Nothing sparks the imagination quite like a star-studded view of the sky above.

The innate human desire to understand the origins and natural systems of our own world and our place in the universe fuels the questions EAPS scientists seek to answer. How do planets form and evolve? What role do atmospheres play in their evolution, and how might this inform us about our own environmental changes? What can exoplanets tell us about our own solar system? Do other Earth-like planets exist? Could they be harboring life?

Since the first astronomy course was taught in the department in 1956, EAPS scientists continue to make major discoveries and lead pioneering missions across the furthest reaches of our solar system and beyond. Advances in radar mapping provided the Apollo program with the first detailed topographic maps of the Moon, and laid the groundwork for future breakthroughs like the Mariner 10 mission's discovery of Mercury's magnetic field and probable molten core, as well as the recent high-resolution gravitational maps of Mars and the Moon. Our research has led from finding the first evidence of Pluto's atmosphere to the startling recent photos of its thin haze taken by the New Horizons spacecraft. And our scientific gains have practical applications. The first detection of an atmosphere on an extrasolar planet has driven innovations in satellite technology and instrumentation, laying the groundwork for projects like the TESS (Transiting Exoplanet Survey Satellite) space telescope, specifically designed to find planets orbiting bright nearby stars, launching in 2017.

MIT CAMPAIGN FOR A BETTER WORLD

The history-making NASA New Horizons mission to Pluto captured the world's attention with its detailed images of a surprising, dynamic landscape. For EAPS Professor Richard Binzel, his involvement as co-investigator was the culmination of 25 years of research on Pluto and objects in the Kuiper Belt.

Why study the planets?

Exploring the workings of our solar system provides a window into Earth's past, with implications for our future. The study of magnetic fields of meteorites has helped establish a timeline for how quickly our solar system emerged from its protoplanetary nebula, and offers insights into the early composition of planetary bodies as they formed. The atmospheric extremes of other planets can tell us about our own climate and its potential changes, whether it be the cooling effects of dust, the heat-trapping properties of carbon dioxide, or even interactions with the solar wind. And as we continue to discover the existence of water and organic molecules elsewhere in the solar system, we are given more clues to the origins of life on Earth—and the tantalizing prospect of detecting life beyond our own planet.

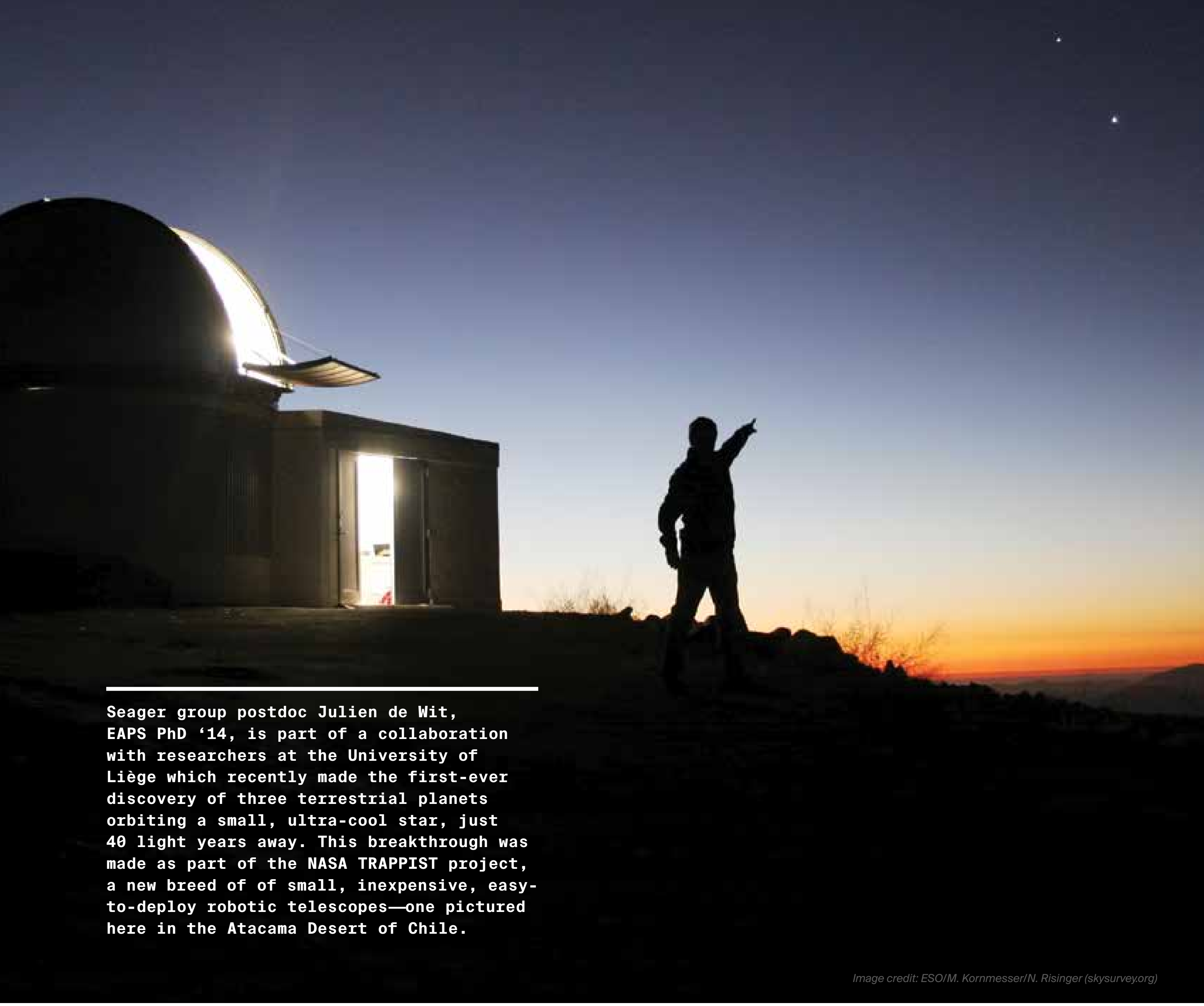
The OSIRIS-REx mission, bound for asteroid Bennu, includes EAPS co-investigators and will be NASA's first-ever probe to take samples of a near-Earth object and return them from space.

NASA selected the REXIS instrument as a Student Collaboration Experiment for OSIRIS-REx. Over 60 students from MIT and Harvard are involved in the design, flight, and data analysis.

How do EAPS scientists conduct their research?

EAPS planetary research breaks the boundaries between disciplines. Integrating the fields of physics, chemistry, biology, astronomy, and the geosciences is critical to understanding the natural systems which shape the solar system, and our place in it.

To gain answers, our scientists employ a multitude of tools and techniques, from theoretical analysis and modeling to experimentation and observation. Whether using telescopes at our own Wallace Observatory or those deployed in space, we are innovators in the use of stellar occultations and the transit method to characterize faraway planets. In the lab, we combine the elemental building blocks of the planets, subjecting them to extreme heat and pressure to recreate the early conditions of the solar system and study their mineral compositions as they solidify into rock. While other collaborations—like our work with the Mars Curiosity mission designing mass spectrometry experiments to detect organic compounds in martian soil—yield valuable data and experience which will guide our search for biosignatures on other planets.



Seager group postdoc Julien de Wit, EAPS PhD ‘14, is part of a collaboration with researchers at the University of Liège which recently made the first-ever discovery of three terrestrial planets orbiting a small, ultra-cool star, just 40 light years away. This breakthrough was made as part of the NASA TRAPPIST project, a new breed of of small, inexpensive, easy-to-deploy robotic telescopes—one pictured here in the Atacama Desert of Chile.

Image credit: ESO/M. Kornmesser/N. Risinger (skysurvey.org)

EAPS

http://eapsweb.mit.edu

Join Us

For our work to continue, we need you. EAPS relies on generous gifts from our alumni and friends to ensure we continue to attract the most outstanding students and scientists in the field. There are a number of ways you can participate, such as supporting a graduate student or donating to our Discretionary Fund. Or, better yet, establish your own fellowship and create a lasting legacy at MIT.

For more information about EAPS and how to support our research and our graduate students, please contact Angela Ellis, Senior Development Officer, at 617-253-5796 or aellis@mit.edu.

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