 Lichtjahre
- P = 4.23 Tage



5 WEGE PLANETEN ZU FINDEN

Beobachtung des Sternenwackelns

Die Suche nach Schatten

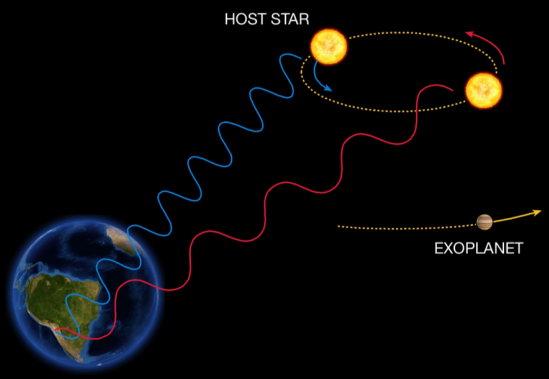
Direkte Bildaufnahmen

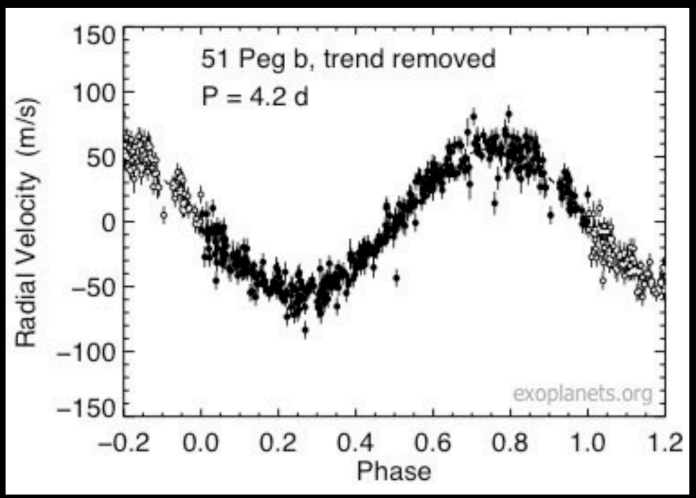
Licht in Gravitationslinsen

Winzige Bewegungen

WACKELNDE STERNE - RADIALGESCHWINDIGKEITSMESSUNG

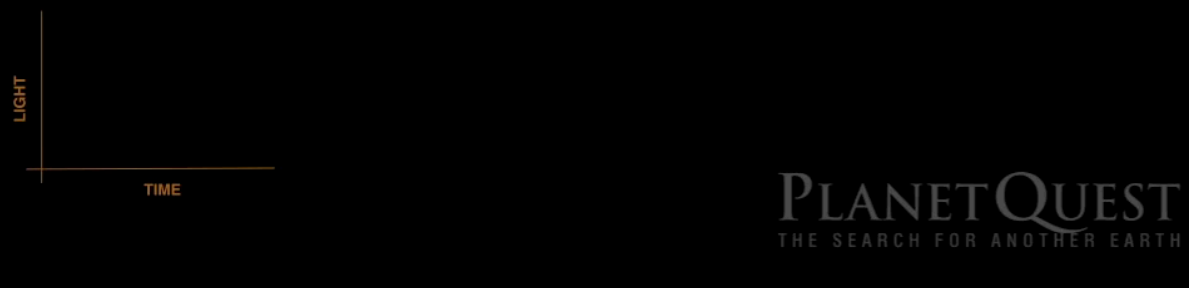
RADIALGESCHWINDIGKEITSMESSUNG BEI 51 PEGASI



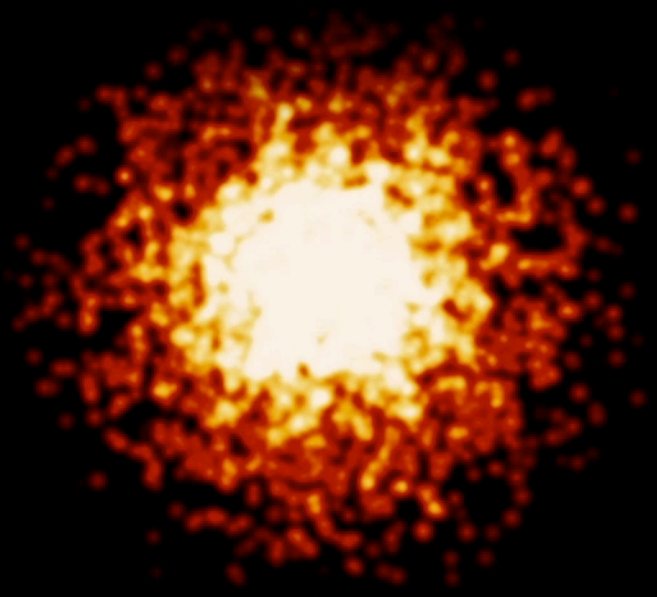


DIE “TRANSITMETHODE” - EIN PLANET

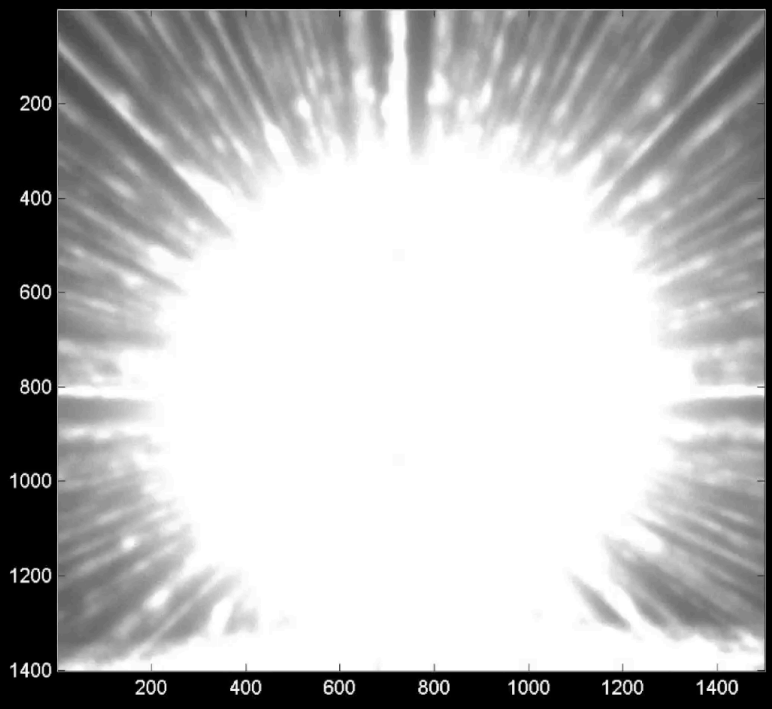
DIE “TRANSITMETHODE” - MEHRERE PLANETEN



DIREKTE AUFNAHMEN - ABDECKUNG DER ÜBERSTRAHLUNG



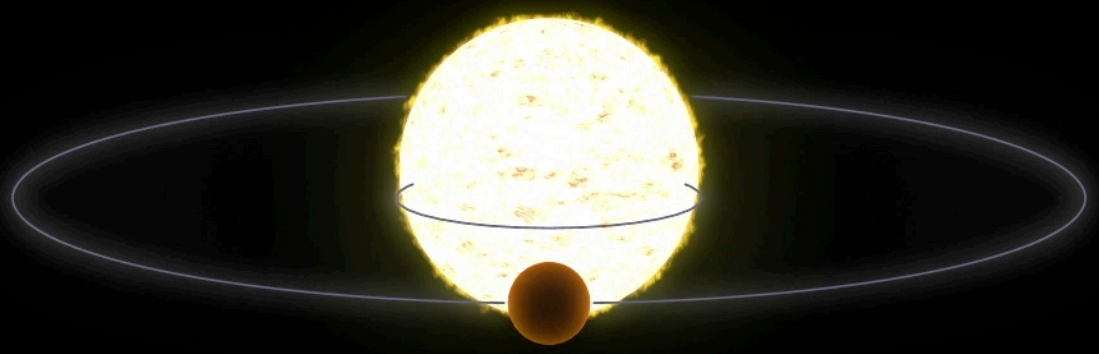
PLANET QUEST
THE SEARCH FOR ANOTHER EARTH



GRAVITATIVES MIKROLENSING

PLANET QUEST
THE SEARCH FOR ANOTHER EARTH

MINI-BEWEGUNGEN - ASTROMETRIE



PLANET QUEST
THE SEARCH FOR ANOTHER EARTH

DIE MISSION "KEPLER"

Suche nach Exoplaneten durch Transits

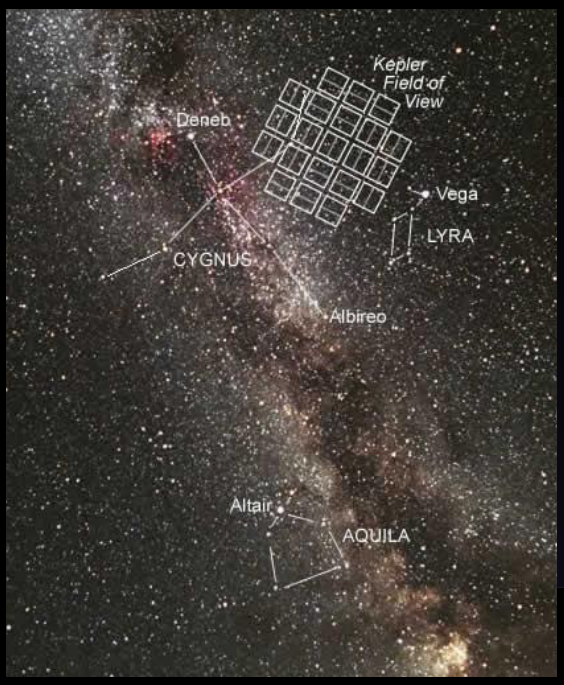
Blickfeld im Sternfeld Schwan

~190,000 Sterne

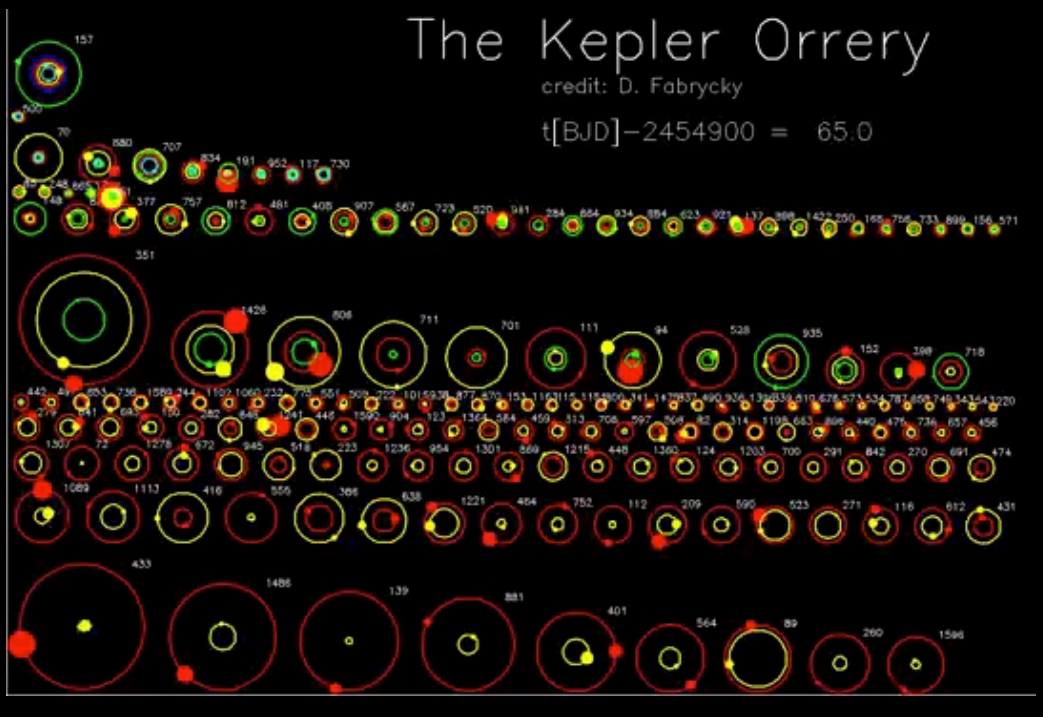
Launch 7. März 2009

Probleme 2013, modifizierte Mission ab 2014

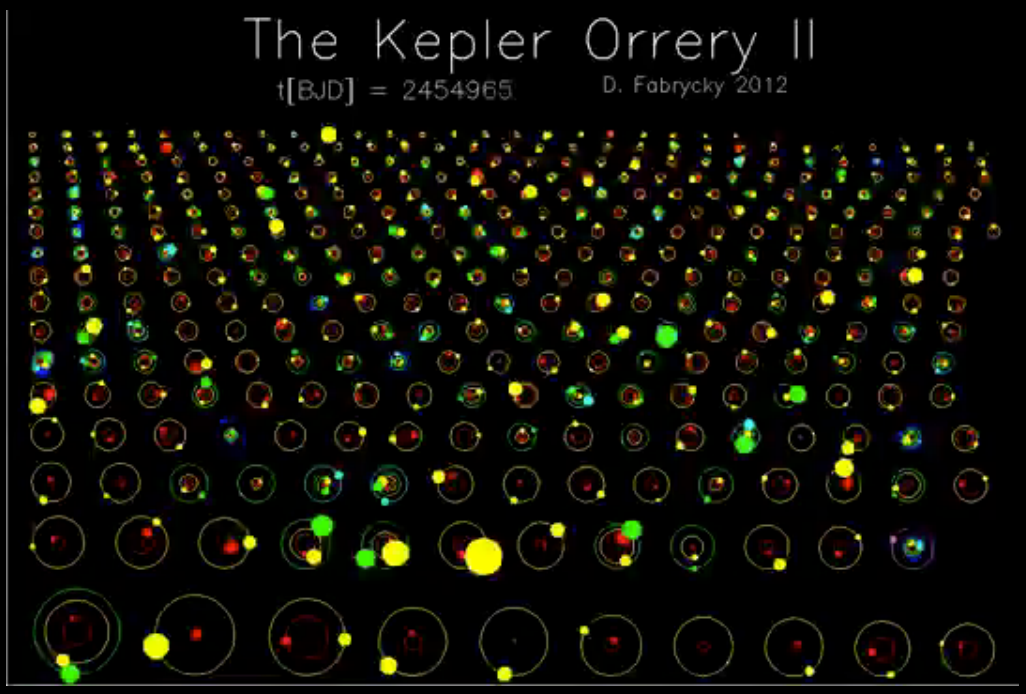
Ende 2018 (Treibstoffmangel)



2011



FEB. 2012 - 885



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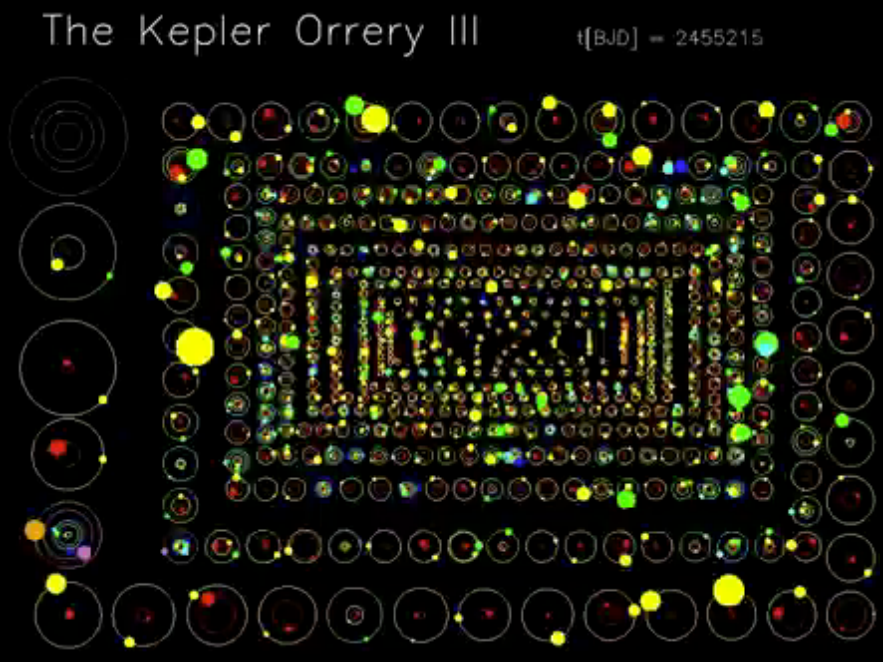
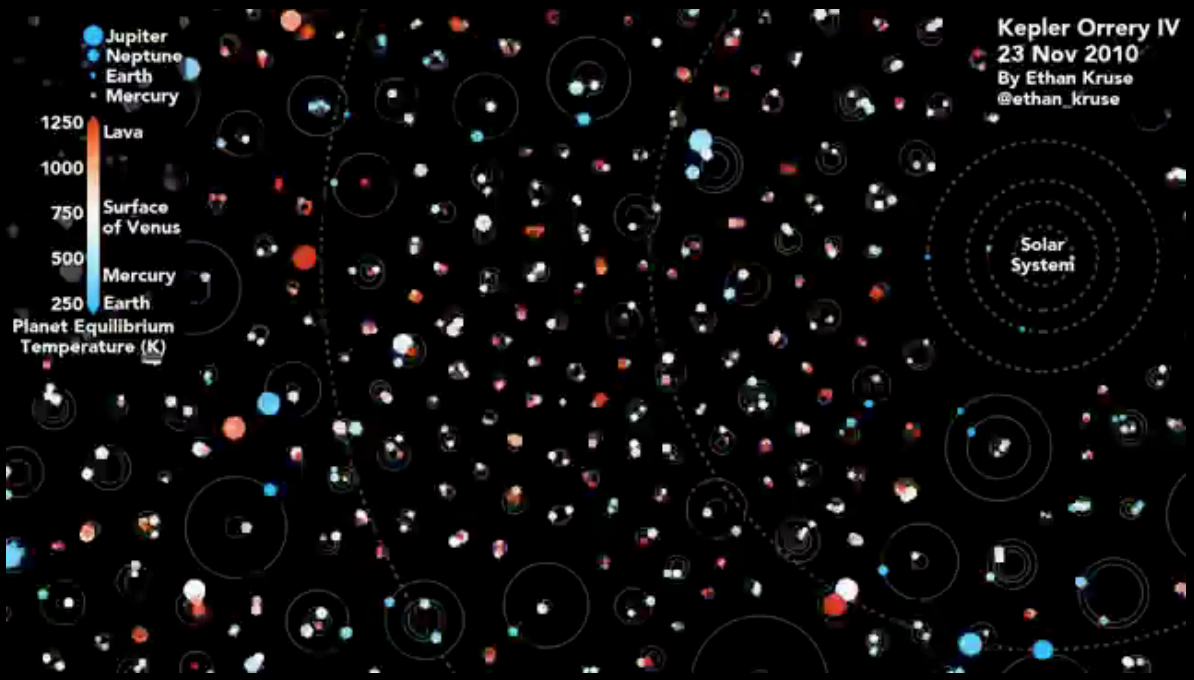
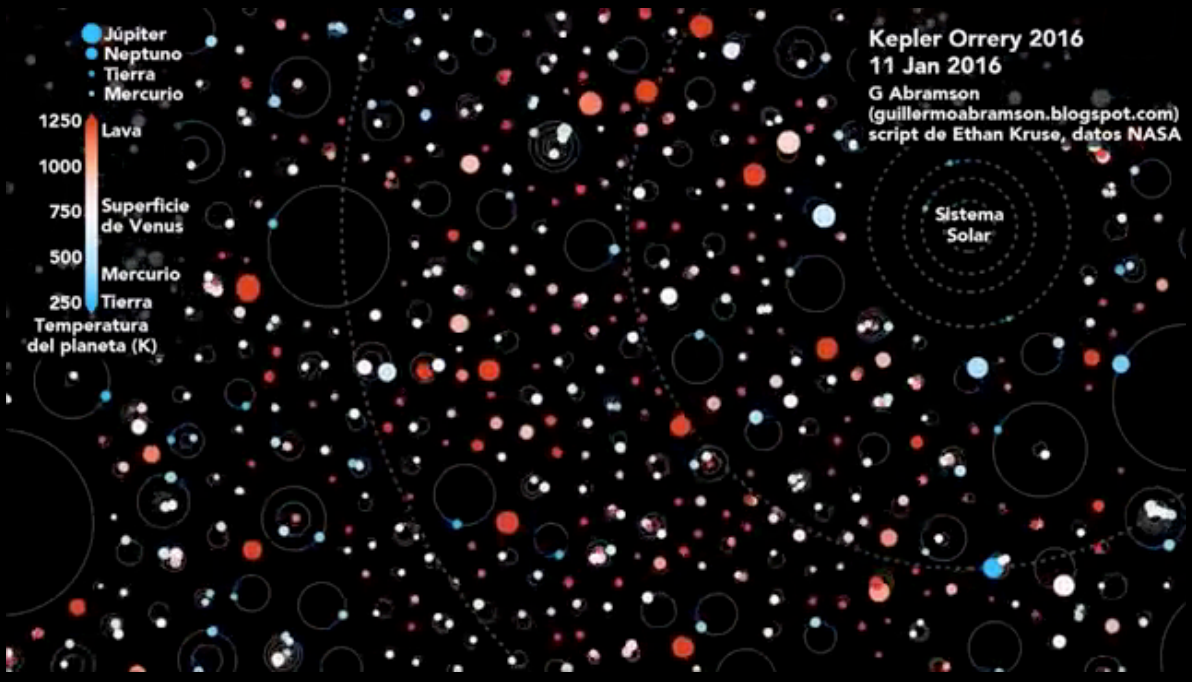


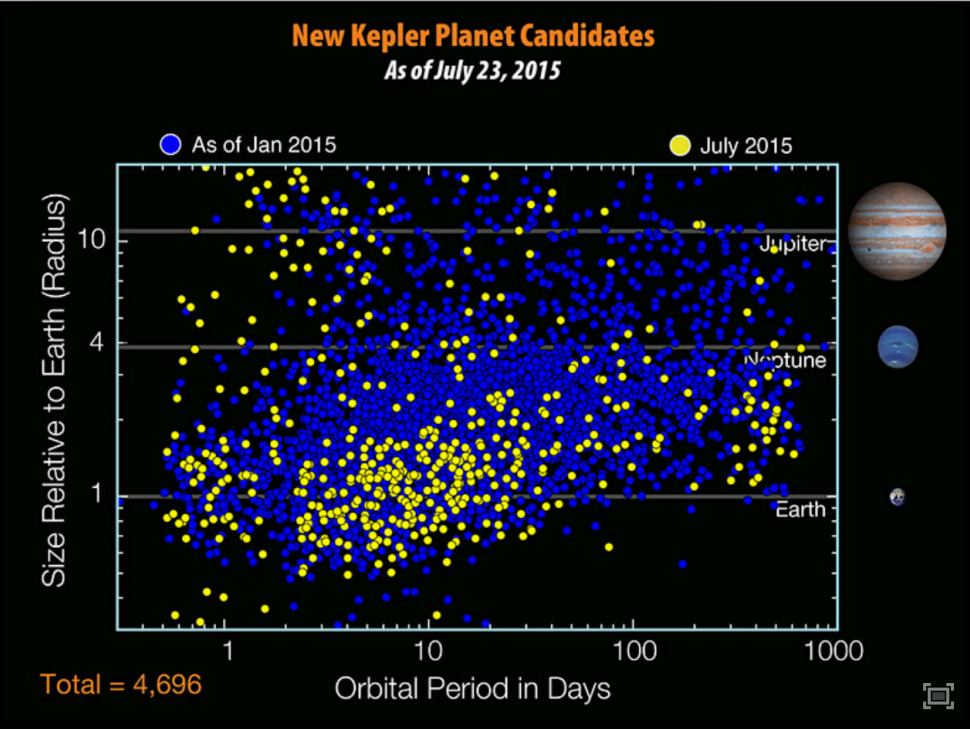
NOV. 2015 - 1705



MAI 2016 - 2289

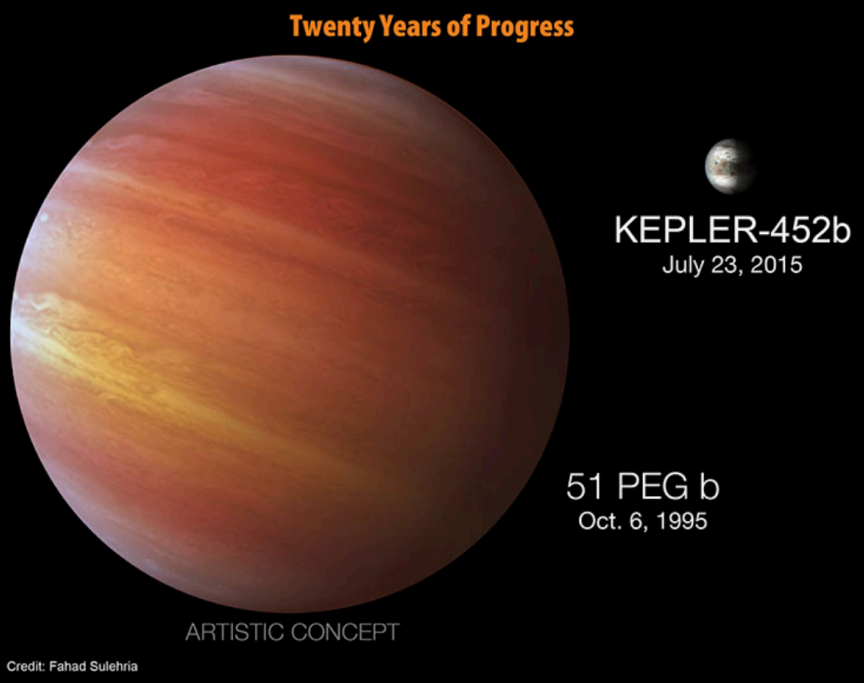


KANDIDATEN KEPLERS



KEPLER-452B - 23. JULI 2015

DER FORTSCHRITT - 20 JAHRE AUF DER SUCHE



TYPEN

Gesteinsplaneten

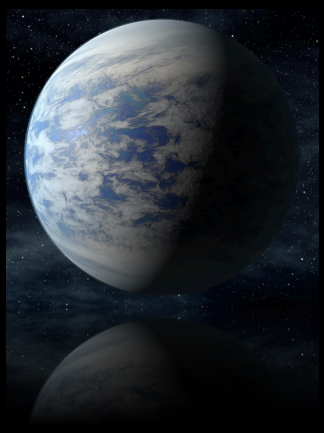
- erdähnlich
- mehrere Erdmassen: “Supererden”

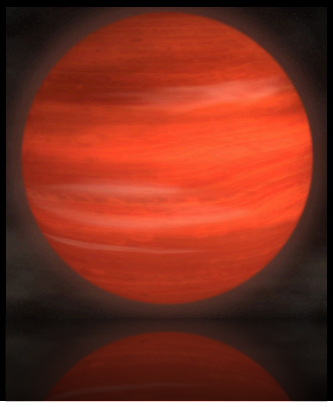
Gasriesen

- jupiterähnlich
- große Nähe zum Stern: “Hot Jupiters”

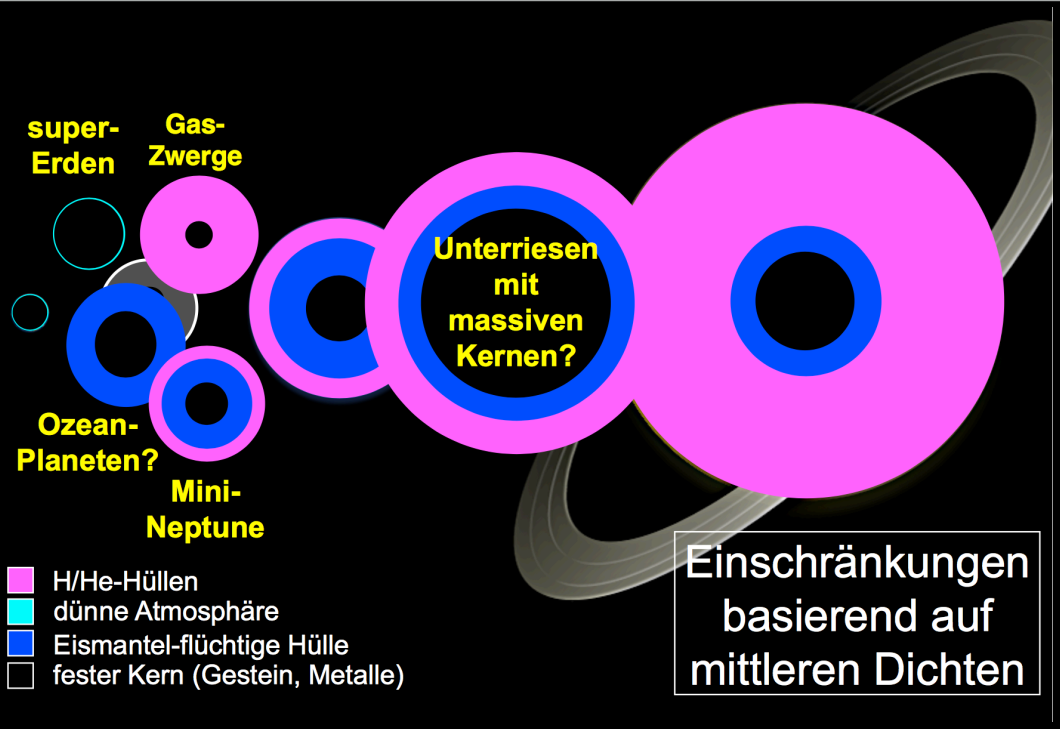
Gasplaneten

- neptunähnlich
- “Hot Neptunes”

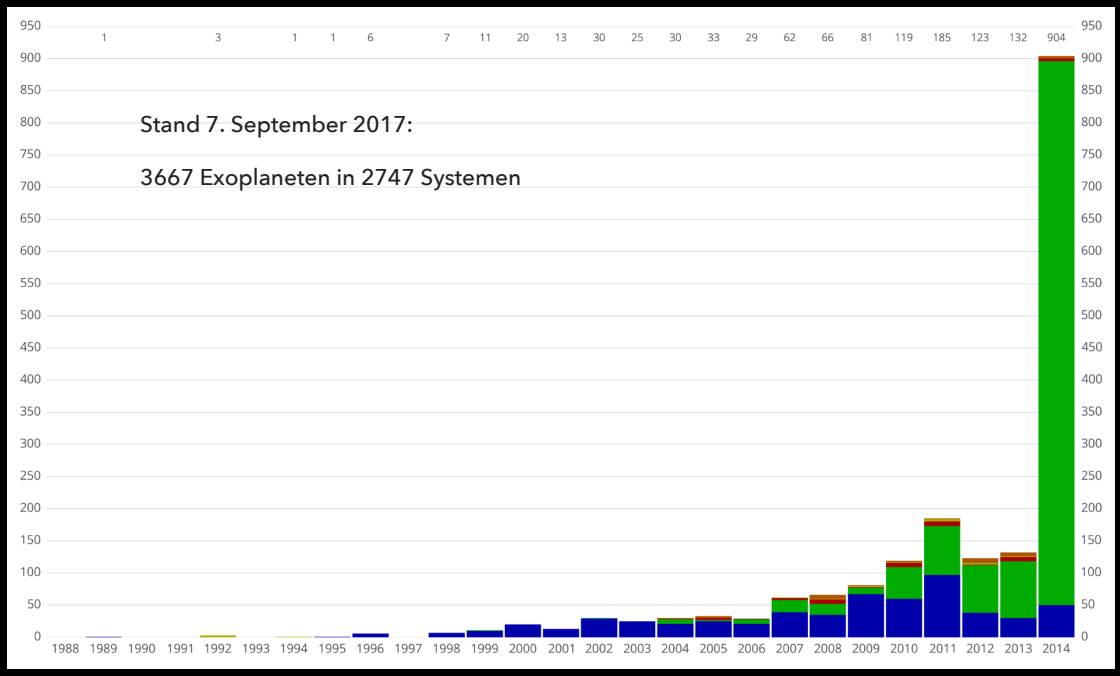




AUFBAU



EXOPLANETEN



2015: 182

2016: 1458

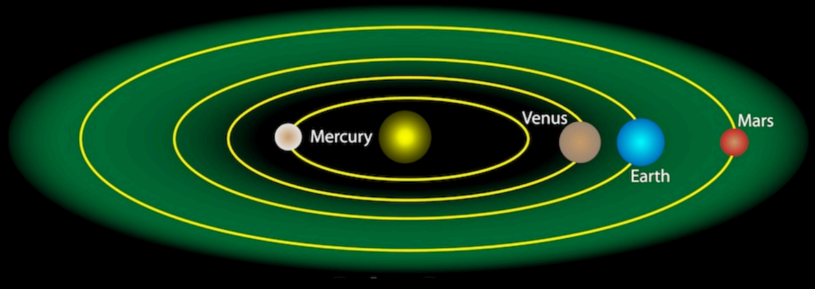
2017: 90

Exoplaneten

≠

Leben

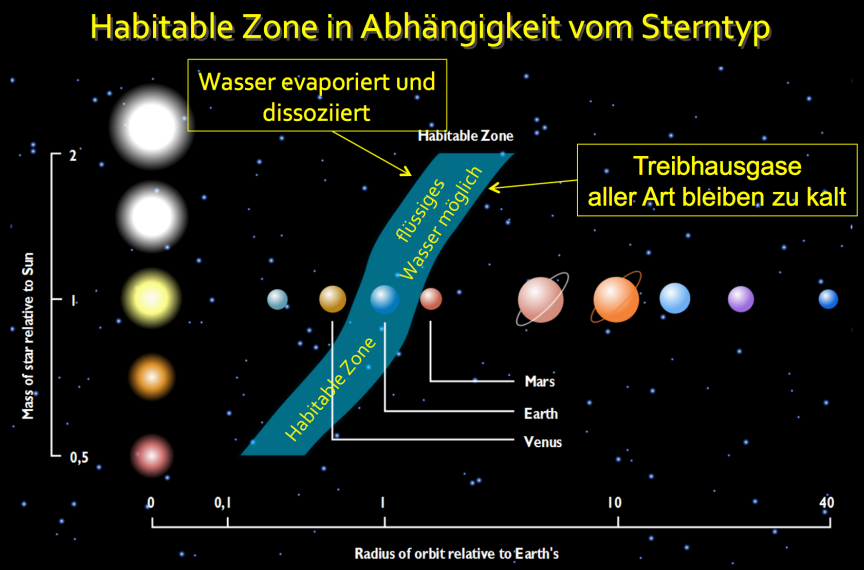
Habitable Zonen:
Orte, wo Planeten mit
flüssigem Oberflächenwasser im Prinzip möglich sind



Hängt von der stellaren Strahlung ab, daher von der Distanz vom Stern.
Bedingt die Anwesenheit einer Atmosphäre

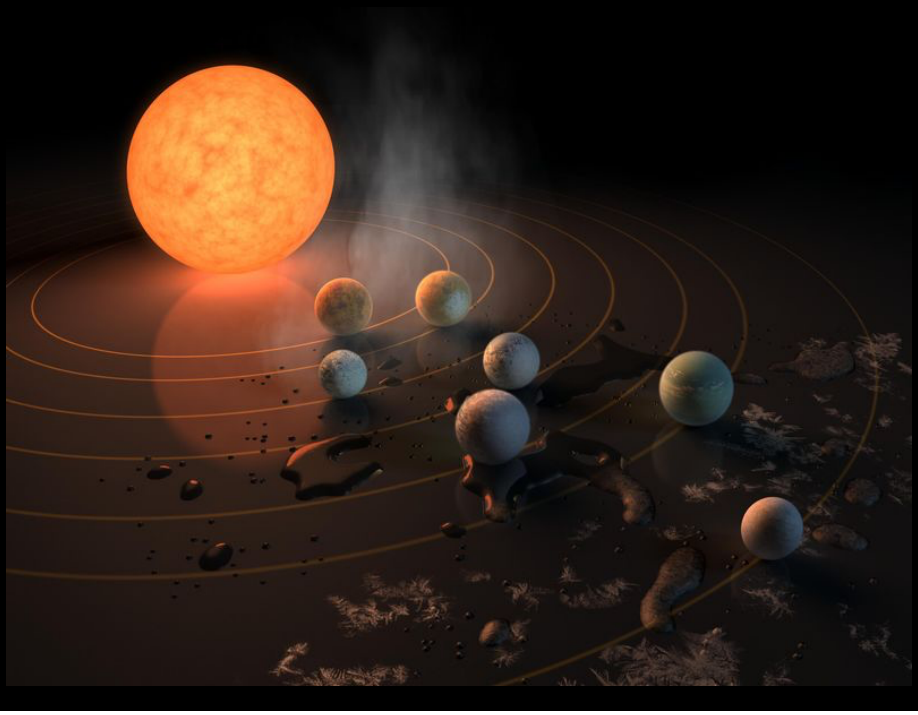
NASA/Ames/JPL-Caltech

DIE HABITABLE ZONE IM SONNENSYSTEM

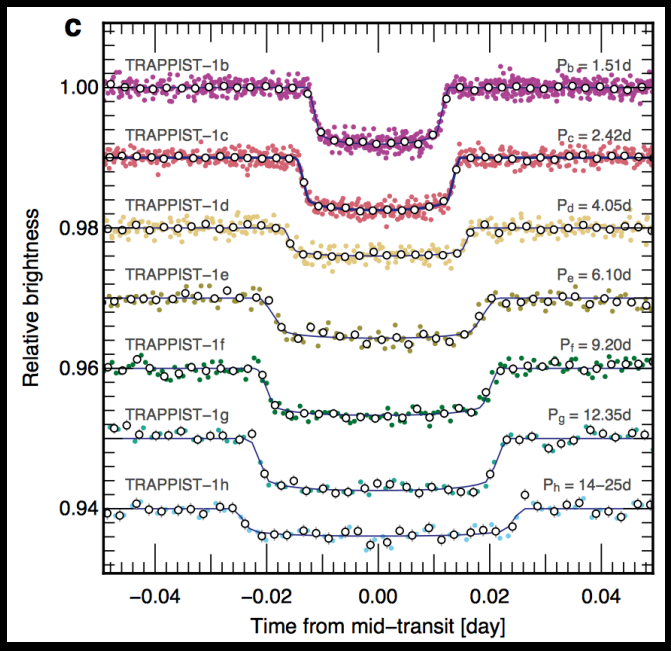


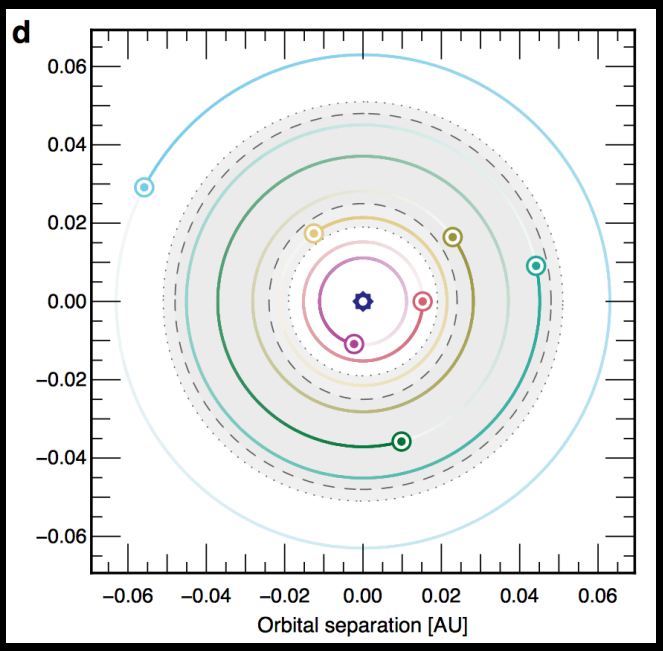
(Kasting et al. (1993); http://www.dlr.de/en/desktopdefault.aspx/tabid-5170/8702_read-15322/8702_page-2/

TRAPPIST-1



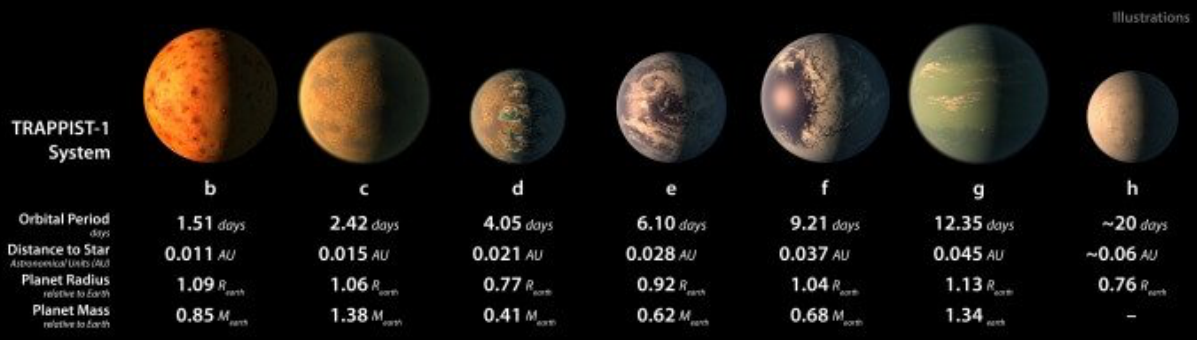
TRAPPIST-1

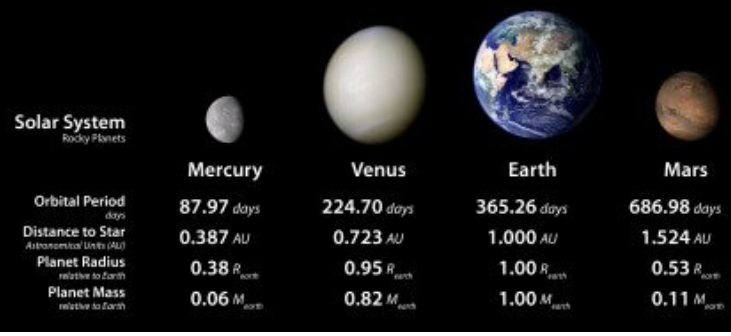




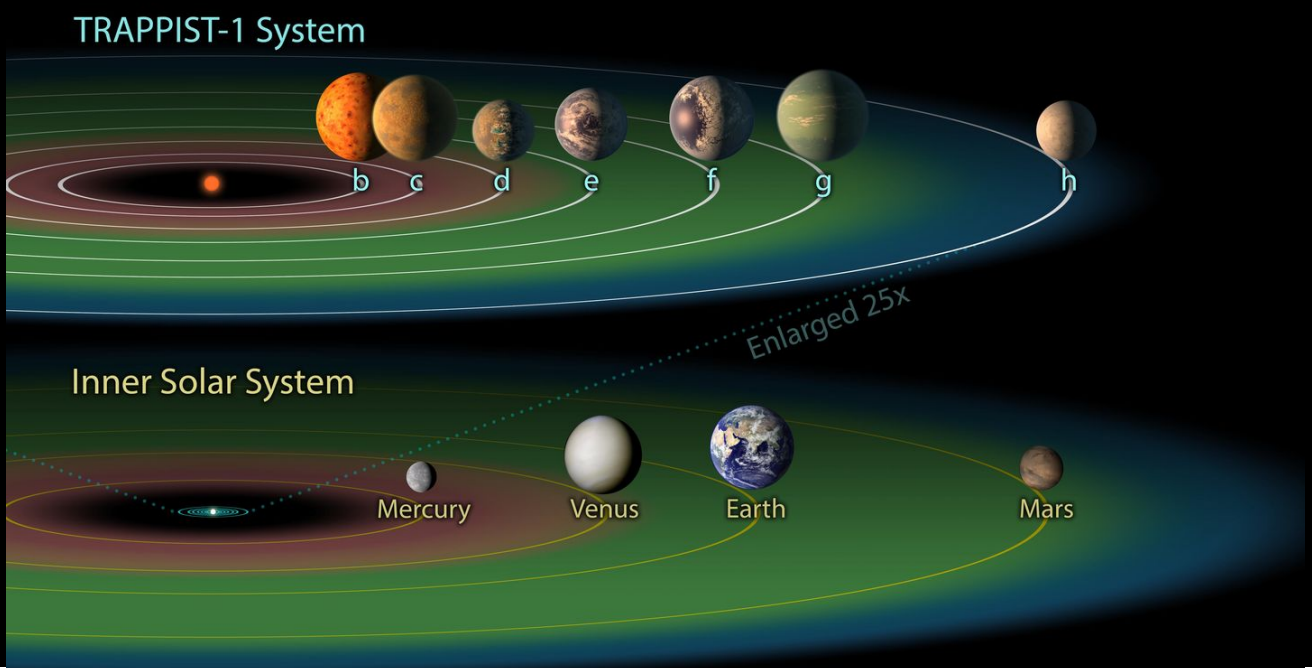
Gillon et al. 2017

TRAPPIST-1

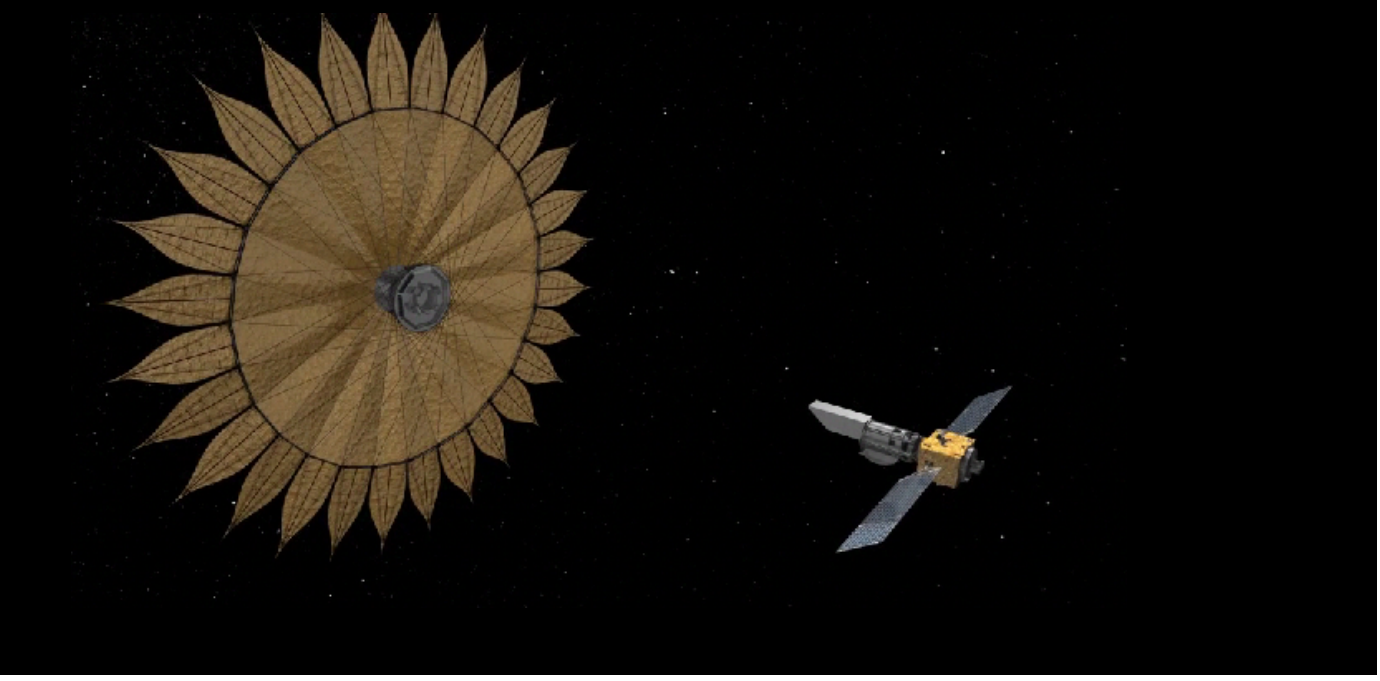




TRAPPIST-1



DIE ZUKUNFT - DAS STARSHADE PROJECT (WFIRST)



DIE ZUKUNFT - DAS STARSHADE PROJECT

Starshade Deployment Technology Demo

August 2013

Gefunden:

3667

Planeten

(nur in unserer eigenen Galaxie):

~400 000 000 000