



**La neta de los  
Exoplanetas...**

DESCUBRIMIENTO DE PLANETAS >

# Un telescopio de la NASA descubre un sistema solar con siete planetas como la Tierra

Una estrella enana y fría a 40 años luz cobija un sistema planetario que podría albergar vida



NUÑO DOMÍNGUEZ

24 FEB 2017 - 01:03 CET

PERFIL PERIODISMO PURO

CIENCIA ▶ LO ANUNCIÓ LA NASA

## Descubren un sistema solar con siete planetas como la Tierra

Se trata de uno de los descubrimientos más importantes para quienes buscan planetas habitables para el futuro de la humanidad.



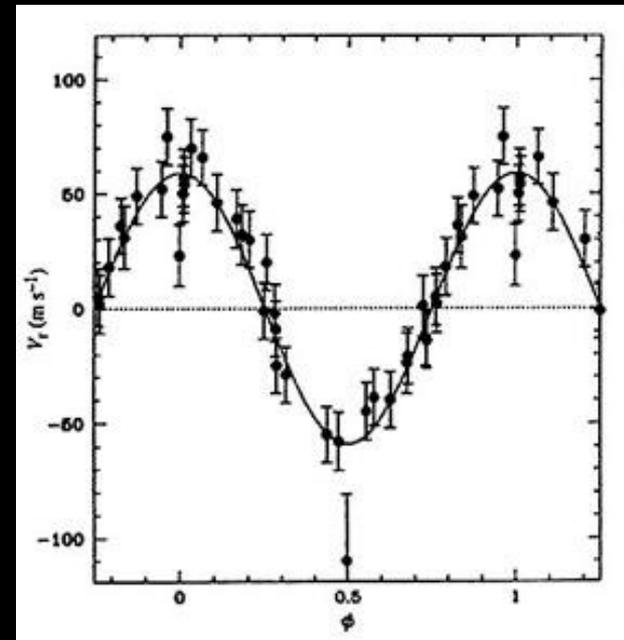
Florencia Ballarino

TRAPPIST-1 System



# Historia

- 9 de enero de 1992
  - Alex Wolszczan y Dale Frail
  - Arecibo Observatory
  - Pulsar: PSR B1257+12
  - 2,300 años luz.
  - Cuatro veces más masivos que la Tierra
  - PSR1257+12b, PSR1257+12c y PSR1257+12d.
- 



- 51 Pegasi



Mayor y Queloz



ELODIE

# Métodos

## **Tambalearse**

Velocidad Radial (632 planetas descubiertos)

## **Sombras**

Tránsitos (2726 planetas)

## **Con Fotografías**

Imagen Directa (44 planetas)

## **Lentes gravitacionales**

Gravitational Microlensing (44 planetas)

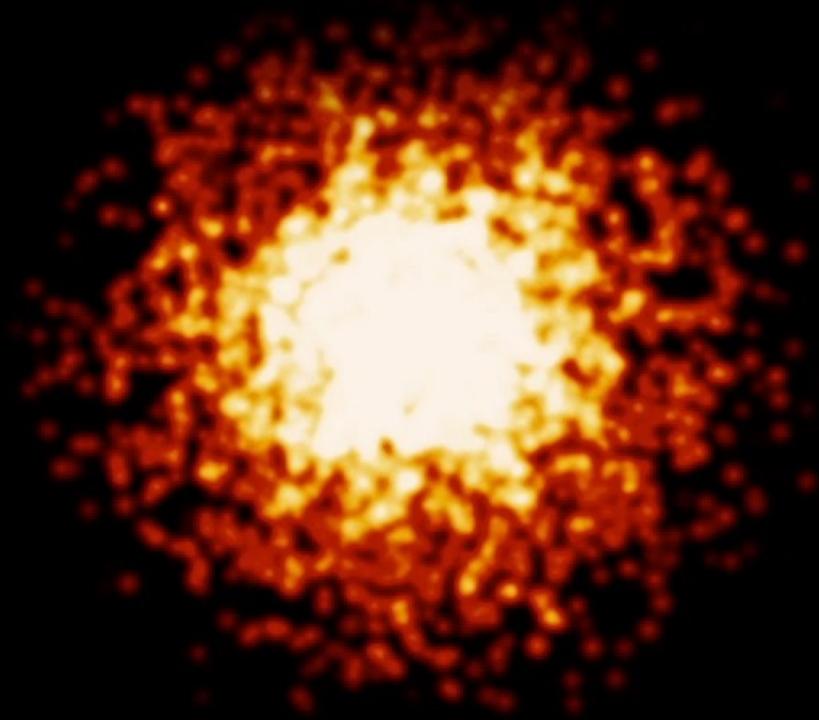
## **Movimientos propios**

Astrometría (1 planeta)

# Velocidad radial



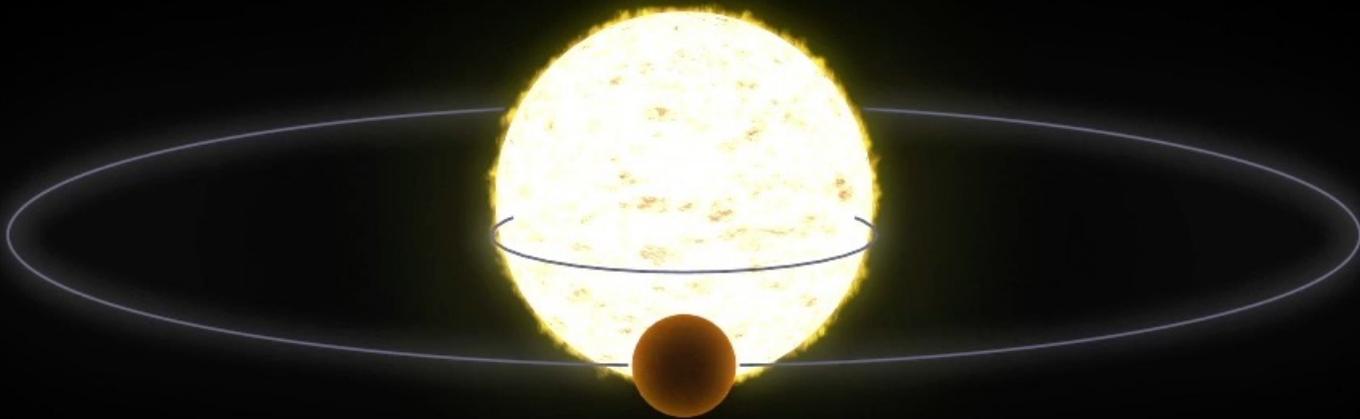
# Tomar fotografías



PLANET QUEST  
THE SEARCH FOR ANOTHER EARTH

# Lentes gravitacionales (micro)

# Astrometría



PLANET QUEST  
THE SEARCH FOR ANOTHER EARTH

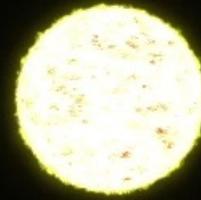
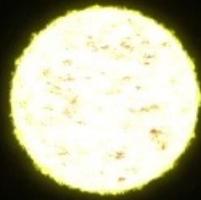
# Tránsito: un planeta



PLANET QUEST  
THE SEARCH FOR ANOTHER EARTH

# Tránsito varios planetas

PLANET QUEST  
THE SEARCH FOR ANOTHER EARTH



# Tránsito: Múltiples planetas



# El inicio

**nature**

International weekly journal of science

[Home](#)

[News & Comment](#)

[Research](#)

[Careers & Jobs](#)

[Current Issue](#)

[Archive](#)

[Audio & Video](#)

[For A](#)

[Archive](#)

[Volume 533](#)

[Issue 7602](#)

[Letters](#)

[Article](#)

**NATURE** | LETTER



[日本語要約](#)

## Temperate Earth-sized planets transiting a nearby ultracool dwarf star

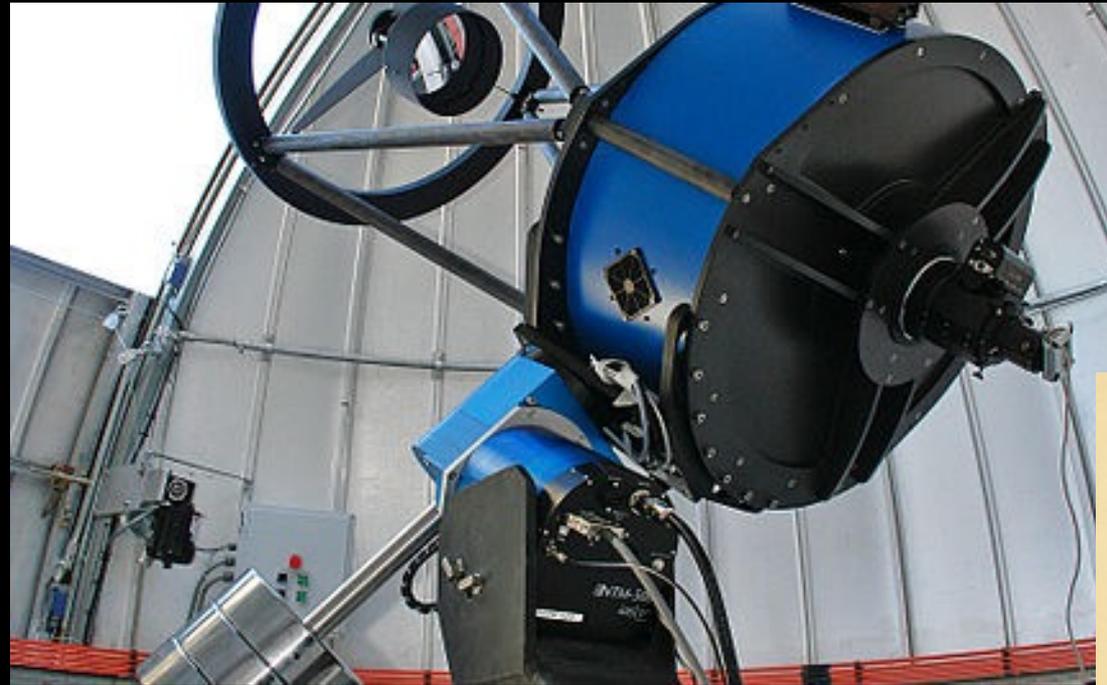
[Michaël Gillon](#), [Emmanuël Jehin](#), [Susan M. Lederer](#), [Laetitia Delrez](#), [Julien de Wit](#), [Artem Burdanov](#), [Valérie Van Grootel](#), [Adam J. Burgasser](#), [Amaury H. M. J. Triaud](#), [Cyrielle Opitom](#), [Brice-Olivier Demory](#), [Devendra K. Sahu](#), [Daniella Bardalez Gagliuffi](#), [Pierre Magain](#) & [Didier Queloz](#)

[Affiliations](#) | [Contributions](#) | [Corresponding author](#)

*Nature* **533**, 221–224 (12 May 2016) | doi:10.1038/nature17448

Received 11 January 2016 | Accepted 18 February 2016 | Published online 02 May 2016

- TRAPPIST: **T**Ransiting **P**lanets and **P**lanetesimals **S**mall **T**elescope



- Monitoreo del brillo de la estrella TRAPPIST-1 (2MASS J23062928-0502285)
- En el muy cercano IR (aprox.  $0.9 \mu\text{m}$ )
- Alta frecuencia (aprox. 1.2 minutos) durante 245 horas en más de 62 noches
- Del 17 de septiembre al 28 diciembre de 2015

# No era suficiente

- Observaciones fotométricas follow-up  
Visible: Himalayan Chandra 2-metre Telescope (HCT) en India,
- Infrarrojo: 8-metre Very Large Telescope (VLT) en Chile
- 3.8-metre UK Infrared Telescope (UKIRT) en Hawaii.

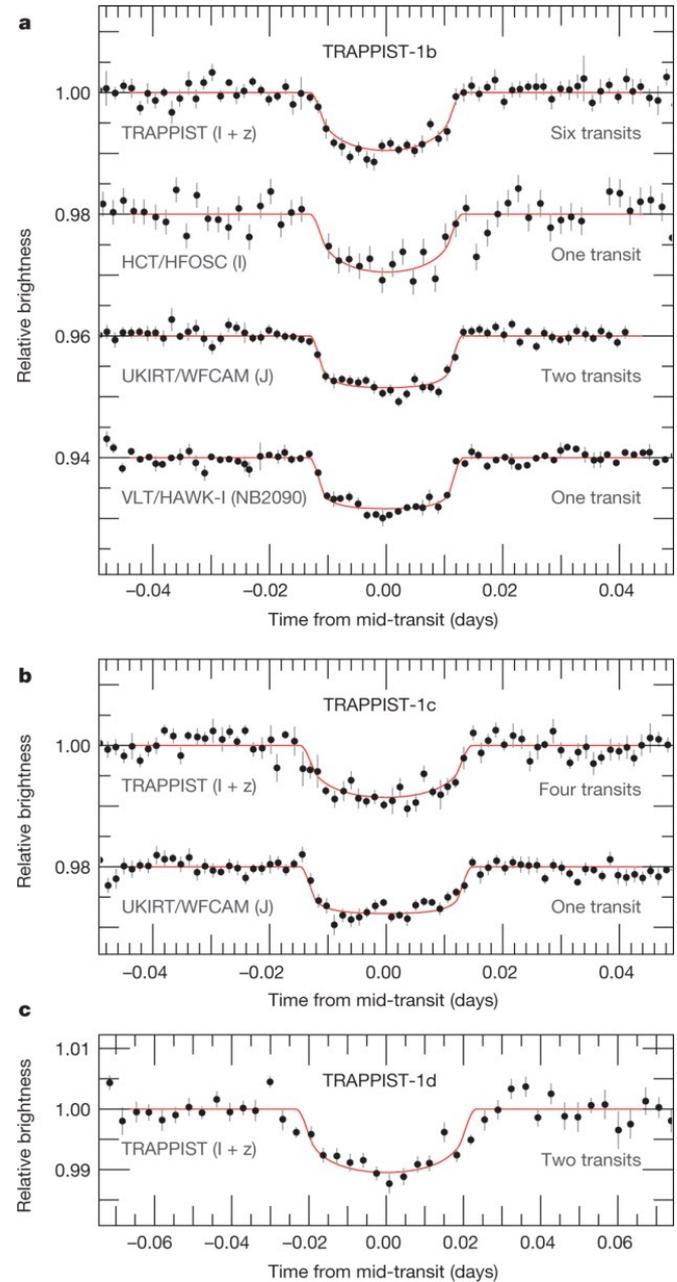


# Ultracool stars

- Objetos tipo-estelar con temperaturas efectivas menores a 2,700 kelvin
- Incluye estrellas de muy baja masa y enanas café
- 15 % de la población de objetos astronómicos cercanos al Sol.
- Modelos de evolución predicen, dada su baja masa, tendrán discos protoplanetarios con una población no detectada de planetas tipo terrestres
- Ricos en metales con tamaños como Mercurio
- Planetas más hospitalarios ricos en volátiles y tamaños como la Tierra



# Transit photometry of the TRAPPIST-1 planets



nature

# Propiedades y eliminar otras opciones

- Determinar distancia (40 A. L.)
- Composición química (Solar)
- Temperatura
- Masa (8 % Sol)

Eliminar:

- Sistema binario
- Objetos de fondo o frente la estrella



# El paper

nature

International weekly journal of science

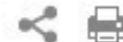
[Home](#) | [News & Comment](#) | [Research](#) | [Careers & Jobs](#) | [Current Issue](#) | [Archive](#) | [Audio & Video](#) | [For Authors](#)

[Archive](#) > [Volume 542](#) > [Issue 7642](#) > [Letters](#) > [Article](#)

## ARTICLE PREVIEW

[view full access options](#) ▶

NATURE | LETTER



[日本語要約](#)

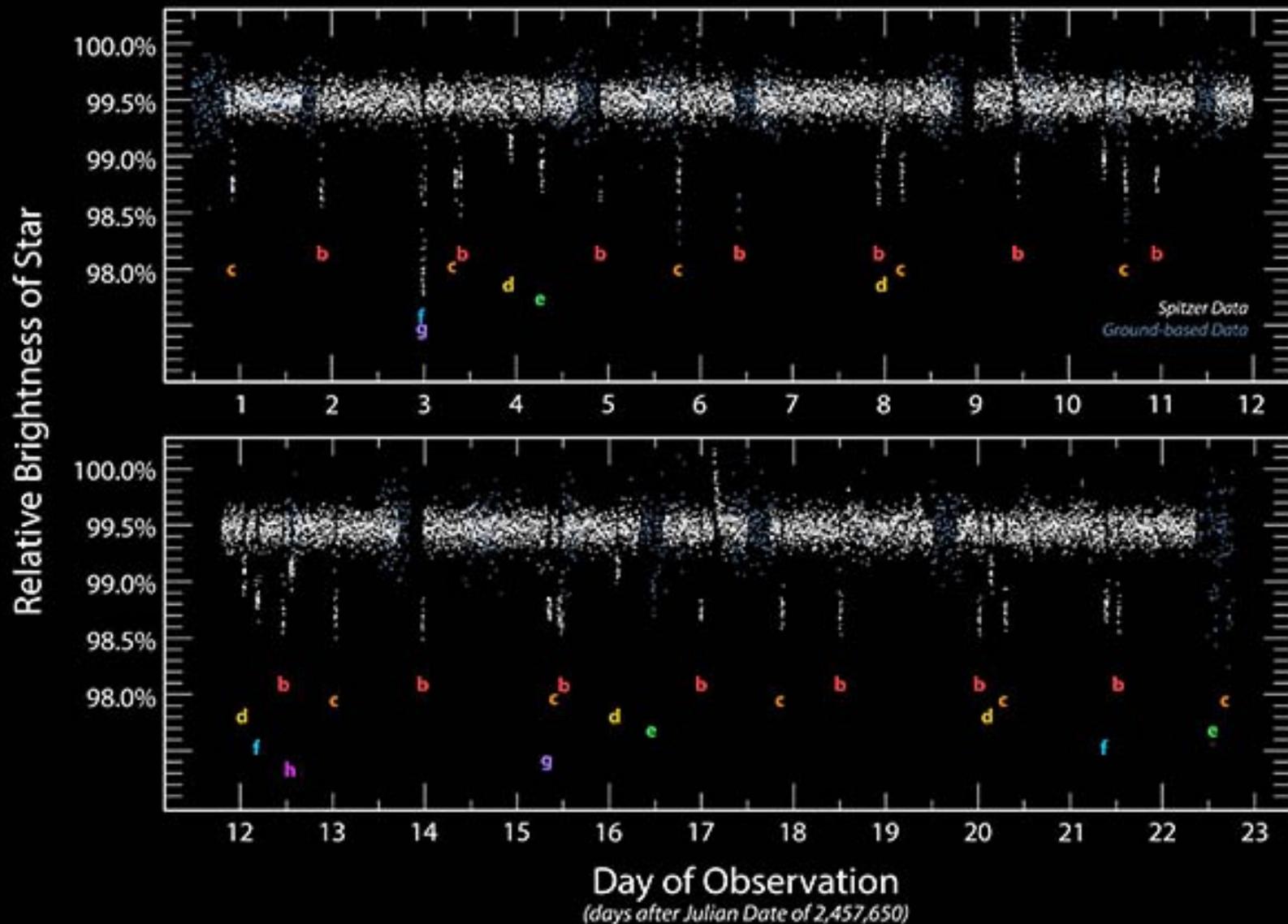
## Seven temperate terrestrial planets around the nearby ultracool dwarf star TRAPPIST-1

Michaël Gillon, Amaury H. M. J. Triaud, Brice-Olivier Demory, Emmanuël Jehin, Eric Agol, Katherine M. Deck, Susan M. Lederer, Julien de Wit, Artem Burdanov, James G. Ingalls, Emeline Bolmont, Jeremy Leconte, Sean N. Raymond, Franck Selsis, Martin Turbet, Khalid Barkaoui, Adam Burgasser, Matthew R. Burleigh, Sean J. Carey, Aleksander Chaushev, Chris M. Copperwheat, Laetitia Delrez, Catarina S. Fernandes, Daniel L. Holdsworth, Enrico J. Kotze  *et al.*

# Más observaciones

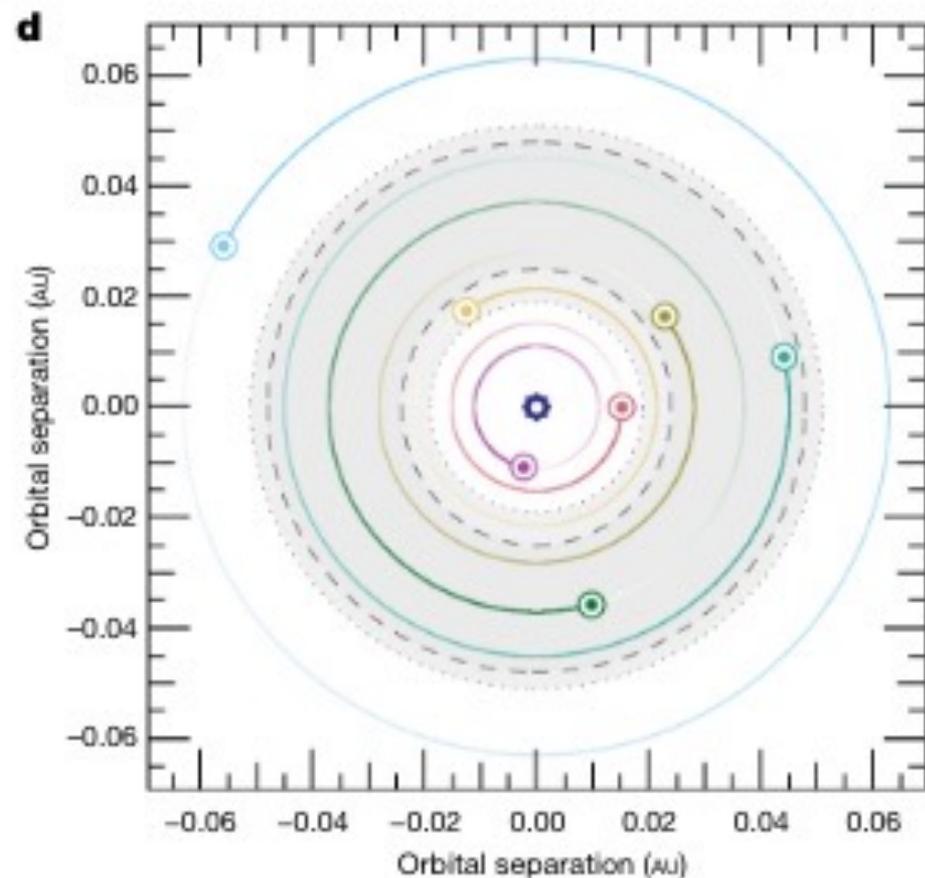
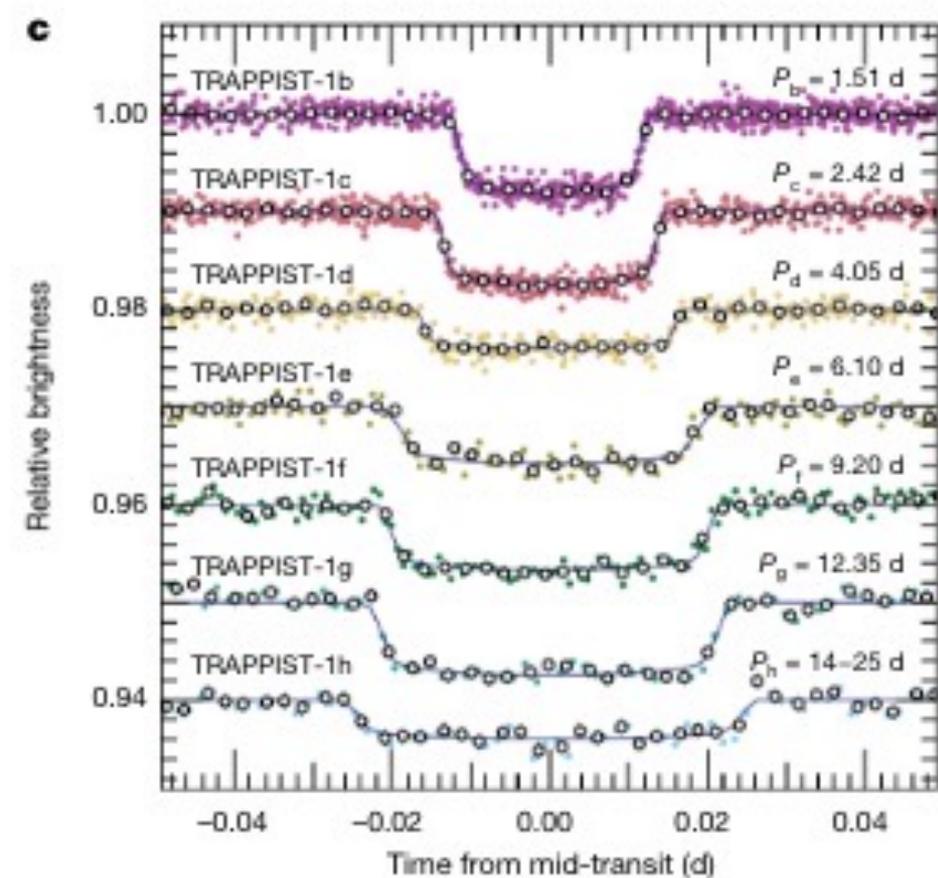
- Spitzer Space
- TRAPPIST-South telescope in Chile
- TRAPPIST-North—in Morocco
- 3.8-metre UK InfraRed  
Telescope (UKIRT) in Hawaii
- 4-metre William Herschel and
- 2-metre Liverpool telescopes en La Palma, Spain, and the
- South African Astronomical Observatory 1.0-metre telescope



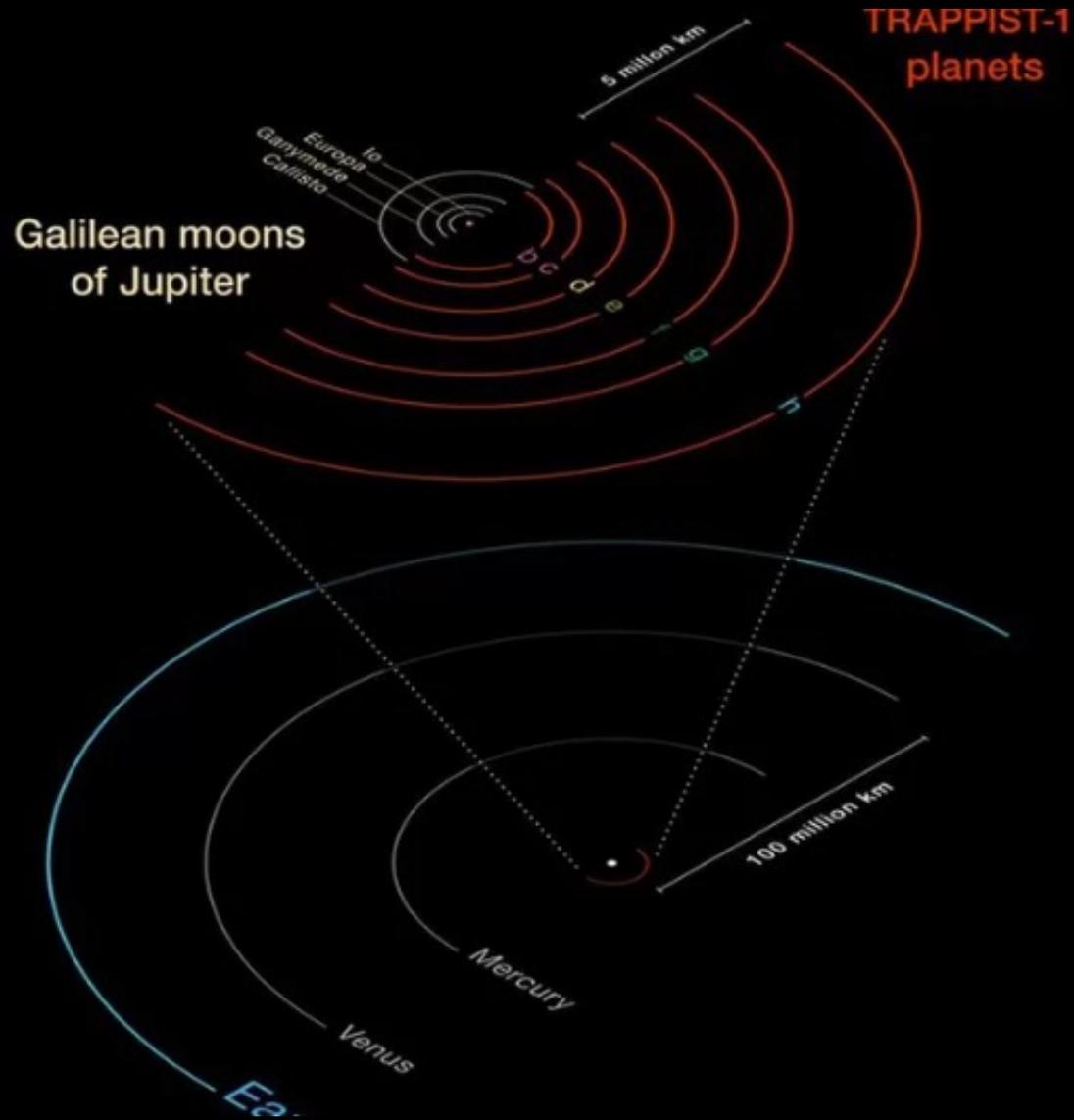


500 Hours of Exoplanet Transits in the TRAPPIST-1 System  
 NASA/JPL-Caltech/M. Gillon (Univ. of Liegè, Belgium)

Spitz



# Los siete planetas



Illustrations

TRAPPIST-1  
System

	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>
Orbital Period <small>days</small>	1.51 days	2.42 days	4.05 days	6.10 days	9.21 days	12.35 days	~20 days
Distance to Star <small>Astronomical Units (AU)</small>	0.011 AU	0.015 AU	0.021 AU	0.028 AU	0.037 AU	0.045 AU	~0.06 AU
Planet Radius <small>relative to Earth</small>	1.09 $R_{\text{Earth}}$	1.06 $R_{\text{Earth}}$	0.77 $R_{\text{Earth}}$	0.92 $R_{\text{Earth}}$	1.04 $R_{\text{Earth}}$	1.13 $R_{\text{Earth}}$	0.76 $R_{\text{Earth}}$
Planet Mass <small>relative to Earth</small>	0.85 $M_{\text{Earth}}$	1.38 $M_{\text{Earth}}$	0.41 $M_{\text{Earth}}$	0.62 $M_{\text{Earth}}$	0.68 $M_{\text{Earth}}$	1.34 $M_{\text{Earth}}$	—

Solar System  
Rocky Planets

	<b>Mercury</b>	<b>Venus</b>	<b>Earth</b>	<b>Mars</b>
Orbital Period <small>days</small>	87.97 days	224.70 days	365.26 days	686.98 days
Distance to Star <small>Astronomical Units (AU)</small>	0.387 AU	0.723 AU	1.000 AU	1.524 AU
Planet Radius <small>relative to Earth</small>	0.38 $R_{\text{Earth}}$	0.95 $R_{\text{Earth}}$	1.00 $R_{\text{Earth}}$	0.53 $R_{\text{Earth}}$
Planet Mass <small>relative to Earth</small>	0.06 $M_{\text{Earth}}$	0.82 $M_{\text{Earth}}$	1.00 $M_{\text{Earth}}$	0.11 $M_{\text{Earth}}$

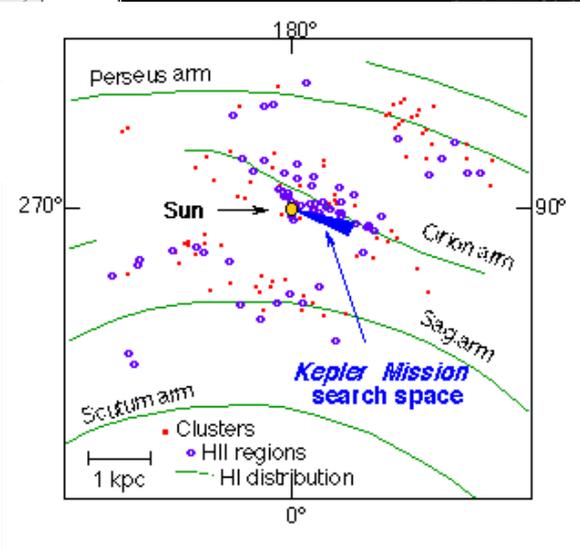
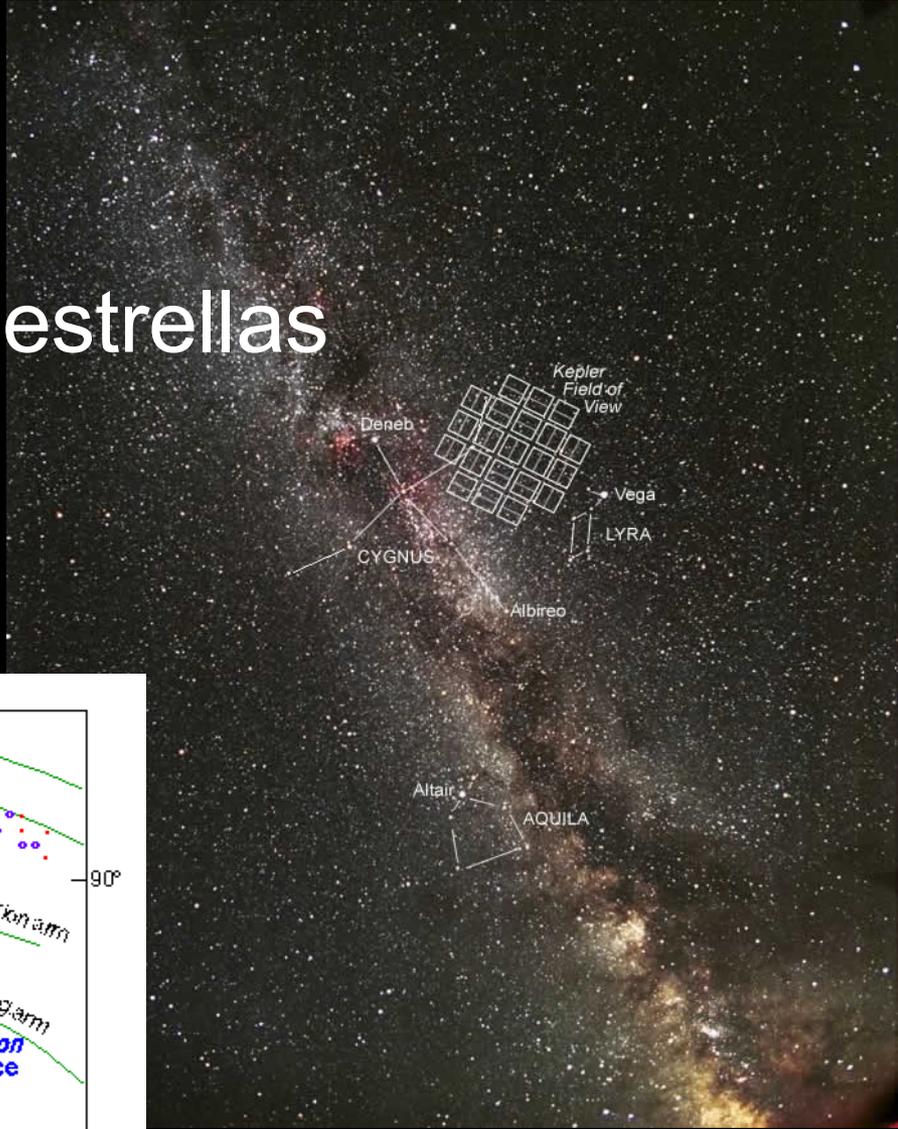
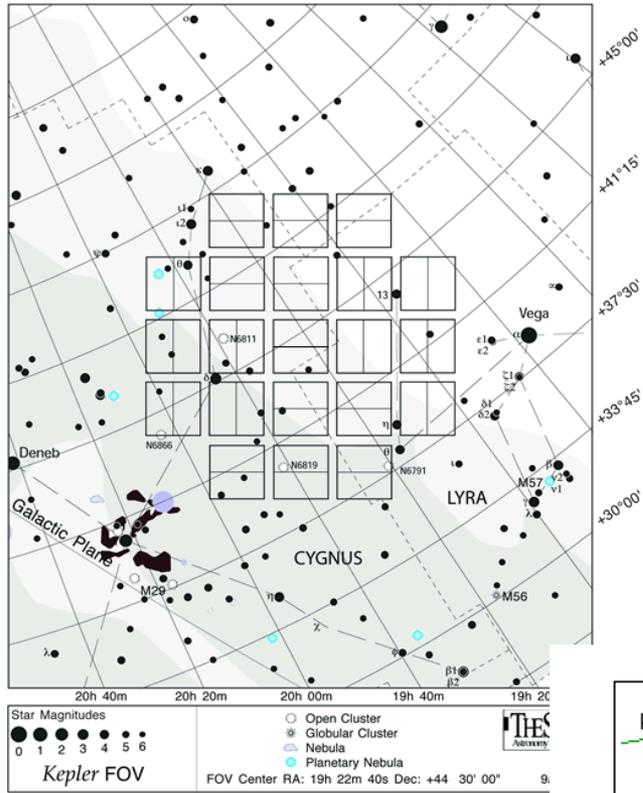




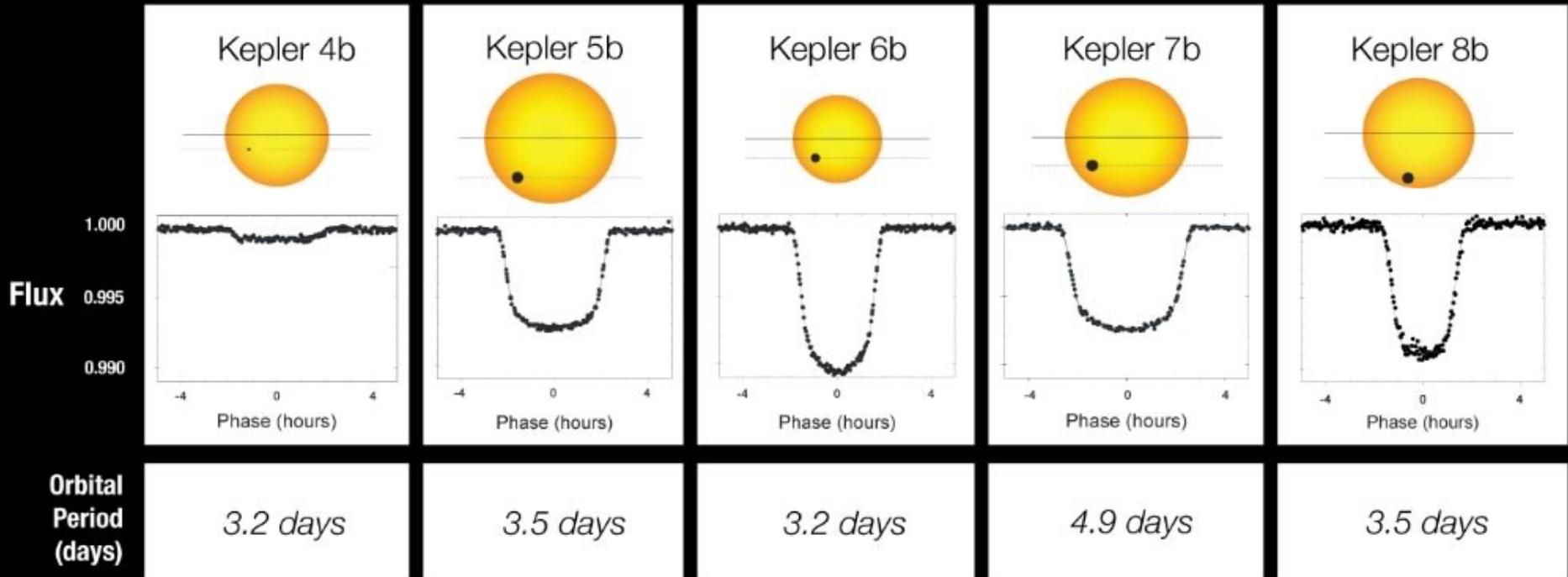
# Kepler Mission: A search for habitable planets.



## 150 mil estrellas



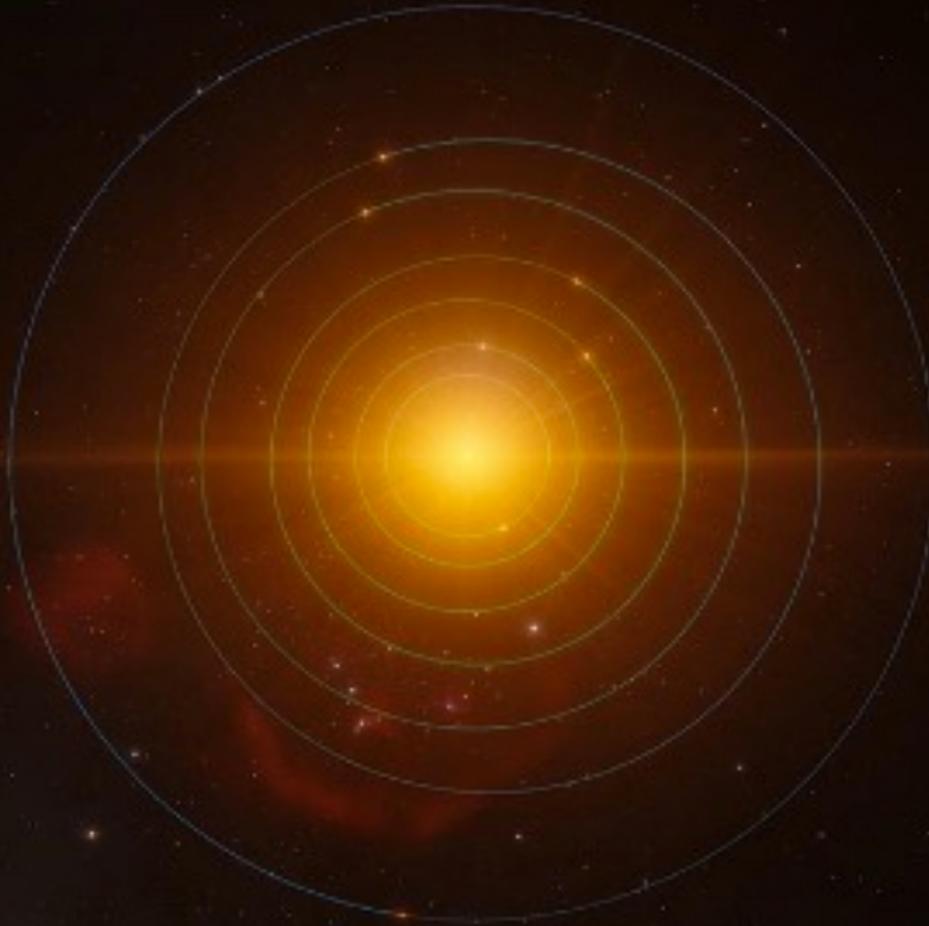
# Transit Light Curves



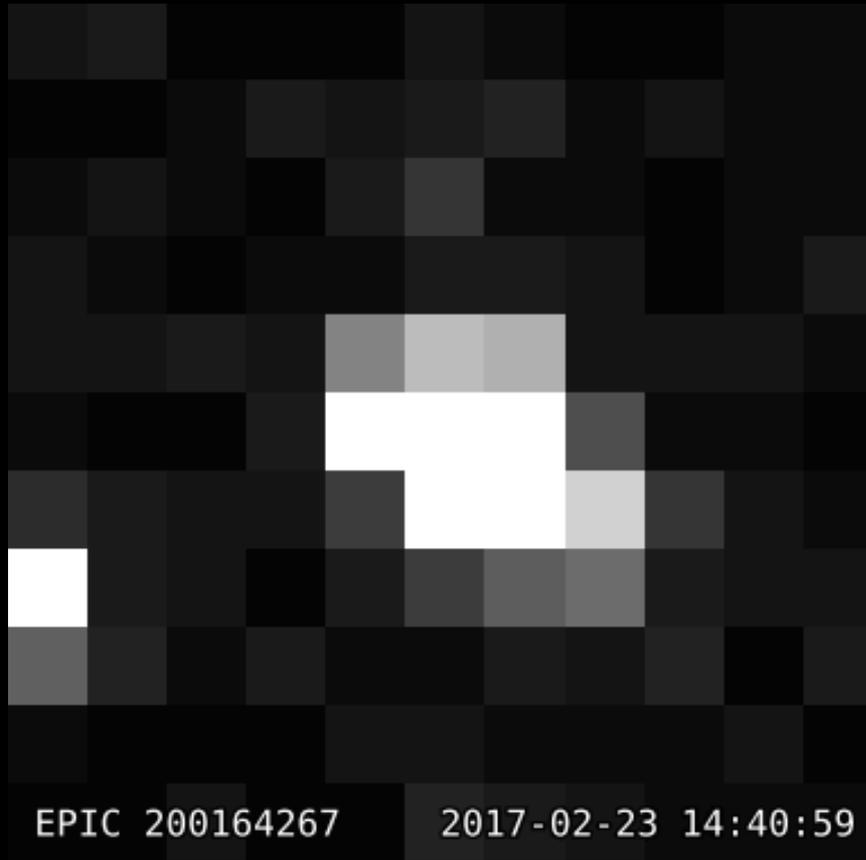
7,000 exoplanetas confirmados

<https://exoplanet.eu/>

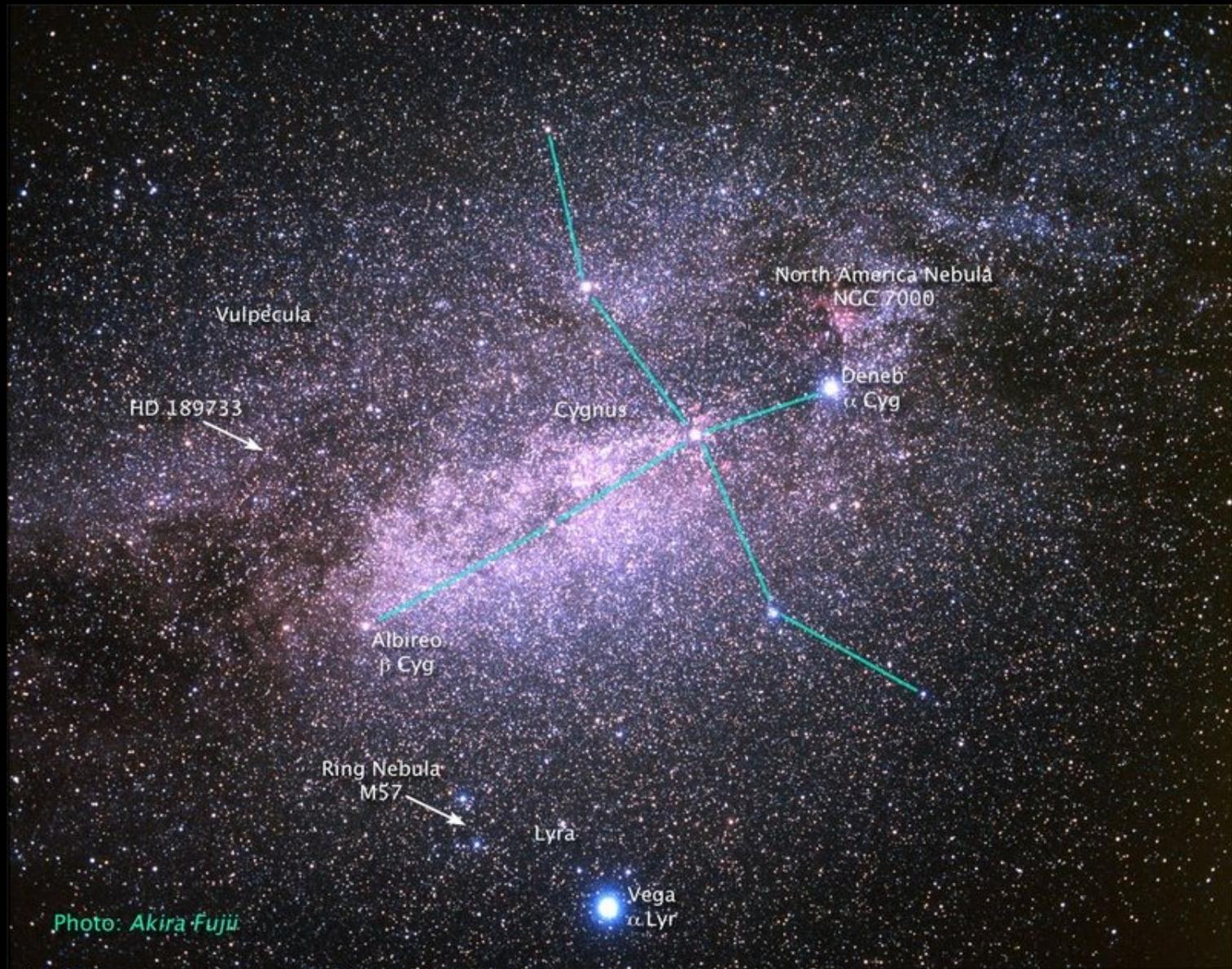
# Expectativa

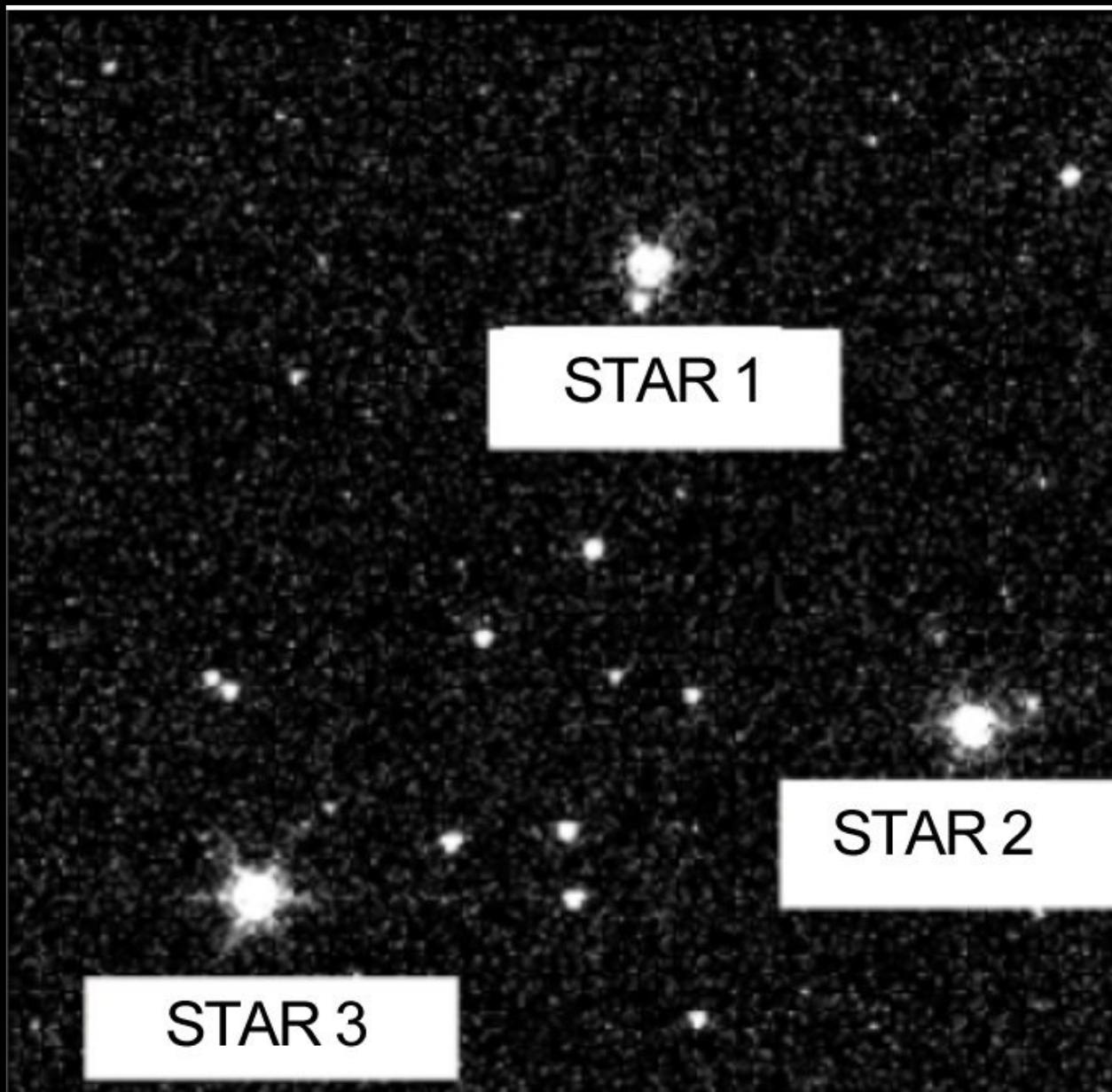


# Realidad



# HD189733





STAR 1

STAR 2

STAR 3

# NameExoWorlds 2022



NameExoWorlds  
2022

8 August - 11 November

#NameExoWorlds2022 #IAUoutreach



# 2015 – 19 (14\* 31 P) 2019 – 112 países

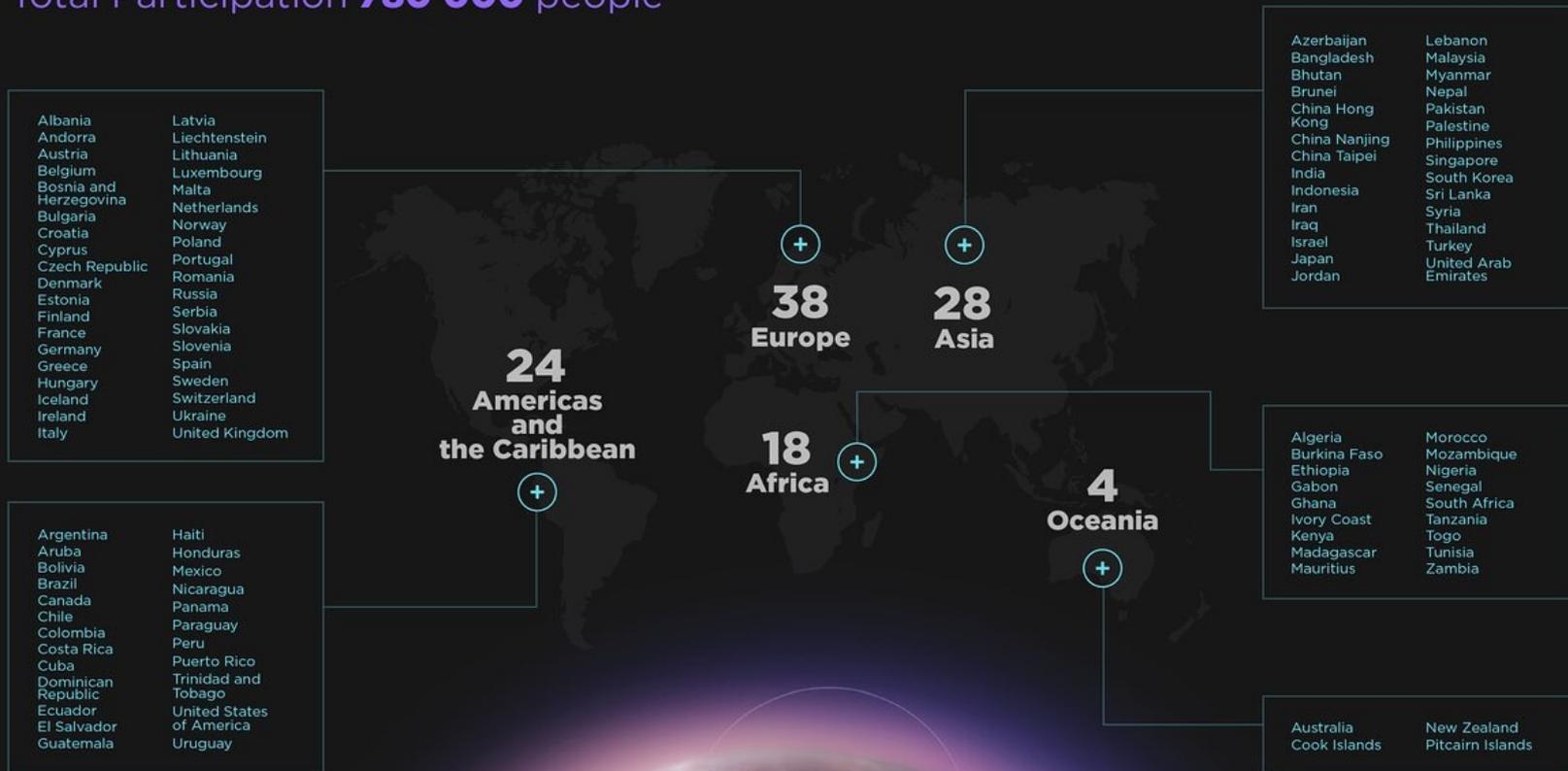
## NameExoWorlds



IAU 100  
NameExoWorlds

National Campaigns **112**

Total Participation **780 000** people



# Constelación de Cetus (Ballena)

D = 306 años luz de  
distancia

M = 1.3 veces la masa  
del Sol



IAU100  
NameExoWorlds

# MEXICO

*Name of Star*

## Axólotl

*Name of Exoplanet*

## Xólotl

+



IAU 100  
NameExoWorlds

# COLOMBIA

*Name of Star*

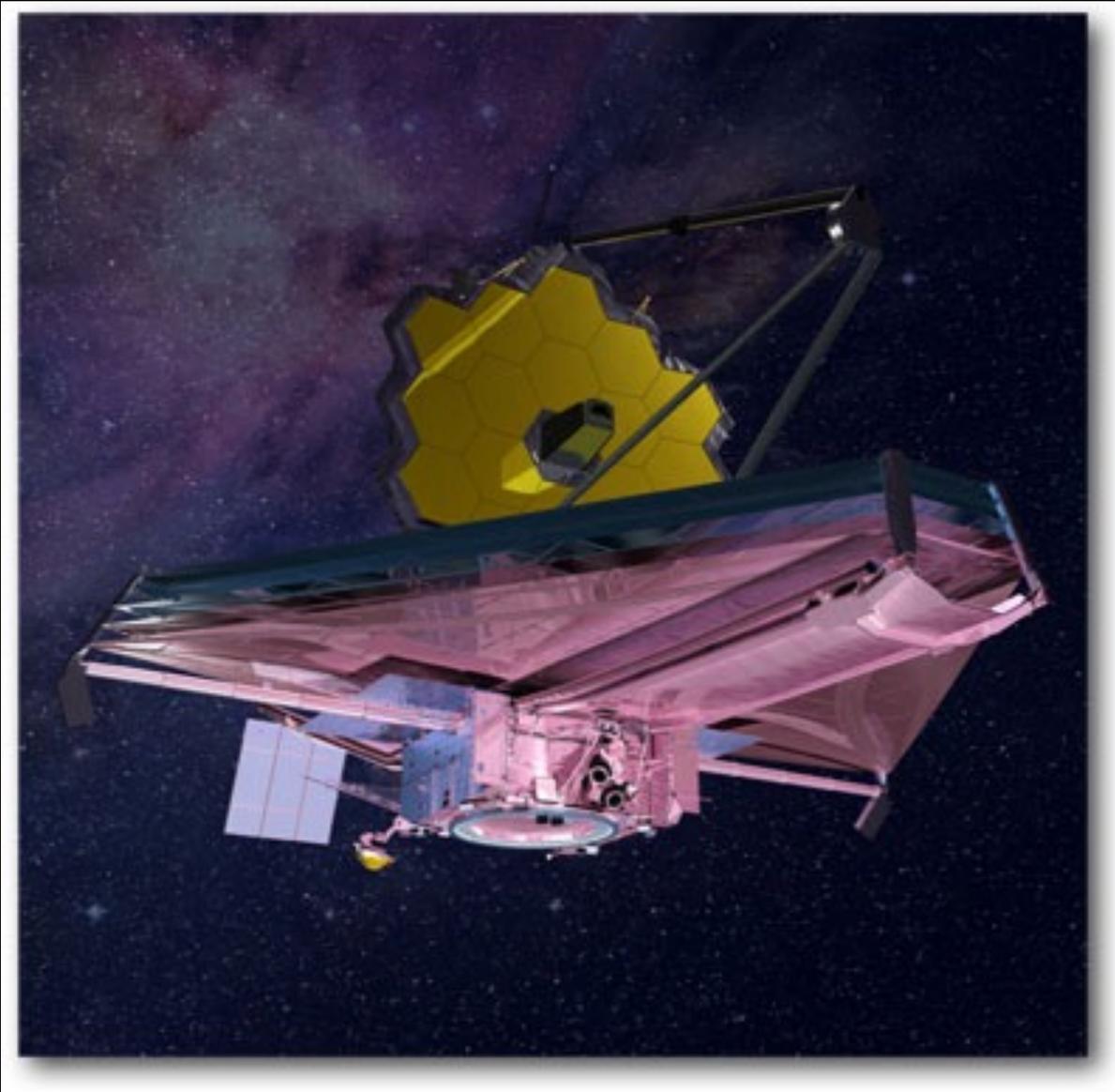
**Macondo**

*Name of Exoplanet*

**Melquíades**

+

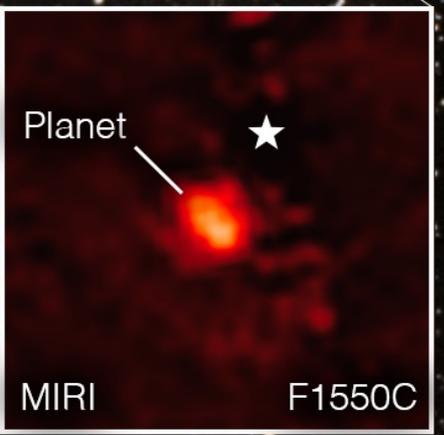
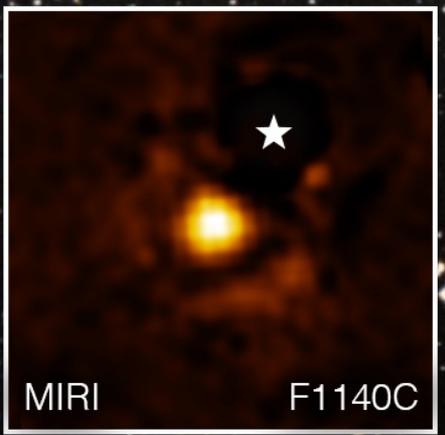
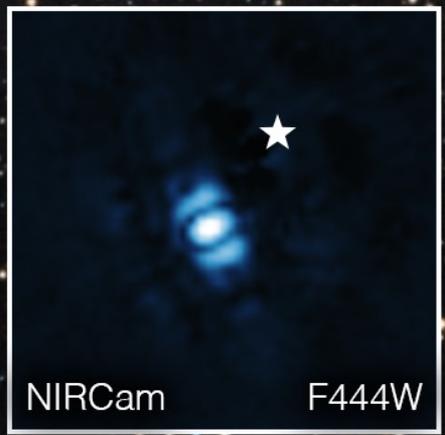
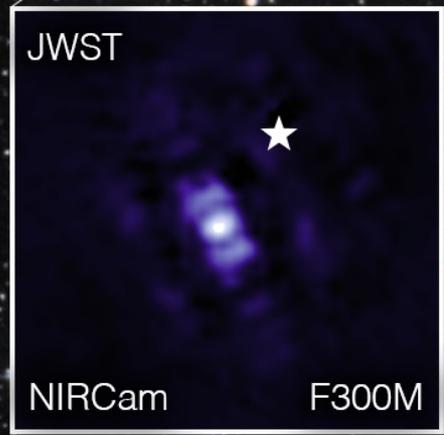
# James Webb



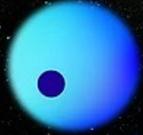
6.5m

Star  
HIP 65426

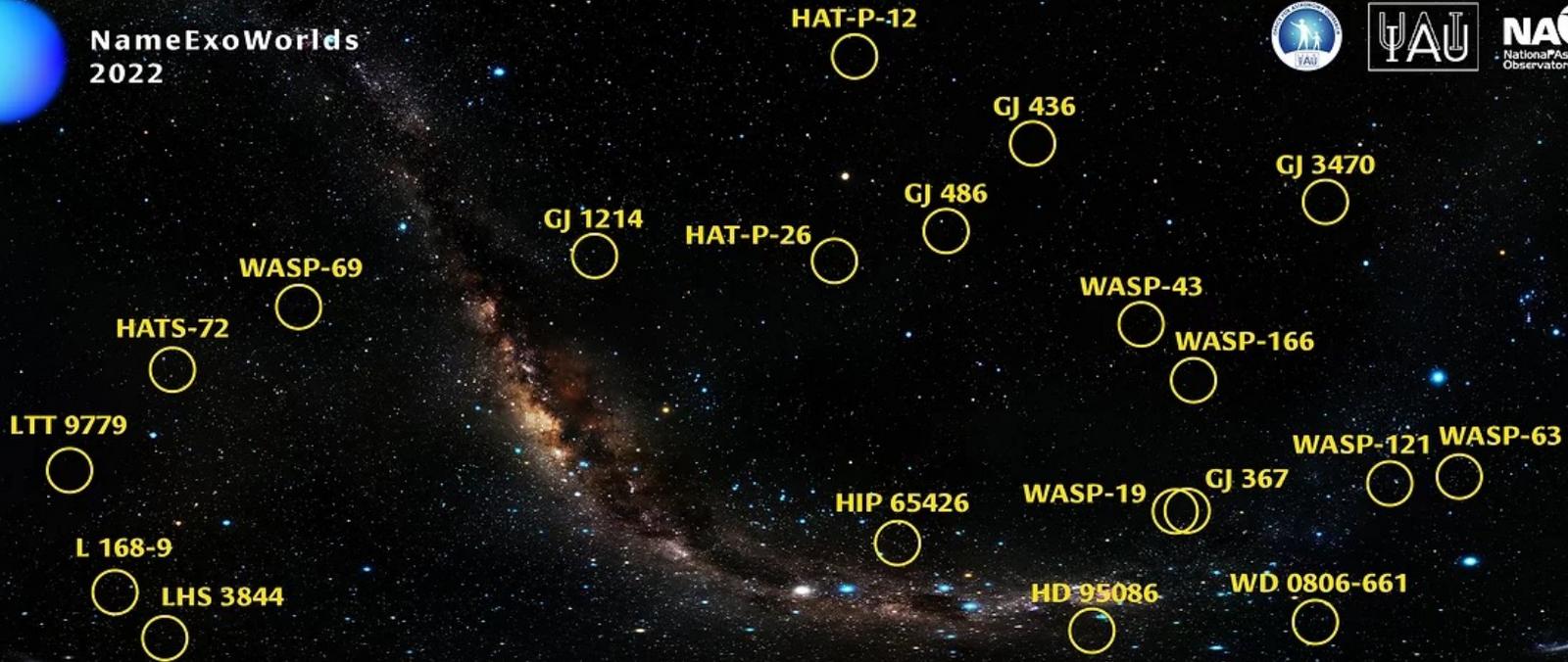
Exoplanet  
HIP 65426 b



# JWST



NameExoWorlds  
2022



Equipos, todo público, 20 sistemas estrella planeta, evento de divulgación

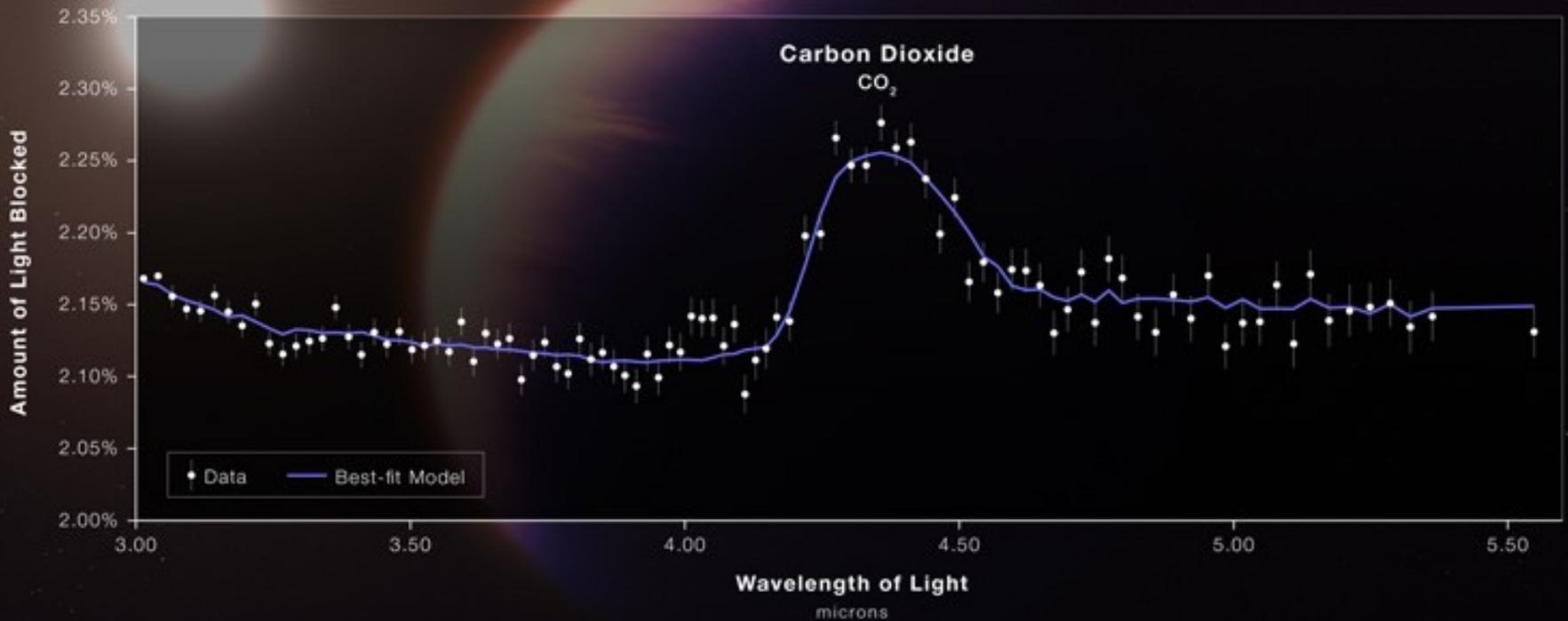
<https://www.nameexoworlds.iau.org>

q

# JWST

## HOT GAS GIANT EXOPLANET WASP-39 b ATMOSPHERE COMPOSITION

NIRSpec | Bright Object Time-Series Spectroscopy



**WASP-39b** 200 parsecs

**WEBB**  
SPACE TELESCOPE