National Aeronautics and Space Administration

THE NRP POST

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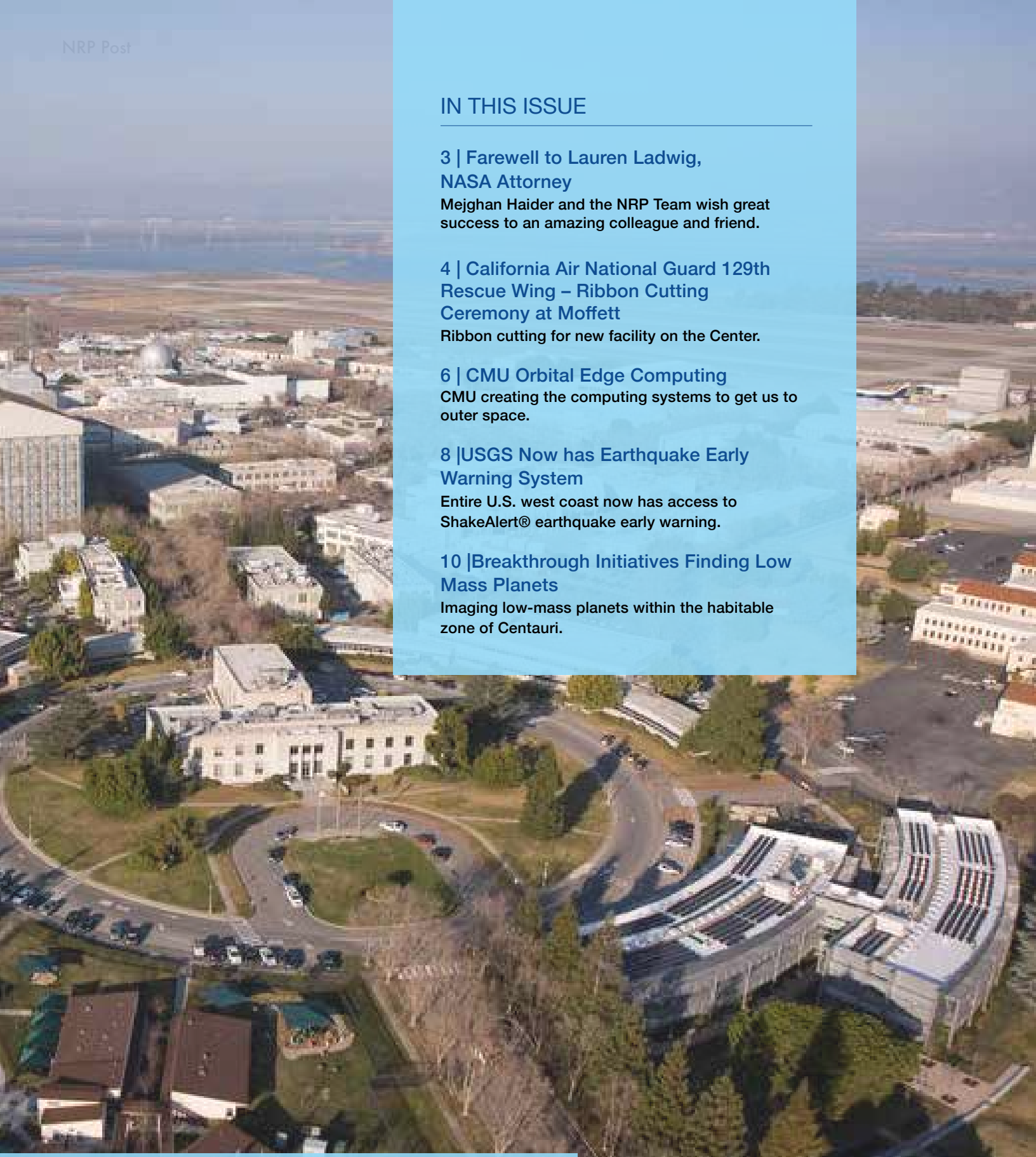

COVER

(from left to right) Dr. Eugene Tu, Ames Center Director, Steve Jurczyk Acting Administrator, Bhavya Lal Acting Chief of Staff and Mejghan Haider Director, NASA Research Park

Lauren Ladwig, Leaving the NASA Team, and Will be Missed.

Our esteemed colleague and Ames Associate Chief Counsel, Lauren Ladwig, will depart from NASA on June 11, 2021. Ladwig began her career at NASA Ames' Office of the Chief Counsel in 2009 and took on the role of Real Estate Counsel for the NASA Research Park in 2013. Ladwig's work and contributions are recognized not only at Ames, but also in real estate at large -- as an agency expert. During her time at NASA, she was the recipient of the Agencies most prestigious awards including the early career achievement medal. Ladwig led NASA's real estate legal team through negotiations on long-term lease transactions with Planetary Ventures, Mountain View Housing Ventures, and the University of California. She was instrumental to U.S. Geological Survey's relocation from Menlo Park to Moffett. Her successful execution of these agreements, and more, solidify Lauren's legacy at NASA Research Park for years to come.

"It has been an honor and privilege to work with Lauren for the past 8 years. Her work ethic, dedication and pleasant and professional demeanor will be sorely missed," said Mejghan Haider, Director of NRP. We wish her all the best!

(from left to right) Sumara Thompson-King (NASA General Counsel), Lauren Ladwig (NASA ARC Associate Chief Counsel), and Thomas Berndt (NASA ARC Chief Counsel) touring the USGS offices in Building 19.

California Air National Guard 129th Ribbon Cutting at Moffett

By Elena Serna, NRP Account Manager, May 10, 2021

The California Air National Guard 129th Rescue Wing, a NASA Research Park (NRP) partner at Moffett Federal Airfield, held a ribbon cutting ceremony on March 25, 2021 for their new facility on the Center. This was a joyous occasion as it officially signified opening its brand new Operations, Small Air Terminal and Maintenance Building.

This is a perfect example of how the NRP's location in the Silicon Valley contributes towards the world-class and shared-use Center. It provides a place for connections and collaborations for extraordinary opportunities. In this case, collaborations with private entities led up to the construction of this new building! This is not only a benefit to our community but to the world - as it will enhance the 129th Rescue Wing's ability to perform critical missions locally and anywhere in the world.

Maj. Gen. Gregory Jones, Commander, California Air National Guard and Col. Jeffrey Waldman, Commander, 129th Rescue Wing were in attendance at the ribbon cutting ceremony and thanked all partners involved in the process.

CMU Orbital Edge Computing

Moffett Field, California – April 13, 2020

Carnegie Mellon University

As humanity moves into outer space, scientists and engineers must come up with innovative technology to get them there. In a recently published paper, Brandon Lucia, assistant professor of electrical and computer engineering, and Bradley Denby, a Ph.D. student, explore one such innovative idea: orbital edge computing with nanosatellite constellations.

The paper recently received the Best Paper Award at the 2020 Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS).

A satellite constellation is a large group of satellites that work together. Constellations are widely used today with various applications including GPS. Today, however, satellites are not managed as a constellation, instead being individually remotely controlled by a human operator. Satellites are directed by an operator to collect information

using sensors (like taking pictures of Earth) and they then send their sensor data back to a radio base station somewhere on Earth. Sending data to Earth from a satellite costs a huge amount of time and energy, and the model of manual control and sending all of the data collected on orbit makes today's satellite operations extremely expensive.

The cost goes up as satellites – now appropriately called nanosatellites – become smaller. Smaller satellites are cheaper and we can send more of them into space. As we create ever-larger and more promising constellations, we also increase the human cost to manually control the satellites and the time and energy cost to beam their sensor data back down to Earth. Growing constellations create a problem on Earth, too. Together, the satellites of a constellation collect and send down an enormous amount of raw data. As the number of satellites increases, eventually, ground stations can't keep up. The problem is in the operating model of satellites, which, today, expect data to be processed by computers in computing clouds on Earth. As constellations hit the limit of data downlinking, Lucia and Denby propose that the relationship between satellites and computers must change.

Lucia and his group propose that, instead of sending the data back to Earth, satellites in a constellation process their sensor data in orbit, a new model that they call "orbital edge computing". With orbital edge computing, the satellites don't send large amounts of raw data to Earth. Equipped with machine learning capabilities, they analyze the sensor data, looking for signals of interest to any number of different applications and send down only the data that are actually valuable. Lucia's team's new software and hardware satellite control system supports orbital edge computing and ensures that a constellation avoids collecting redundant data. Using these techniques, the data size can be considerably reduced, and the data that's left can be sent much faster and cheaper. A constellation of thousands can be supported by a single operator and a few small radio ground stations on Earth to collect sensed data.

According to the paper, Lucia expects to see tens or hundreds of thousands of small, sensor-equipped satellites launched in the near future, which he says will be a perfect fit for the new orbital edge computing, and might even need it.

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Entire U.S. West Coast Now Has Access to ShakeAlert® Earthquake Early Warning

Release Date: May 4, 2021

After 15 years of planning and development, the ShakeAlert earthquake early warning system is now available to more than 50 million people in California, Oregon, and Washington, the most earthquake-prone region in the conterminous U.S.

Today's debut of ShakeAlert-powered public alerting to mobile phones in Washington completes the U.S. Geological Survey and partners' West Coast roll-out of this mode of alert delivery to the public that began with California in 2019 and expanded to Oregon in March 2021. People in these three states can now receive alerts from FEMA's Wireless Emergency Alert system, third-party phone apps, and other technologies.

"USGS science is the backbone of hazard assessment, notification, and response capabilities for communities nationwide so they can plan for, and bounce back from natural disasters," said David Applegate, Associate Director for Natural Hazards Exercising the Delegated Authority of the USGS Director. "Systems powered by ShakeAlert can turn mere seconds into opportunities for people to take life-saving protective actions or for applications to trigger automated actions that protect critical infrastructure. An effort like this takes the dedication, ingenuity and hard work of dozens of partners with the same vision, and the USGS is proud to have been part of a collaborative team that made this robust public safety system available for millions of citizens on the West Coast."

The ShakeAlert system relies on sensor data from the USGS Advanced National Seismic System. ANSS is a USGS facilitated collection of regional earthquake monitoring networks operated by partner universities and state geological surveys on the West Coast and throughout the nation. USGS works closely with ANSS partners and state emergency management agencies on the system's development as well as public communication, education and outreach. ShakeAlert is a new ANSS tool in the USGS risk reduction toolbox.

The ShakeAlert earthquake early warning system can save lives and reduce injuries by giving people time to take protective actions like drop, cover and hold on before potentially dangerous earthquake shaking arrives at their lo-

cation. In addition to supporting public alerts to mobile phones, ShakeAlert system data has, since late 2018, been used to develop applications that trigger automated actions. Automatic actions can be used to slow down trains to prevent derailments, open firehouse doors so they don't jam shut and close valves to protect water and gas systems.

This innovative technology will continue to improve over time with the addition of more seismometers to the network, by expanding alert delivery area and by improving messaging speeds.

USGS
science for a changing world

To learn more about the ShakeAlert system, read this feature story.

For more information about ShakeAlert in your state, visit the California Governor's Office of Emergency Services, Oregon Emergency Management, and Washington's Emergency Management Division.

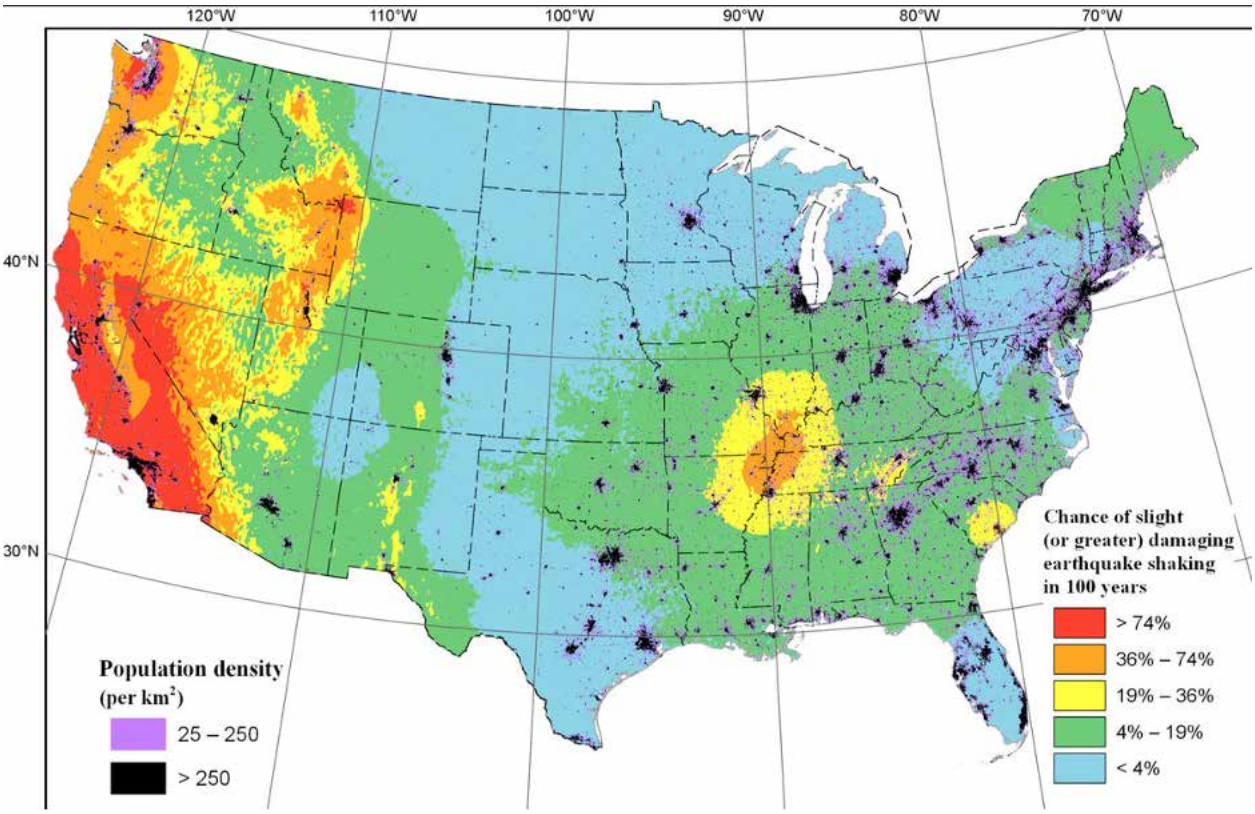


Image shows the chance of damaging earthquake shaking in 100 years from the 2018 National Seismic Hazard Map. Earthquakes are a national problem with more than 143 million people as risk of potentially damaging shaking in the United States. Fifty million of those people are on the West Coast of the United States in California, Oregon, and Washington. (Public domain.)

Imaging Low-mass Planets Within The Habitable Zone of α Centauri

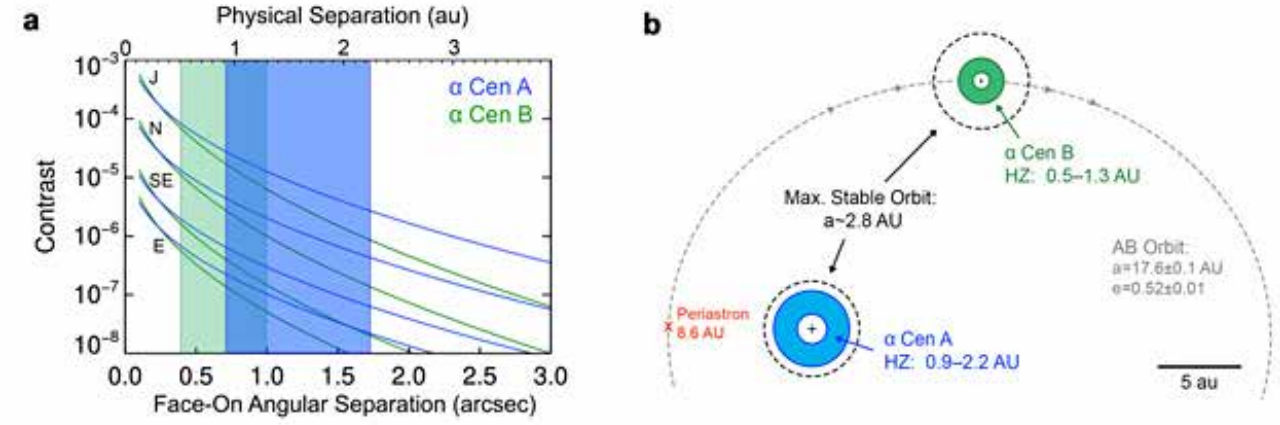
Source: astro-ph.EP
Posted February 11, 2021

Giant exoplanets on wide orbits have been directly imaged around young stars. If the thermal background in the mid-infrared can be mitigated, then exoplanets with lower masses can also be imaged.

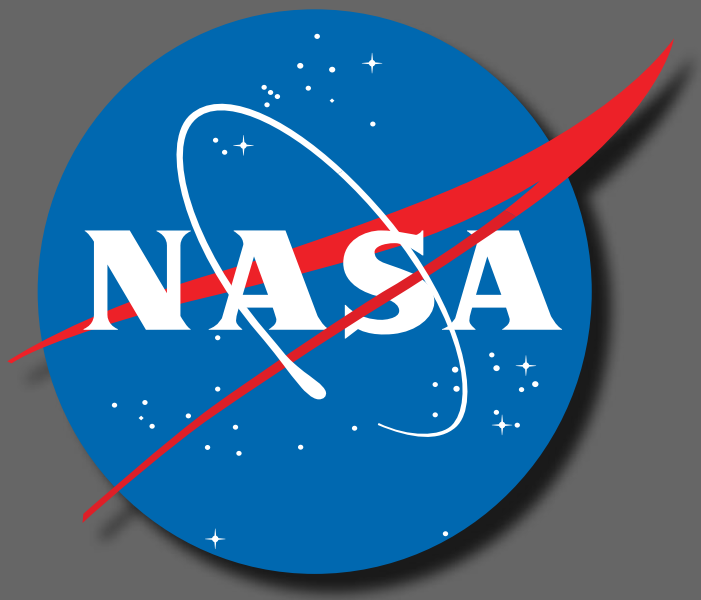
Here we present a ground-based mid-infrared observing approach that enables imaging low-mass temperate exoplanets around nearby stars, and in particular within the closest stellar system, alpha Centauri. Based on 75-80% of the best quality images from 100 hours of cumulative observations, we demonstrate sensitivity to warm sub-Neptune-sized planets throughout much of the habitable zone of alpha Centauri A.

This is an order of magnitude more sensitive than state-of-the-art exoplanet imaging mass detection limits. We also discuss a possible exoplanet or exozodiacal disk detection around alpha Centauri A. However, an instrumental artifact of unknown origin cannot be ruled out. These results demonstrate the feasibility of imaging rocky habitable-zone exoplanets with current and upcoming telescopes.

Contributors:
K. Wagner, A. Boehle, P. Pathak, M. Kasper, R. Arsenault, G. Jakob, U. Kaufl, S. Leveratto, A.-L. Maire, E. Pantin, R. Siebenmorgen, G. Zins, O. Absil, N. Ageorges, D. Apai, A. Carlotti, É. Choquet, C. Delacroix, K. Dohlen, P. Duhoux, P. Forsberg, E. Fuenteseca, S. Gutruf, O. Guyon, E. Huby, D. Kampf, M. Karlsson, P. Kervella, J.-P. Kirchbauer, P. Klupar, J. Kolb, D. Mawet, M. N'Diaye, G. Orban de Xivry, S. P. Quanz, A. Reutlinger, G. Ruane, M. Riquelme, C. Soenke, M. Sterzik, A. Vigan, T. de Zeeuw



Simulated planet brightness and basic properties of the α Centauri system. a N-band (10–12.5 μm) contrast vs. angular separation of planets around α Centauri A (blue) and B (green), assuming face-on circular orbits, a Bond albedo of 0.3 and internal heating that provides an additional 10% of the planets' equilibrium temperatures. The curves correspond from bottom to top to planetary radii equivalent to that of Earth, a Super-Earth (1.7×Earth's radius, R), Neptune, and Jupiter. The blue and green shaded regions show the location of the classical habitable zones around α Centauri A and B, respectively (13). b Diagram of the orbital properties and approximate habitable zones of the α Centauri AB system. Note that this diagram does not show the 79° inclination of the orbit as seen from Earth, or the tertiary dwarf star, Proxima Centauri, at ~104 au.



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