SKY&TELESCOPE

Insight Cruises
THE JOURNEY WITHIN

PROGRAM GUIDE

FULL CONFERENCE

MARCH 30 – APRIL 13, 2024
MEXICO

www.InsightCruises.com/events/st16/

*Blue asterisk indicates lectures included in MINI CONFERENCE

Program subject to change

Saturday, March 30 — San Diego

3 pm — **Depart San Diego**

5 – 7 pm* — **Reception**
[Crow's Nest]

We'll be handing out Program Guides, name badges, and making important announcements that you won't want to miss. Drinks served, too!

Sunday, March 31 — At Sea

8:30 – 10:15 am

The Hazards of the Space Flight to Mars

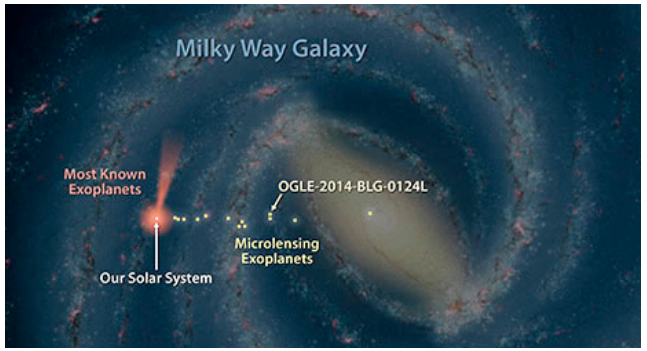
Chris Benton, M.B.Ch.B. — [Wajang]

NASA plans to send astronauts to Mars in the 2030s. Why go to Mars, and what are the challenges to the human body with this pioneering journey? Dr. Chris Benton discusses these questions and outlines the physical hazards of human long-duration spaceflight, proposed countermeasures, and current research in this field answering the question as to whether it will be safe. It could be your close relatives or friends travelling on these pioneer missions. Come along and discover what you need to know for spaceflight to our neighboring planet and possibly humanity's second home.

10:30 – 11:45 am

Our Place in the Universe: Past, Current, and Future Directions in Exoplanet Exploration

Néstor Espinoza, Ph.D. — [Wajang]



Having transitioned from science fiction to actual science only in the past few decades, the field of exoplanetary science is a young and vibrant one that keeps surprising and updating our view of the Earth in the cosmic context. In this lecture, Dr. Néstor Espinoza, an expert on the detection and detailed characterization of exoplanets, will review the state of the art in the field of exoplanet science, and how this has been shaped by constant paradigm shifts, kickstarted by the "impossible" 51 Peg b discovery in 1995. Historical perspectives will be given from the very first claims of exoplanet discoveries back to the early 50's, to ongoing efforts to try to detect the elusive "Earth 2.0".

1 – 2:30 pm

Studying Earth as an Exoplanet to Advance the Search for Habitable Worlds

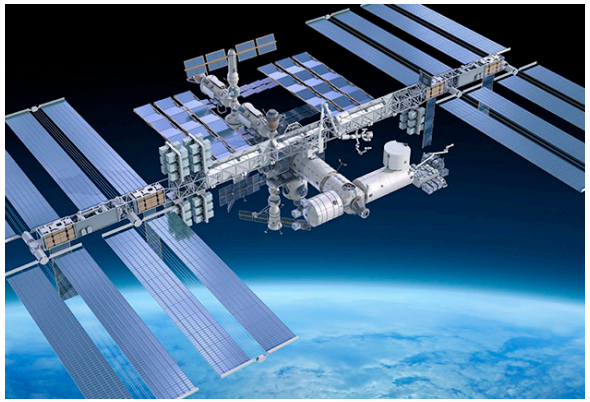
Eddie Schwieterman, Ph.D. — [World Stage]

More than five thousand exoplanets have been discovered, and recent observations from the James Webb Space Telescope (JWST) are piercing the veil of the atmospheres of gas-rich worlds. As the exoplanet field moves from detection to characterization, we are leaping ever closer to a detailed examination of the atmospheres and surfaces of rocky planets within the temperate "habitable zones" of their host stars. How would we recognize the signs of habitability and life on these distant exoplanets? We must begin with the only known example of a habitable and inhabited world — our own. However, viewing our homeworld as an exoplanet isn't as simple as it may first seem — low Earth-orbiting satellites afford only limited spatial views, and even space-based platforms like DSCOVR observe the Earth at only one phase. This talk will review the various ways we examine Earth as an exoplanet — from Earthshine observations of the Moon to limb soundings of Earth's atmosphere to spectral imaging of Earth from interplanetary spacecraft — and the remote indicators of habitability and life such observations reveal. The talk will also cover the advanced computational simulations being developed to simulate ExoEarths, which are critical for informing the development of future observation platforms to characterize other solar systems.

3 – 4:30 pm*

Astronaut Tales of Flying on the Space Shuttle and the International Space Station

Astronaut Garrett Reisman, Ph.D. — [World Stage]



Drawing upon his multiple Space Shuttle and Space Station missions as a NASA astronaut, Dr. Garrett Reisman will share his experiences in space and some lessons learned along the way. Using illuminating and humorous personal stories and an engaging multimedia presentation Dr. Reisman will leave you with useful gems of wisdom while keeping you thoroughly entertained.

5 – 7 pm*

Reception

[Crow's Nest]

*Included in Mini Conference

Monday, April 1 — At Sea

8:30 – 9:30 am

Weighing Black Holes: Not As Easy As It Sounds

Breanna Binder, Ph.D. — [Wajang]

Black holes are the most extreme objects in our universe. Supermassive black holes (million or billions of times as massive as our own Sun) reside at the hearts of nearly all large galaxies, and stellar mass black holes (usually five- to ten- times the mass of our Sun) are the corpses of the most massive stars. How do we know how massive these black holes are? In this talk I will review techniques that we use to weigh black holes using light from traditional telescopes and gravitational wave observatories, and describe the mystery of the missing "intermediate mass black holes."

9:45 – 10:45 am

Our Daytime Star and the Sun-Earth Connection

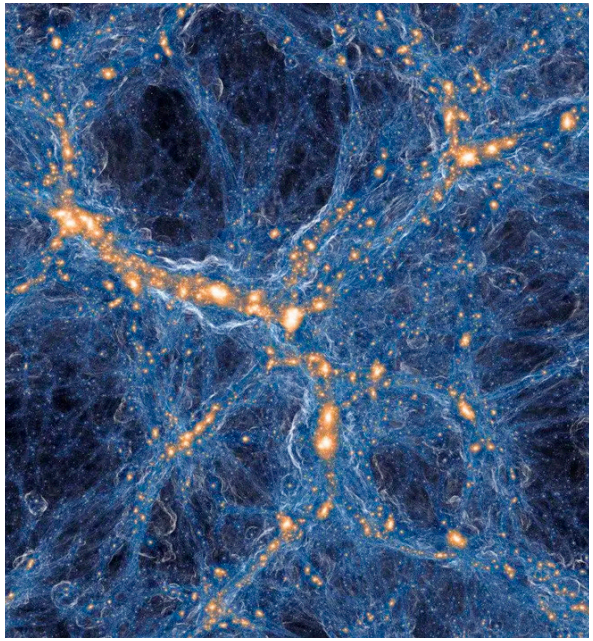
Richard Fienberg, Ph.D. — [Wajang]

The Sun, giver of light and heat and sustainer of life on Earth, is the only star in the heavens that we can examine up close and in detail. What do we know about its internal structure, what makes it shine, its dynamic atmosphere, and how it affects our planet and everything else in the solar system? We know a lot, but mysteries remain. Hear how astronomers are working to solve them with new telescopes and instruments on the ground and in space.

11 – 11:45 am

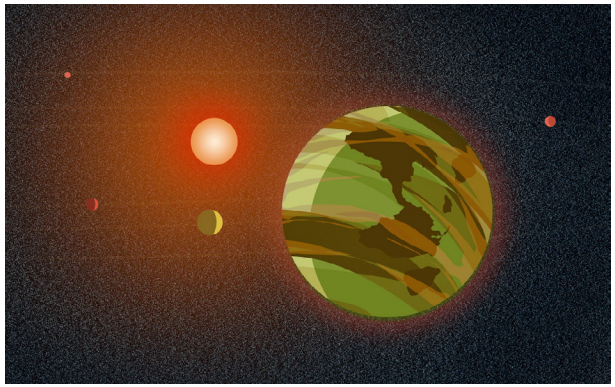
Large-Scale Structures of the Universe

Chris Benton, M.B.Ch.B. — [Wajang]



Starting with our location in the Milky Way, we move out through the Local Group into the Virgo and Laniakea Superclusters of galaxies and beyond to reveal the large-scale structures of the Universe as shown in a video travelling through space made from the Sloan Digital Sky Survey data of observed galaxy positions and distances.

1 – 2:15 pm **From Biosphere to Atmosphere: What is a Biosignature Anyway?**
Eddie Schwieterman, Ph.D. — [World Stage]



In the context of exoplanets, a biosignature is a remotely observable indication of living processes influencing a planet's atmosphere or surface. Identifying these fingerprints of life on distant worlds requires the robust exchange of gases between life and the atmosphere and/or substantial surface coverage of living biomass such as vegetation. Thus, the search for life beyond the solar system is — in practice — a search for planetary biospheres. Modern Earth's biosphere could be identified by the combination of oxygen, ozone, methane, and nitrous oxide gases in Earth's atmosphere and specific reflection patterns from vegetation on its surface. Why is this combination compelling evidence for life? Could we be fooled by abiotic processes masquerading as living ones? This talk traces the biosignature gases from their metabolic production in the ocean and on land to their chemical accumulation in the atmosphere in the face of photochemical destruction to their possible remote detectability from across interstellar space. We examine potential "false positives" for life and describe the growing catalog of potential biosignatures beyond those most commonly studied.

2:45 – 4:15 pm* **What Happens in a Space Flight — An Astronaut's Tale**
Astronaut Jeffrey A. Hoffman, Ph.D.
[World Stage]

A veteran of five Space Shuttle flights, Dr. Jeffrey Hoffman shares his experiences of launch, weightlessness, Earth from orbit, and reentry at 25 times the speed of sound (about 19,000 MPH). He also speculates on the future spaceflight for non-professional astronauts.

5 – 7 pm* **Reception**
[Crow's Nest]

Tuesday, April 2 — Manzanillo

10 am **Arrive Manzanillo**

6 pm **Depart Manzanillo**

5 – 7 pm* **Reception**
[Crow's Nest]

*Included in Mini Conference

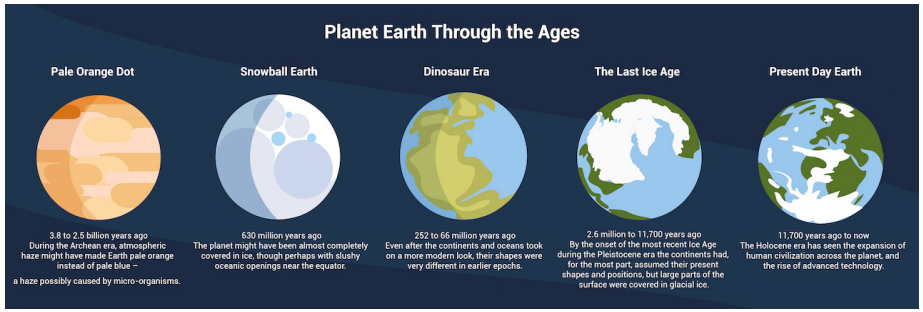
Wednesday, April 3 — Zihuatanejo

7 am **Arrive Zihuatanejo**

1 pm **Depart Zihuatanejo**

1 – 2 pm **Alternative Earths in Time and Space**
Eddie Schwieterman, Ph.D. — [World Stage]

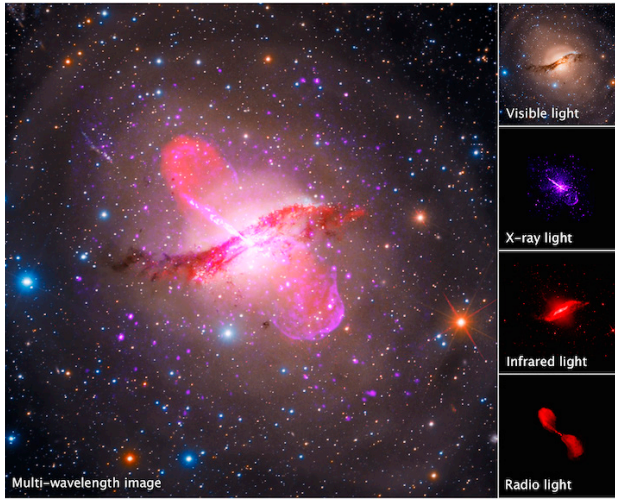
Throughout geologic time, our planet's prevailing atmospheric and chemical state has undergone titanic shifts, including from an oxygen-free, possibly orange-tinged, methane-choked global habitat to the oxygen-rich pale blue dot we now take for granted, all while maintaining persistent habitability over four billion years. Despite identical initial conditions and bulk characteristics, these divergent chemical states would have led to vastly different remote signatures apparent to a distant observer. Each chapter of Earth's dynamic history affords insight into the plausible (bio)geochemical states of habitable and inhabited exoplanets.



This lecture will review our efforts to apply insights from Earth's geochemical proxy record to our planet's long-term chemical and spectral evolution. We examine alternative scenarios where Earth is moved elsewhere in the habitable zone or around a different spectral type of star, relaxing to equilibrium states predicted by long-term geochemical cycles or photochemical equilibrium. For example, for most of the traditional habitable zone, planets must have carbon dioxide concentrations hundreds to thousands of times higher than Earth's current level to maintain clement temperatures with implications for the chemistry of their oceans, the remote characterization of their atmospheres, and the types of biospheres we'd expect on those worlds.

2:10 – 3:10 pm* **The New Great Observatories and the Future of Multiwavelength Astrophysics**
Breanna Binder, Ph.D. — [World Stage]

NASA's four Great Observatories — the Hubble Space Telescope, Chandra X-ray Observatory, Spitzer Space Telescope, and the Compton Gamma Ray Observatory — are among the greatest scientific missions ever undertaken. In addition to transforming our understanding of the cosmos, they were triumphs of human ingenuity and embodied the spirit of peaceful international partnership. Today, only two of the original Great Observatories remain, and the two newest additions to NASA's flagship observatory line-up (the James Webb Space Telescope and the Roman Space Telescope) will complete their missions by the 2040s. The pursuit of three new, multi-wavelength flagship missions to succeed the Great Observatories beyond the 2040s — the New Great Observatories — is a major national priority. These next-generation engines of discovery will usher in a new golden era of cosmic discovery, built to pursue the greatest questions human-

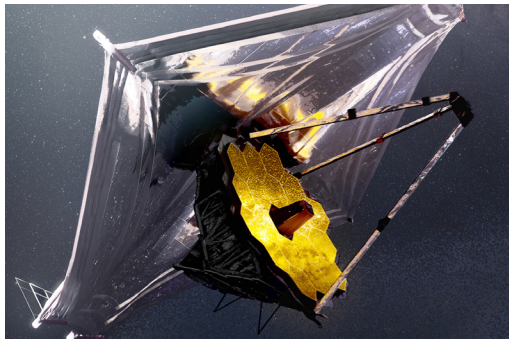


ity has ever asked: How does the universe work? How did we get here? Are we alone? In this talk, I will discuss the history of the Great Observatories program, the transformative power of the James Webb Space Telescope and the Roman Space Telescopes, and mission concepts for the New Great Observatories fleet.

3:20 – 4:30 pm*

Exploring New Frontiers in Exoplanetary Science with the James Webb Space Telescope

Néstor Espinoza, Ph.D. — [World Stage]



From being able to detect the faint light of the first galaxies to being able to characterize the atmospheres of Earth-sized worlds, the James Webb Space Telescope (JWST) is humanity's sharpest eye to look at the infrared Universe. In this lecture, Dr. Néstor Espinoza, an expert on exoplanet characterization with JWST, will provide an overview of the capabilities of JWST for exoplanet science, the most exciting results in the field from its very first two years of science operations, as well as what to expect in the near future from upcoming JWST programs and observations.

5 – 7 pm*

Reception

[Crow's Nest]

Thursday, April 4 — Huatulco

11 am **Arrive Huatulco**

6 pm **Depart Huatulco**

5 – 7 pm* **Reception**

[Crow's Nest]

*Included in Mini Conference

Friday, April 5 — At Sea

8:30 – 10 am

Engineering Lessons Learned from the Challenger and Columbia Space Shuttle Tragedies

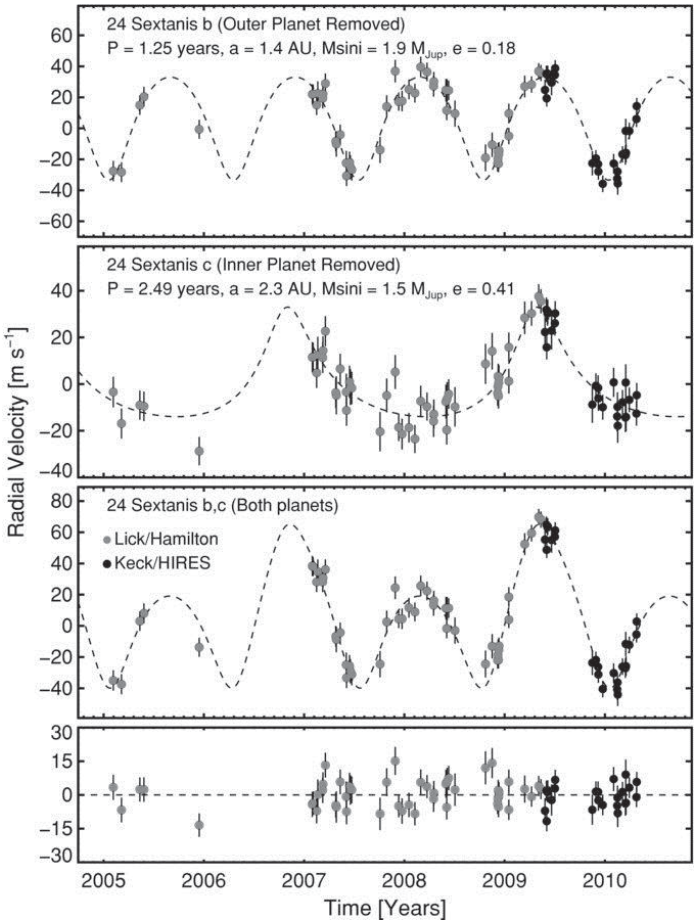
Astronaut Garrett Reisman, Ph.D. — [Wajang]

NASA endured three major human spaceflight tragedies: Apollo 1, Challenger, and Columbia. What do they have in common, and what lessons can we take away from these disasters, not only to mitigate the risks of human spaceflight, but to manage risk in any complex team endeavor?

10:15 – 11:45 am

Connecting the Dots: Planet Formation and Evolution in the Era of Data-Driven Exoplanetary Science

Néstor Espinoza, Ph.D. — [Wajang]

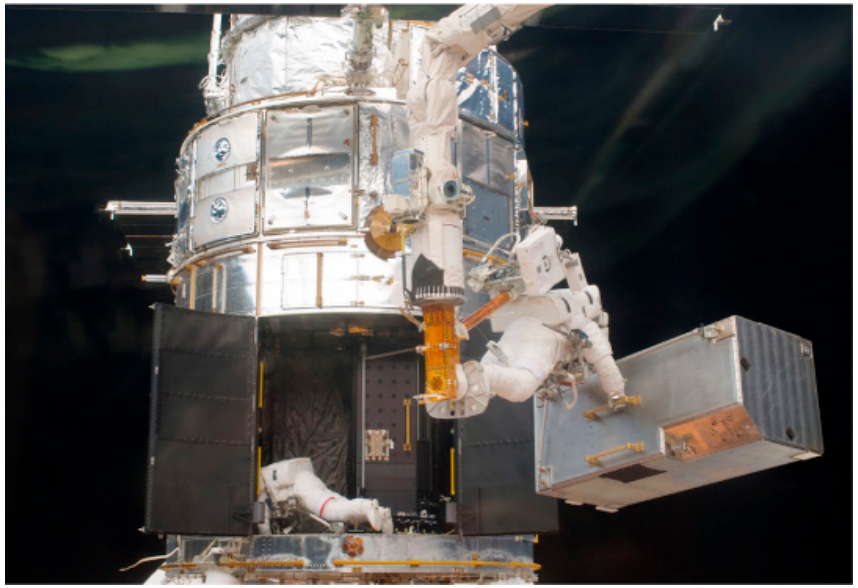


The field of exoplanetary science has been revolutionized by exoplanet surveys which have unveiled exotic — to our Solar System eyes — populations of distant worlds. In this lecture, Dr. Néstor Espinoza will review some of the key features of the currently known exoplanet population, and current efforts from state-of-the-art planet formation and evolution frameworks to try to understand it. Particular emphasis will be given on the history of ground and space-based exoplanet surveys, as well as how those still keep providing a steady inflow of "problem planets" that keep challenging the most advanced planet formation paradigms.

1 – 2:30 pm **What Went Wrong with the Hubble Space Telescope, How we Fixed It, and What we Have Learned From It**

Astronaut Jeffrey A. Hoffman, Ph.D. — [World Stage]

Dr. Jeffrey Hoffman, who made three spacewalks during Hubble's rescue mission, describes how the flaw in Hubble's optics came about, and how we fixed it, taking Hubble from being a devastating failure to one of NASA's greatest successes. Dr. Hoffman will show details of how a spacewalk is conducted and explain the various tasks they had to perform during the December, 1993 rescue mission.



As astronauts Richard Covey, Kenneth Bowersox, Kathryn Thornton, Story Musgrave, Claude Nicollier, **Jeff Hoffman**, and Tom Akers captured Hubble in orbit and moved it into the shuttle bay for repair.

*Included in Mini Conference

2:45 – 4:15 pm* **Exploring Possible Planetary Technosignatures**

Eddie Schwieterman, Ph.D. — [World Stage]

Technosignatures are indicators of technology that might be observed astronomically, demonstrating past or present extraterrestrial intelligence (ETI). Historically focused on radio signals (e.g., SETI), the search for technosignatures is now diversifying as the prospect of characterizing rocky exoplanets comes closer to reality. This lecture will cover the proposed signatures of planetary-scale civilizations, including industrial pollution, artificial greenhouse gases, surface and orbital megastructures, artificial lights, and optical beacons. Such planetary scale technosignatures may be accessible by current or near future observing platforms. We will delve into the reasoning behind those who are pessimistic — and those who are optimistic — about the possibility of finding evidence of ETI in the nearby galaxy.

5 – 7 pm* **Reception**

[Crow's Nest]

Saturday, April 6 — Puerto Vallarta

Noon **Arrive Puerto Vallarta (and then overnight)**

8:30 – 9:20 am **Here Comes the Great North American Solar Eclipse, Part I**

Richard Fienberg, Ph.D.

[Wajang]

Whether the total solar eclipse on April 8th will be your 1st or your 21st, you'll get the most out of the experience if you know exactly what to expect and when. In this presentation, we'll review how and why eclipses happen; describe how the April 8th eclipse will unfold from start to finish; and explain safe viewing techniques for unaided eyes, binoculars, and telescopes.

9:30 – 11 am **SpaceX and the Future of Commercial Human Spaceflight**
Astronaut Garrett Reisman, Ph.D. — [Wajang]

From humble beginnings in 2002, SpaceX has become a $150 billion company today that dominates the global rocket launch industry and is the sole American provider of astronaut launches to the International Space Station. Landing rockets on ships and working towards flying humans to Mars, SpaceX has disrupted the entire aerospace industry. How did SpaceX achieve such incredible success? What could SpaceX do even better? And what is Elon Musk really like?

5 – 7 pm* **Reception**
Crow's Nest]

Sunday, April 7 — Puerto Vallarta

5 pm **Depart Puerto Vallarta (overnighted on April 6)**

5 – 7 pm* **Reception**
[Crow's Nest]

Monday, April 8 — Mazatlan

1st contact (partial eclipse begins):	**09:51 am**
2nd contact (total eclipse begins):	**11:08 am**
3rd contact (total eclipse ends):	**11:12 am**
4th contact (partial eclipse ends):	**12:32 pm**

2 pm **Arrive Mazatlan**

6 pm **Depart Mazatlan**

7:30 – 8:30 am* **Here Comes the Great North American Solar Eclipse!, Part II**
Richard Fienberg, Ph.D. — [World Stage]

Whether the total solar eclipse on April 8th will be your 1st or your 21st, you'll get the most out of the experience if you know exactly what to expect and when. In this presentation, we'll review how and why eclipses happen; describe how the April 8th eclipse will unfold from start to finish; and explain safe viewing techniques for unaided eyes, binoculars, and telescopes.

5 – 7 pm* **Reception**
[Crow's Nest]

*Included in Mini Conference

Tuesday, April 9 — Loreto

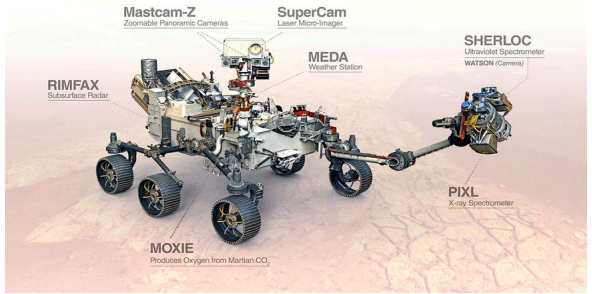
2 pm **Arrive Loreto**

11 pm **Depart Loreto**

8:30 – 9:45 am **Strange New Worlds — An Overview of Exoplanetary Sciences**
Joshua Winn, Ph.D. — [Wajang]

Did you know that it wasn't until the 1990s that scientists could be sure there were planets beyond our solar system? Since then, astronomers have discovered thousands of these planets — known as "exoplanets" — circling distant stars. Josh Winn, Princeton professor and author of The Little Book of Exoplanets, will explain why it took so long to find them, what new technologies and techniques were required, and what kinds of planets have been found. Recent advances have revealed bizarre new planets unlike anything in the solar system, while also bringing us to the threshold of finding other planets similar to Earth.

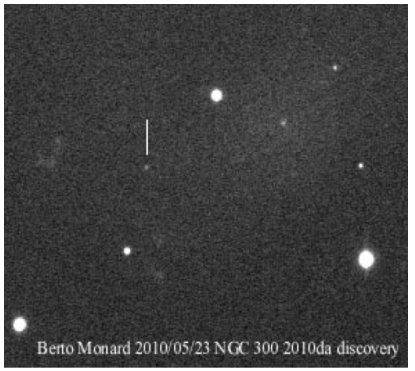
10 – 11:15 am **Mars, MOXIE, and the Future of Mars Missions**
Astronaut Jeffrey A. Hoffman, Ph.D. — [Wajang]



Dr. Jeffrey Hoffman, Deputy Principal Investigator for NASA's MOXIE oxygen-producing experiment on Mars, will discuss why using local resources will be necessary for exploration beyond the Earth-Moon system; he will explain how MOXIE works and the results it has produced during 2.5 years of operation; he will also briefly present some of the other accomplishments of NASA's Perseverance rover and will discuss the relationship of humans and robots in future planetary exploration.

11:30 am –12:30 pm **10+ Years of Chasing an Amateur Astronomer's Supernova Impostor**
Breanna Binder, Ph.D. — [Wajang]

In 2010, an amateur astronomer in South Africa observed an unusually bright transient event in the nearby galaxy NGC 300, located ~6.5 million light years away in the constellation Sculptor. Although the event was initially dubbed Supernova (SN) 2010da, follow-up optical and infrared observations revealed that this event was not a true supernova explosion, but rather the outburst from a massive, evolved star in NGC 300 — one of a growing class of "supernova imposters." SN 2010da was serendipitously observed in X-rays four months after the initial outburst and found to be unusually bright, suggesting that the



outbursting star was part of an X-ray binary system. Many years later, the system entered a new and unexpected ultraluminous X-ray phase, which unequivocally identified the compact object as a pulsar. The X-ray luminosity of the source has since faded below detectable limits. I will summarize more than a decade's worth of observational and theoretical work on this enigmatic source — all of which began with a single amateur astronomer.

5 – 7 pm* **Reception**
[Crow's Nest]

Wednesday, April 10 — Pichilingue

8 am **Arrive Pichilingue**

5 pm **Depart Pichilingue**

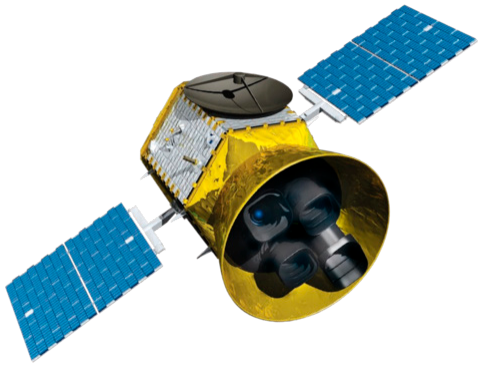
5 – 7 pm* **Reception**
[Crow's Nest]

Thursday, April 11 — Cabo San Lucas

7 am **Arrive Cabo San Lucas**

2 pm **Depart Cabo San Lucas**

3 – 4:30 pm* **NASA's Transiting Exoplanet Survey Satellite**
Joshua Winn, Ph.D. — [World Stage]



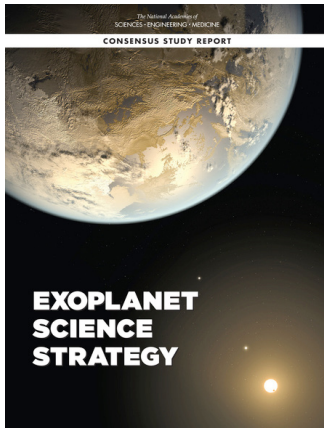
The Transiting Exoplanet Survey Satellite (TESS) is NASA's ongoing mission to discover planets outside the solar system, and more generally, to explore the bright and time-variable sky. TESS uses four 10cm optical telescopes to perform precise time-series photometry over wide fields of view. In the five years since it was launched, TESS has covered nearly the entire sky, leading to the confirmation of 330 new planets and the identification of about 6000 planet candidates that are being followed up by ground-based observers. The initial goal of the TESS Mission — to detect 50 planets smaller than Neptune and measure their masses — has been achieved, and now TESS is in an Extended Mission with broader goals. Dr. Winn, one of the Architects of the TESS mission, will review the history of TESS since its inception in 2006, and the most important and interesting results that have been achieved thus far. He will also describe the characteristics of TESS data and how you might use the data yourself.

5 – 7 pm* **Reception**
[Crow's Nest]

*Included in Mini Conference

Friday, April 12 — At Sea

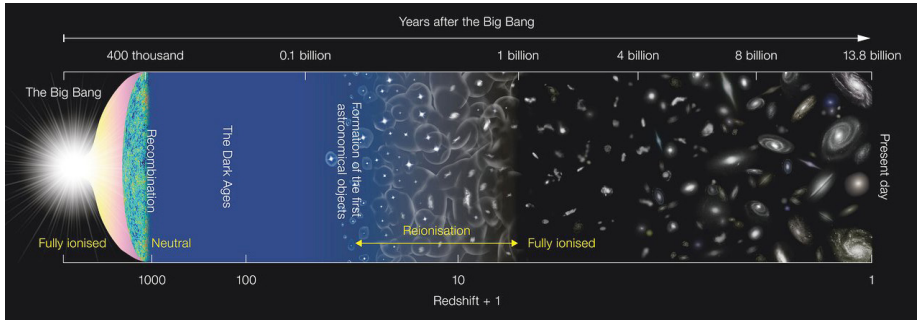
8:30 – 10 am **The Future of Exoplanet Science: 100,000+ New Worlds and Pictures of Earth-Like Exoplanets**
Néstor Espinoza, Ph.D. — [Wajang]



Exoplanet astronomy's present is bright, but its future is even brighter. In this lecture, Dr. Néstor Espinoza will provide an overview of two upcoming missions set to revolutionize the field of exoplanet science: the Nancy Grace Roman Space Telescope (set to launch in a few years) and the Habitable Worlds Observatory (HWO). Their science objectives as well as synergies with other observatories will be discussed, as well as some of the most exciting scientific highlights to expect from these upcoming flagship missions, which will include important technology demonstrations, the discovery of over 100,000 new worlds and family portraits of nearby, Solar-System-like exoplanetary systems.

10:30 – 11:45 am **History of the Universe, Part I**
Joshua Winn, Ph.D. — [Wajang]

Every culture has a creation story about the beginning (and often the end) of the Universe. Over the last 50 years, astronomers and physicists have developed a modern story, involving the Big Bang, the creation of the elements, the formation of stars and galaxies, and the expansion of the cosmos. The great advantage of the modern story is that it is based on solid and specific evidence. In this meeting, we will recount the history of the Universe as a whole, from its fiery beginning to its possible fate over billions of years. Our emphasis will be on understanding the evidence. How do we know the age of the Universe? How do we measure the distances to other galaxies? We will also discuss those parts of the modern creation story that are still mysterious, such as the nature of "dark matter," the apparent acceleration of the Universe's expansion, and the reason why the Big Bang banged. Finally, we will learn about the prospects for near-term advances using new facilities: the Vera Rubin observatory, the Simons Observatory, and the Euclid and Roman space telescopes.

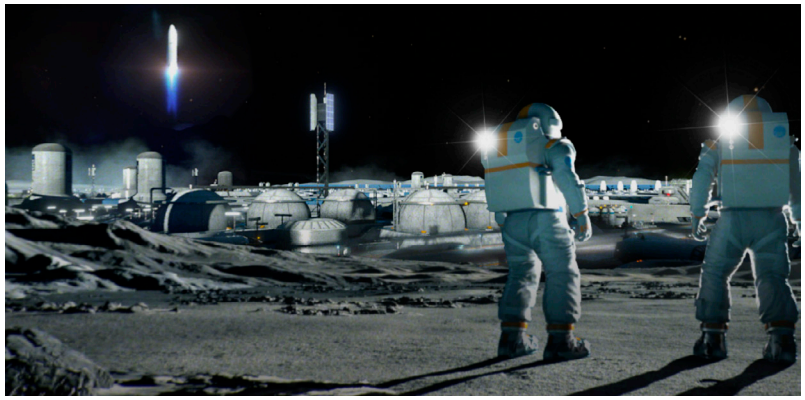


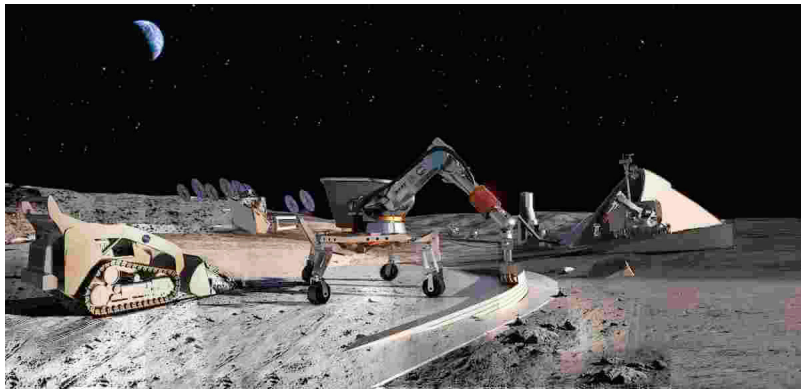
1:30 – 2:50 pm* **Establishing a U.S. Base on the Moon: Timing and Challenges**

Chris Benton, M.B.Ch.B. — [World Stage]

There's now a strong sentiment in the aerospace community and many sectors of society that it's time humans leave the confines of our planet to explore the Moon and, eventually, Mars. But this time, we mine precious resources and set up long-term bases with the goal of staying. It will not be easy, won't be cheap, and will involve creating new technologies. Such an ambitious project carries many other challenges, too, the least of which will be international competition to reach and tap water sources. This lecture will identify and expose all the "big picture" challenges to be faced, met, and overcome within NASA's incredible 2030 timeline for its Artemis Program's permanent moon base and whether this can be achieved.

*Included in Mini Conference





3 – 4:30 pm **History of the Universe, Part II**

Joshua Winn, Ph.D. — [World State]

Every culture has a creation story about the beginning (and often the end) of the Universe. Over the last 50 years, astronomers and physicists have developed a modern story, involving the Big Bang, the creation of the elements, the formation of stars and galaxies, and the expansion of the cosmos. The great advantage of the modern story is that it is based on solid and specific evidence. In this meeting, we will recount the history of the Universe as a whole, from its fiery beginning to its possible fate over billions of years. Our emphasis will be on understanding the evidence. How do we know the age of the Universe? How do we measure the distances to other galaxies? We will also discuss those parts of the modern creation story that are still mysterious, such as the nature of "dark matter," the apparent acceleration of the Universe's expansion, and the reason why the Big Bang banged. Finally, we will learn about the prospects for near-term advances using new facilities: the Vera Rubin observatory, the Simons Observatory, and the Euclid and Roman space telescopes.

5 – 7 pm* **Reception**

[Crow's Nest]

Saturday, April 13 — San Diego

8:30 am **Disembarkation Begins**

SPEAKER PROFILES

Chris Benton, M.B.Ch.B. (Bachelor of Medicine, Bachelor of Surgery), M.Sc. (Astronomy), F.R.NZ.C.GP (Fellowship of the Royal New Zealand College of General Practitioners) is a recently retired family physician with a keen interest in astronomy and human spaceflight since the Apollo missions to the Moon in the late 1960s and early 1970s.

Having grown up on a dairy farm in rural New Zealand, Chris graduated from the University of Auckland as a medical doctor in 1986 before commencing his own private practice in 1991. After 25 years of caring for a semi-rural community just north of Auckland, an opportunity to semi-retire arose in 2014, allowing him to continue his passion for medicine and return to school for a Master's Degree in Astronomy. These studies ignited his long-time interest in astronomy and spaceflight, including researching the hazards of space travel on the human body and mind. Chris completed this degree in 2020, fully retired from medicine in 2021, and now enjoys astronomy and medical communication work, writing articles and speaking on related topics. He has won three writing awards for the Auckland Astronomical Society, including one on the medical aspects of human spaceflight.

As the president of his local Hibiscus Coast Astronomical Society and a committee member of the Auckland Astronomical Society, the latter with over 600 active members, Chris regularly gives talks to both groups on the principles of general astronomy, planetary science, and cosmology. He also frequently talks to various community groups and colleges on astronomical and medical matters of interest to the public. These public speaking events allowed him to continue using his skill of explaining complex ideas in plain language, which he developed and enjoyed during his long and rewarding career in family medicine.

He learned the night sky constellations and many astronomical objects for years with his manually-operated 8-inch Dobsonian reflector telescope. Inspired by the knowledge and pleasure this provided, he bought an 11-inch GoTo Schmidt-Cassegrain for his fiftieth birthday to explore the beautiful New Zealand dark skies to a deeper level. His stargazing activities include transporting the new telescope to the nearby Great Barrier Island, one of the few International Dark Sky Sanctuaries.

Chris has ever-lasting fond memories of the 2017, 2019, and 2023 solar-eclipses in the USA and Chile through Insight Cruises/*Sky & Telescope* tours, and is looking forward to their upcoming total solar eclipse adventures in 2024, 2026, and 2027.

Breanna Binder, Ph.D. is an associate professor at California State Polytechnic University, Pomona ("Cal Poly Pomona") who studies the multiwavelength emission from X-ray binaries and the galaxies in which these reside. X-ray binaries are evolved binary star systems composed of a compact object — either a black hole or a neutron star — that is accreting material from its companion star. Her research utilizes multiwavelength observations of X-ray binaries in nearby galaxies to investigate how different galactic environments leave signatures on the X-ray binary populations and what this means for massive star evolution — both in our local universe, and across cosmic time.

Dr. Binder is also deeply passionate about securing the next generation of space-based "great observatories" (to follow the James Webb Space Telescope, the Hubble Space Telescope, the Chandra X-ray Observatory, and others) and promoting a climate of accessibility and inclusivity in astronomy. She has a bachelor's degree in Physics with a Specialization in Astrophysics from the University of California, San Diego, and a Ph.D. in Astronomy from the University of Washington.

Néstor Espinoza, Ph.D. is an astronomer at the Space Telescope Science Institute (STScI) — the science and operations center for the Hubble (HST) and James Webb (JWST) Space Telescopes — where he acts as the Mission Scientist for Exoplanet Science. He works both on the detection of new exoplanets — planets outside our Solar System — as well as on the characterization of their atmospheres and interiors. His research interests focus on trying to understand what planets as small as ours and as big as our very own Solar System giants look like and are made of elsewhere, in order to ultimately put our own neighborhood into a cosmic context. In essence, his entire research revolves around a simple question: how special are we?

Dr. Espinoza was born and raised in Santiago, Chile, where he obtained both his B.S. in Astronomy and his Ph.D. in Astronomy and Astrophysics from the Pontificia Universidad Católica de Chile.

After finishing his Ph.D. in 2017, he held a position as a Bernoulli Fellow, jointly working at the Max Planck Institute for Astronomy in Heidelberg, Germany and the University of Bern in Bern, Switzerland. In 2018, he was awarded

the prestigious IAU-Gruber Fellowship for his contributions to the field of exoplanetary science.

In 2019, Dr. Espinoza moved to STScI. There, half of his time is spent on the science he and his team lead, which is mainly focused on characterizing exoplanet atmospheres using space-based telescopes — in particular the JWST. The rest of his time is spent leading teams and providing support to the HST and JWST missions, including technical deep dives to optimize instrumentation and operations onboard these telescopes.

Astronomer **Richard Tresch Fienberg, Ph.D.** was the American Astronomical Society's Press Officer from September 1, 2009 until his retirement on September 1, 2021.

Born and raised in Los Angeles, California, Rick was locked into astronomy and space exploration as a career in 1968. In that pivotal year, he received a small telescope as a 12th birthday gift, read *The Universe: From Flat Earth to Quasar* by Isaac Asimov, got caught up in the excitement of the Apollo 8 mission to the Moon, and was riveted by the movie *2001: A Space Odyssey.*

Rick majored in physics at Rice University. During the summer of 1976, between his sophomore and junior years, he spent a month at the Jet Propulsion Laboratory as an undergraduate intern with NASA's Viking mission, working on both the orbiter and lander teams.

While pursuing his doctorate, he worked with Giovanni Fazio and a team of NASA and University of Arizona scientists in developing one of the first digital infrared cameras suitable for use on telescopes. Fazio's later selection as team leader for the Spitzer Space Telescope's Infrared Array Camera rose from that team success.

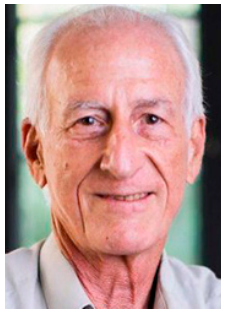
"Even before I finished my Ph.D.," says Fienberg, "I realized that I enjoyed teaching and writing about astronomy more than I liked doing research." Accordingly, in September 1986 he joined the staff of *Sky & Telescope* magazine as an assistant editor. Over the next 22 years Rick served in a variety of editorial and management positions at *S&T*, including eight years as Editor in Chief and nine as President of parent company Sky Publishing. In 2009 he became the AAS Press Officer.

Rick is an elected Fellow of the American Association for the Advancement of Science (AAAS). The International Astronomical Union (IAU) — which he served as President of Commission C2, Communicating Astronomy with the Public, from August 2018 to August 2021 — named asteroid 9983 Rickfienberg in his honor. In 2018 NASA awarded him its Exceptional Public Achievement Medal "for exceptional service to the nation in [his] tireless efforts for the public's safe solar viewing of the 2017 total solar eclipse."

In 2019, the North East Region of the Astronomical League (NERAL) gave him the Walter Scott Houston Award for his "many years enlightening [amateur astronomers] and educating the public."

Rick is currently Senior Contributing Editor of *S&T*. He continues to serve the AAS as Senior Advisor to the Executive Officer and Program Manager of the AAS Solar Eclipse Task Force, helping prepare North America for the October 14, 2023 annular eclipse and the April 8, 2024 total eclipse. He is coauthor with Stephen P. Maran of *Astronomy For Dummies, 5th edition*, published by John Wiley & Sons in June 2023.

Trained as a professional astronomer, Rick nevertheless remains an amateur at heart, observing the sky and taking astrophotos from his private observatory in central New Hampshire. An inveterate traveler and eclipse-chaser, Rick has visited all seven continents and the North and South Poles. He and his wife Susan — who retired in 2019 from a career in senior health and housing — are the parents of three grown sons and have four young grandchildren.



Professor Jeffrey A. Hoffman is a member of the Department of Aeronautics and Astronautics at MIT. Dr. Hoffman earned a B.A. (summa cum laude) from Amherst College in 1966 and a Ph.D. in astrophysics from Harvard University in 1971. He subsequently received a M.Sc. in Materials Science from Rice University in 1988. Dr. Hoffman's original research interests were in high-energy astrophysics — cosmic gamma ray and X-ray astronomy. His doctoral work at Harvard was a balloon-borne, low-energy, gamma ray telescope. He spent one year as a post-doctoral fellow at the Smithsonian Astrophysical Observatory, after which he joined the research staff of the Physics Department at Leicester University in the UK (1972–1975), where he worked on several X-ray astronomy rocket payloads and was project scientist for the medium-energy X-ray experiment on the European Space Agency's EXOSAT satellite. From 1975–1978, he worked at MIT's Center for Space Research, where he was project scientist in charge of the orbiting HEAO-1 A4 hard X-ray and gamma ray experiment, launched in August 1977. He also contributed extensively to analysis of X-ray data from the SAS-3 satellite, being operated by MIT. His principal research was the study of X-ray bursts, about which he authored or co-authored more than 20 papers.

Dr. Hoffman served in the Astronaut Corps from 1978–1997, making five space flights and becoming the first astronaut to log 1,000 hours of flight time

aboard the Space Shuttle. Dr. Hoffman's assignments included testing guidance, navigation, and flight control systems. He worked with the orbital maneuvering and reaction control systems, with crew training, and with the development of satellite deployment procedures. Dr. Hoffman served as a support crewmember for **STS-5** and as a CAPCOM (spacecraft communicator) for the **STS-8** and **STS-82** missions. For several years, Dr. Hoffman was the Astronaut Office representative on the Payload Safety Panel. Dr. Hoffman was a co-founder of the Astronaut Office Science Support Group. During 1996 he led the Payload and Habitability Branch of the Astronaut Office.

Dr. Hoffman's spaceflight experience included serving as Payload Commander of **STS-46**, the first flight of the US-Italian Tethered Satellite System. He played a key role in coordinating the scientific and operational teams working on this project. Dr. Hoffman has performed four spacewalks, including the first unplanned, contingency spacewalk in NASA's history (**STS-51-D**; April, 1985) and three spacewalks during the initial rescue/repair mission for the Hubble Space Telescope (**STS-61**; December, 1993). He worked for several years as the Astronaut Office representative for EVA and helped develop and carry out tests of advanced high-pressure space suit designs and of new tools and procedures needed for the assembly of the International Space Station.

Following his astronaut career, Dr. Hoffman spent four years as NASA's European Representative, based at the US Embassy in Paris.

In August 2001, Dr. Hoffman joined the MIT faculty, where he teaches courses on space operations and design. Dr. Hoffman is director of the Massachusetts Space Grant Consortium, responsible for statewide NASA-related educational activities designed to increase public understanding of space and to attract students into aerospace careers. His principal areas of research are advanced EVA systems, space radiation protection, management of space science projects, human-robotic exploration strategies, ISRU (in situ resource utilization, i.e., "living off the land"), and space systems architecture. Dr. Hoffman was a member of the MIT/Charles Stark Draper Laboratory Concept Evaluation and Refinement BAA team, optimizing architectures for lunar and Martian exploration. He has been the faculty mentor for numerous teams of MIT students competing in NASA challenges. He led a project to develop an Earth-based flying testbed for a planetary surface hopper exploration system. He is currently Deputy Principal Investigator of the MOXIE experiment on the Mars 2020 Perseverance rover, which is, for the first time, producing oxygen from local Martian resources.

Dr. Hoffman is a member of the International Academy of Astronautics; the International Astronomical Union; the American Institute of Aeronautics and Astronautics; the American Astronomical Society; the Spanish Academy of Engineering; Phi Beta Kappa; and Sigma Xi. From 2008–2018 he held the post of Distinguished Visiting Professor at the University of Leicester, in the UK and is a Professor at the International Space University in Strasbourg, France. He has received honorary doctorates from Leicester University (1997) and Amherst College (1999).

Among his honors and awards are a Woodrow Wilson Foundation Pre-Doctoral Fellowship, 1966–67; a National Science Foundation Pre-Doctoral Fellowship, 1966–71; a National Academy of Sciences Post-Doctoral Visiting Fellowship, 1971–72; a Harvard University Sheldon International Fellowship, 1972–73; and a NATO Post-Doctoral Fellowship, 1973–74. Dr. Hoffman was awarded NASA Space Flight Medals in 1985, 1991, 1992, 1994, and 1996; NASA Exceptional Service Medals in 1988, 1992, and 2002; and NASA Distinguished Service Medals in 1994 and 1997. He was awarded the V. M. Komarov and the Sergei P. Korolyov Diplomas by the International Aeronautical Federation in 1991 and 1994. As part of the Hubble Space Telescope Rescue Team, he was awarded the National Aeronautic Association Collier Trophy in 1993, the Aviation Week and Space Technology Laurels for Achievements in Space in 1993, the American Astronautical Society Victor A. Prather Award in 1994, the Freedom Forum Free Spirit Award in 1994, and the American Institute of Aeronautics and Astronautics Support Systems Award in 1995. In 2007, Dr. Hoffman was elected to the U.S. Astronaut Hall of Fame. In 2011, he was awarded the Centennial Medal from Harvard University's Graduate School of Arts and Sciences.

Professor Garrett Reisman is a member of the Viterbi School of Engineering at USC. Dr. Reisman earned two B.S. degrees (magna cum laude) from University of Pennsylvania in 1991, and an M.S. (1992) as well as a Ph.D. (1996) in mechanical engineering from the California Institute of Technology (Caltech).

NASA Experience: Selected by NASA as a mission specialist in June 1998, Dr. Reisman reported for training in August 1998. Astronaut Candidate Training included

orientation briefings and tours, numerous scientific, and technical briefings, intensive instruction in shuttle and International Space Station (ISS) systems, physiological training, and ground school to prepare for T-38 flight training as well as learning water and wilderness survival techniques. After completing this training, Dr. Reisman was assigned to the Astronaut Office Robotics Branch where he worked primarily on the ISS robotic arm. In October 2001, Dr. Reisman was assigned to the Astronaut Office Advanced Vehicles Branch, where he worked on the displays and checklists to be used in the next-generation space shuttle cockpit.

Space Mission Experience: His first mission was aboard the Space Shuttle Endeavour (**STS-123**), launched March 11, 2008, which dropped him off for a 95-day mission aboard the International Space Station — working with both the **Expedition 16** and **Expedition 17** crews as a flight engineer. Astronaut Reisman returned to Earth with the crew of **STS-124** aboard the Space Shuttle Discovery on June 14, 2008. During his three-month tour of duty aboard the ISS, Dr. Reisman performed one spacewalk totaling seven hours of EVA and executed numerous tasks with the ISS robotic arm and the new robotic manipulator, Dextre.

Astronaut Reisman's second mission was as "Mission Specialist 1" aboard the Space Shuttle Atlantis, **STS-132**, which launched on May 14, 2010. During this mission he logged an additional 11 days, 18 hours and 28 minutes in space, including two more spacewalks. During seven days of docked operations, Dr. Reisman logged 14 hours of EVA which included operating the ISS robotic arm and installed the Russian-built Mini Research Module to the ISS. He also installed a spare antenna and a stowage platform for Dextre, replaced the last of the P6 truss batteries, and retrieved a power data grapple fixture. The STS-132 mission was completed on May 26, 2010 after 186 orbits, traveling 4,879,978 miles.

Born February 10, 1968, in Morristown, New Jersey, Astronaut Reisman considers Parsippany, New Jersey, to be his hometown. Recreational interests include flying, skiing, snowboarding, rock climbing, mountaineering, canyoneering and scuba diving. Dr. Reisman is an FAA certified flight instructor. Currently Dr. Reisman is a Professor of Astronautical Engineering at USC and a Senior Advisor at SpaceX..

Edward (Eddie) Schwieterman, Ph.D. is an Assistant Professor of Astrobiology in the Department of Earth and Planetary Sciences at the University of California, Riverside (UCR). He holds Bachelor's degrees in Physics and Astrophysics from the Florida Institute of Technology, a Master's degree in Astronomy from the University of Washington, and a dual Ph.D. in Astronomy and Astrobiology from the University of Washington. His research interests include astrobiology, exoplanets, planetary atmospheres, planetary habitability, and the biogeochemical evolution of Earth's atmosphere and oceans.

Using computational models, he seeks to understand the composition, evolution, and remote spectral appearance of terrestrial (rocky) planetary atmospheres. These models are informed by observations of Earth and other bodies in our solar system, and have been used for diverse purposes, from calculating Earthshine illumination on the Moon to predicting the signatures of alien oceans. His review of exoplanet biosignatures in Astrobiology is the most highly cited article in that journal published in the last five years. He also harbors a burgeoning interest in planetary technosignatures and other possible signs of extraterrestrial civilization.

Josh Winn, Ph.D. is a Professor of Astrophysical Sciences at Princeton University. His research goals are to explore the properties of planets around other stars, understand how planets form and evolve, and make progress on the age-old question of whether there are other planets capable of supporting life. His group uses optical telescopes to study exoplanetary systems, especially those in which the star and planet eclipse one another. His recent work has focused on the orbital architecture of planetary systems: the sizes, shapes, and orientations of the orbits, and the rotation of the central star. He was a Participating Scientist in the NASA Kepler mission and is a Co-Investigator of the ongoing NASA Transiting Exoplanet Survey Satellite mission. Over the years, he and his group have also pursued topics in stellar astronomy, planetary dynamics, radito interferometry, gravitational lensing, and photonic bandgap materials.

Josh has been distinguished for his teaching by two awards, the MIT School

of Science Prize for Excellence in Graduate Teaching, and the MIT Physics Department Buechner Faculty Teaching Prize. He is a frequent public speaker and produced two series of recorded lectures for the Teaching Company (also knows as The Great Courses, or Wondrium): *The Search for Exoplanets*, and *Introduction to Astrophysics*. He has also written a book for the general public, *The Little Book of Exoplanets*, published in 2023 by Princeton University Press.

Josh grew up in Deerfield, Illinois. He graduated from MIT in 1994. After spending a year as a Fulbright Scholar in the UK, at Cambridge University, he returned to MIT as a Hertz Fellow. While in graduate school, he worked in medical physics, condensed-matter physics, and astrophysics and moonlighted as a science journalist for The Economist. He earned a Ph.D. in physics in 2001, and subsequently held NSF and NASA Hubble postdoctoral fellowships at the Harvard-Smithsonian Center for Astrophysics. He was on the MIT Physics faculty for 10 years before moving to Princeton in 2016.