

NASA Exoplanet Exploration Program Science Update



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ExoPAG 32 - August 19, 2025



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Requests for input on ExEP Science Gap List

<https://exoplanets.nasa.gov/exep/science-overview/>

<https://arxiv.org/abs/2507.18665>

- Descriptions of research areas where additional work would benefit current & future NASA exoplanet missions. *Tactical goals*, flowing from Decadal and NASA *strategic goals*.
- Connects mission needs to work in theory, laboratory measurements, simulations, and supporting observations.
- Its major utility is as a guide for XRP proposers, review panels, and NASA HQ selection officials. Not used proscriptively.
- Updated annually from inputs from ExoPAG EC, community, and HWO scientists
- **Request for input (deadline September 30, 2025) email Karl.R.Stapelfeldt@jpl.nasa.gov & Eric.Mamajek@jpl.nasa.gov**

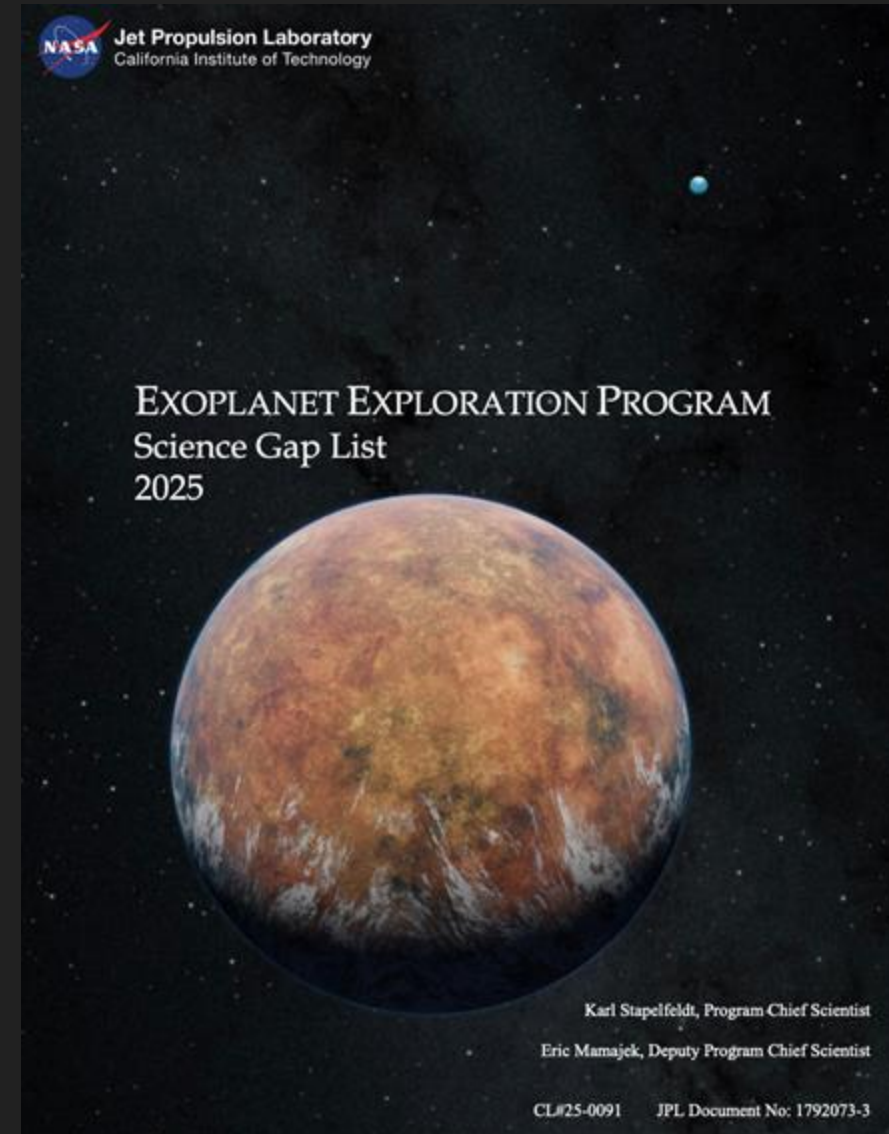


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Each gap is described by:

- **Title**
- **Summary**
- **Capability Needed**
- **Capability Today**
- **Mitigations in Progress**

Mitigations NOT in Progress are what you should be proposing !



WAVELENGTHS

AN EPRV NETWORKING POD PROGRAM

Program Goals

- Promote low-effort, low-pressure, professional networking across the EPRV community
- Foster connections between early-career and more senior researchers
- Bridge gaps between subfields, such as instrumentation, data analysis, and theory
- Encourage cross-collaboration and awareness across international spectrograph teams

Program Structure

- Participants placed into small “pods” of 7-8 people, balanced across career stages, interests, & institutions. One dedicated ‘Pod Organizer’ in each to facilitate meetings and help guide discussion
- 6 meetings per year, each with a suggested theme and discussion questions from the RCN Steering Committee. Examples include: navigating job markets in different countries & sharing favorite tools or techniques
- First cohort launched in July 2025, calls for future cohorts will go out via the EPRV RCN mailing list

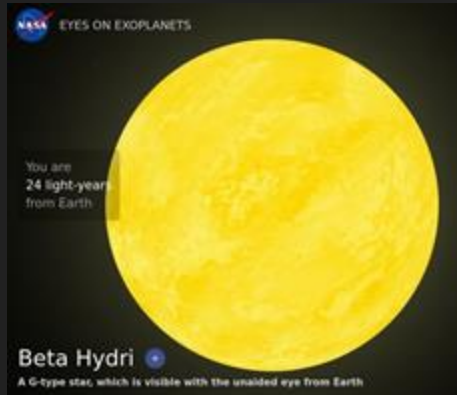
ExEP HWO precursor stars (now HWO “Tier 1” target stars)
are available in a public-facing catalog

Target Star Catalog

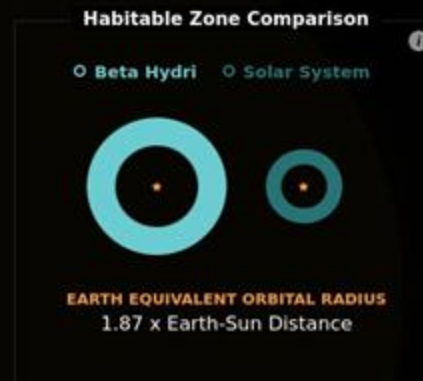
As we search for Earth-like exoplanets, this guide lists the stars we're targeting for future scrutiny — candidates that might be suns shining on their own habitable worlds.

- Goal: Grow public enthusiasm for "Where We Explore" with HWO. Highlight these naked eye targets for amateur astronomers & general public
- Now live at <https://science.nasa.gov/exoplanets/target-star-catalog/>
- 164 stars can be sorted by distance, brightness, constellation, presence of known planets, and stellar type.
- Links to "Eyes on Exoplanets" pages depicting the system
- "+" sign link takes you to description of the system including narrative text

Target star catalog preview for beta Hydri



STELLAR POWER OUTPUT 3.48 x Our Sun <small>Sun: 3.8×10^{26} W</small>	STELLAR TEMPERATURE 5806 K <small>Sun: 5772 K</small>	VISUAL MAGNITUDE 2.82 <small>Sun: -26.7</small>
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Beta Hydri

A bright, nearby Sun-like star with good prospects for finding planets with future direct imaging

STAR TYPE G

DISTANCE 24 light-years away

CONFIRMED PLANETS 0

Beta Hydri is a Sun-like star located in the Southern constellation Hydrus, which represents a male water snake. Visible to the naked eye, it is the brightest star in the constellation, and it represents the tail of the water snake. As the closest prominent star to the south celestial pole, it is easily recognizable in the Southern sky. Relative to the Sun, Beta Hydri is older, larger, similar in temperature, and over three times more luminous. It has lower levels of stellar magnetic activity and a lower abundance of elements heavier than helium, compared to the Sun.

Exploration and Planetary Discovery

No confirmed exoplanets have been identified around Beta Hydri, to date. However, its proximity and low levels of stellar magnetic activity make it a good candidate for radial velocity studies. As a bright, nearby star, Beta Hydri is also a good target star for exoplanet searches with direct imaging from future space telescopes. These future high-contrast imaging capabilities will make it possible to detect Earth-sized exoplanets within Beta Hydri's habitable zone, if they exist.

Pop Culture

Beta Hydri's proximity and Sun-like characteristics have captured the imagination of science fiction writers. It has served as a backdrop for interstellar journeys in novels like "Time for the Stars" by Robert Heinlein and "Old Twentieth" by Joe Halderman. In works such as "A Canticle for Leibowitz" by Walter M. Miller and "Daughters of Earth" by Judith Merrill, Beta Hydri hosts exoplanets where human colonies thrive, and in "Calculating God" by Robert J. Sawyer, it serves as an exoplanet host where alien life is discovered.

The Sixth Spirit of Lyot Conference

THE SCIENCE AND TECHNOLOGY OF HIGH CONTRAST IMAGING

February 2-6, 2026

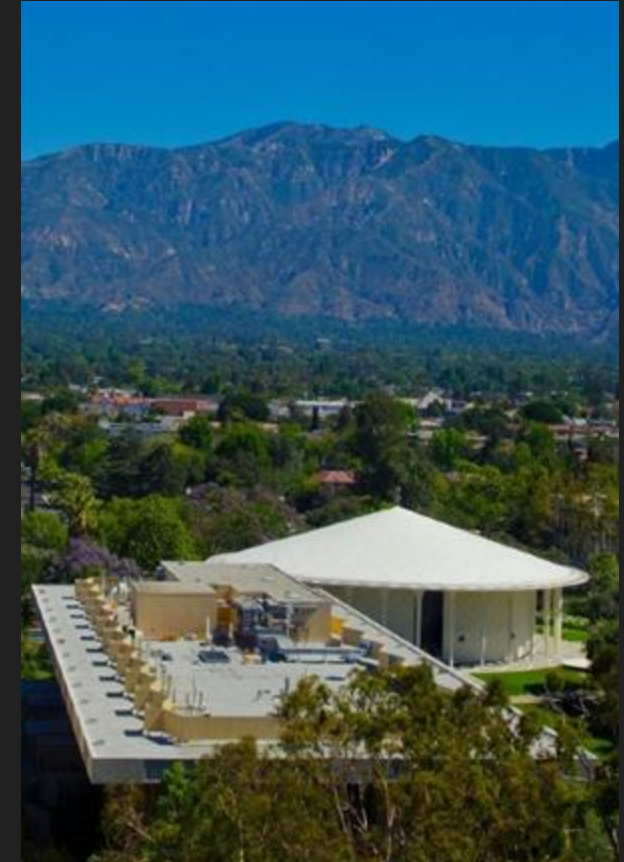
Caltech campus, Pasadena CA

Topics include

- Coronagraph instrument technology
- Exoplanet imaging and spectroscopy
- Theory & imaging studies of circumstellar disks & exozodi
- Large telescopes and adaptive optics for high contrast imaging
- Modeling of exoplanet atmospheres & biosignatures
- Image processing and spectral retrieval techniques
- High contrast imaging space missions and mission concepts, including dedicated Roman Coronagraph session(s)

Submit abstracts by **October 1, 2025**

<https://conference.ipac.caltech.edu/SpiritofLyot6>



Conference Chairs:

Dimitri Mawet (Caltech)

Briann Sitarski (GSFC)



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5,983 Confirmed Planets 08/14/2025 →	686 TESS Confirmed Planets 08/14/2025 →	7,658 TESS Project Candidates 08/07/2025 →	View more Planet and Candidate statistics →
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Explore the Archive

Name or Coordinates

Optional Radius (arcsec)

Transit Surveys

130,041,578 Light Curves



Launched in April 2018, TESS is surveying the sky for two years to find transiting exoplanets around the brightest stars near Earth.

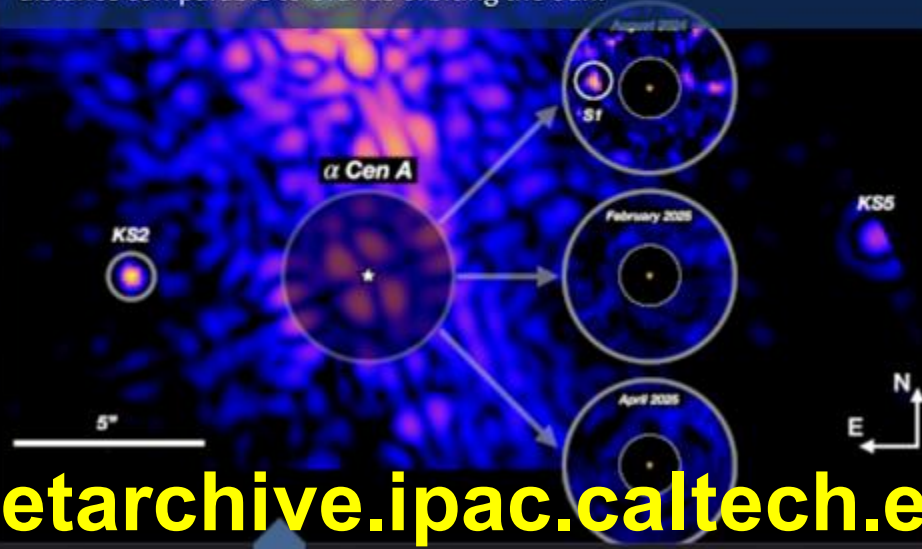
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<input type="button" value="ExoFOP-TESS"/>	→
<input type="button" value="Project Candidates"/>	→

TESS Kepler K2 KELT UKIRT

JWST Direct Imaging of α Cen A Candidate Planet and Five New Planets!

August 7, 2025 • New Data

This week's release includes new JWST observations of a Saturn-mass candidate planet orbiting α Cen A in our closest neighboring star system, and the young, massive planet HD 135344 A b orbiting its host at a distance comparable to Uranus orbiting the Sun.



News → 1 2 3 4 Plots → 1 2 3 4

<https://exoplanetarchive.ipac.caltech.edu/>


Other Updates

- ExoPAG request for a NASA missions webpage: this is underway, but won't be completed until after NASA ExEP webpage migration to main NASA webpages is completed.
- Requesting your input to update a list of astro and/or physics departments that offer PhDs *and have faculty members doing exoplanet-related research*. Please share, and leave suggested updates as comments on the relevant google sheet cells.

Astro Grad Programs w/ Exoplanet Faculty

Requirements for inclusion: Must have a PhD program in either astro or physics/astro and active faculty members doing research related to exoplanets
* Don't have it's own PhD program, but can work with students from nearby schools (e.g. STScI → JHU; NASA Outpost → LMC; Catholic U

School Name	Faculty 1	Specialty	Faculty 2	Specialty	Faculty 3	Specialty	Faculty 4	Specialty	Faculty 5
American Museum of Natural History	Ruth Arzoumanian	dynamical and atmospheric evolution of planetary systems, stellar ages	Jackie Farber	Exoplanet Atmospheres via brown dwarf studies, Atmospheric networks, wide giant planet discoveries through citizen science work	Estelita Casanovi	AO systems, NIR solar vehicles			
Arizona State University	Steven DeWitt	Geochemical cycles on exoplanets	Esperanza Shadmehri	Star-Planet interactions/impact of stellar activity on exoplanets/Exoplanets atmospheres	Wes Long	Atmospheric characterization through retrievals	Jessica Palacios	detection and atmospheric characterization of young giant planets and brown dwarfs	
Brandeis University	Ryan Jackson	orbital dynamics and transit observations of exoplanets							
Brown University	Catherine Essler	planet formation, circumstellar disks	Phil Mulholland	exoplanets around low mass stars, instrumentation	Al Zuckerman	astrometry, time-domain astrophysics, space-based photometry			
Catholic - Astronomy	Andreas Howard	RV planet detection & instrumentation	Dennis Moris	direct imaging with adaptive optics/retrofit control, coronagraphy and spectroscopy	Jim Faller	Migration of exoplanets and solar system moons	Lorenz Bärtsch	Star Formation and Young Stars	
Catholic - DPS	Heather Knutson	exoplanet atmospheres, searches for long-period companions in exoplanetary systems, precision infrared photometry and time series analysis	Konradin Baran	formation and evolution of the solar system, dynamical evolution of exoplanets, as well as physical processes that occur in planetary interiors and atmospheres					
Columbia University	David Haring	Exoplanets, study and characterization of transiting exoplanets, development of novel detection and measuring spectra and photometry of exoplanet atmospheres	Paul Joannopoulos	transiting and direct imaging of exoplanets	Lisa Catherine	habitability of exoplanets			
Cornell University	Wesley Lewis	development of 1D-2D models to guide and interpret future observations							



bit.ly/ExoplanetDepartmentTracker



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California Institute of Technology

jpl.nasa.gov