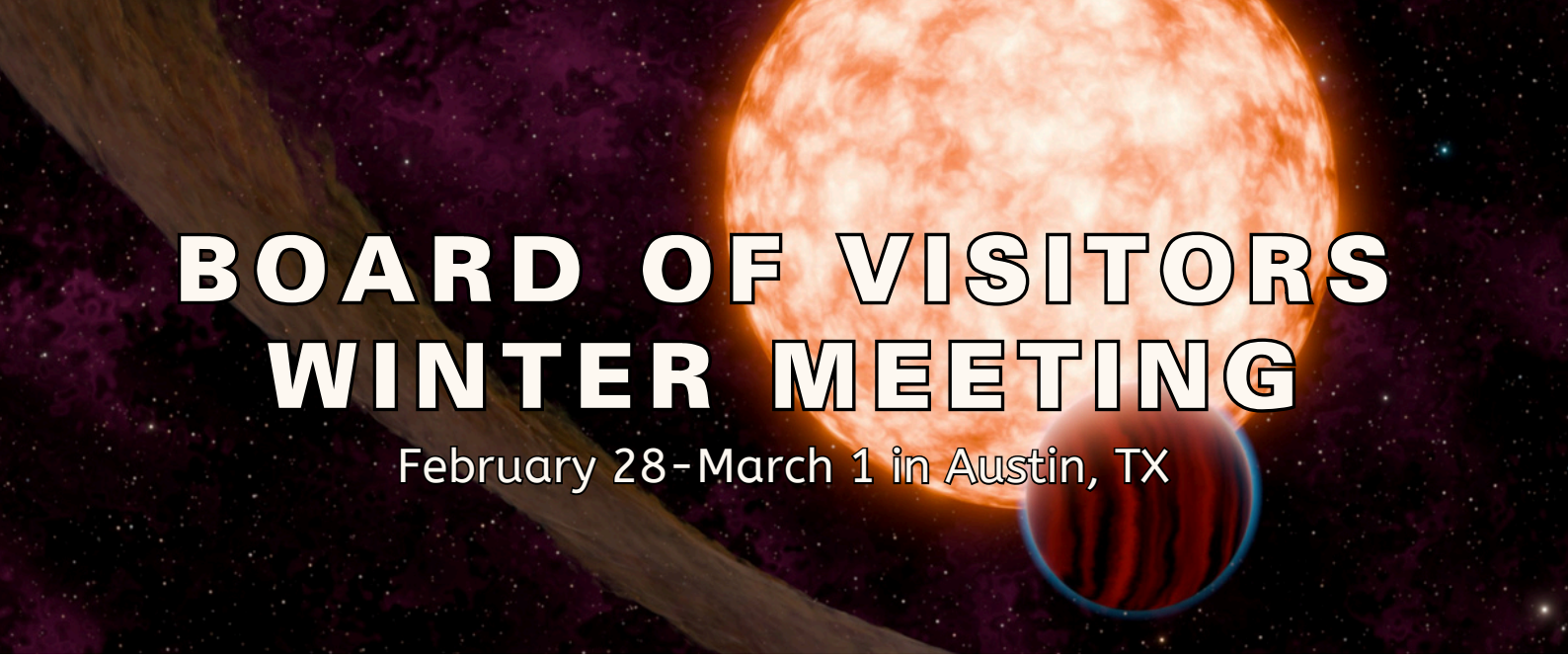


Thank You for Another Great Meeting

The 2025 Board of Visitors Winter Meeting took place February 28 and March 1 on The University of Texas at Austin campus. Over 140 members and guests joined us for a reception at the Texas Science & Natural History Museum, the latest news from UT and BOV leadership, and a showcase of the pioneering work underway at the Department of Astronomy and McDonald Observatory.

Science talks explored:

- The science behind McDonald Observatory's award-winning education programs
- The search for elusive brown dwarfs using the James Webb Space Telescope
- The identification of white dwarfs whose cores are crystalizing using McDonald Observatory's Otto Struve Telescope
- The study and evolution of planets outside of our solar system

Thank you to all who attended. It was a pleasure to connect with so many of you.

Board of Visitors group photo. Credit: Cara Arlauskas

Membership Meeting & Opening Remarks

Membership Meeting

At the event, the Board of Visitors voted in nine new members: Marie and Cameron Chandler, Tyson Tuttle, Karen and Phillip Kelton, Peggie Mueller, Sylvia and Jim Phillips, and Wayne Rosing. Thank you for joining us!

Opening Remarks

Marty Heaner, BOV Chair

- Welcome to the 2025 winter meeting.
- We're entering a golden age of astronomy. Powerful instruments are coming online that can gather massive amounts of data, enabling new and exciting discoveries.
- Welcome to the new Board of Visitors members.

Andreas Matouschek, Associate Dean for Research and Facilities (now the Interim Dean of the College of Natural Sciences)

- The University of Texas at Austin is undergoing a series of leadership transitions. David Vanden Bout, former dean of the College of Natural Sciences, is UT's new interim provost. UT's new interim president is Jim Davis, replacing outgoing President Jay Hartzell.
- UT is one of only four institutes in the U.S. with more than one AI institute. One of these is the NSF-Simons AI Institute for Cosmic Origins (CosmicAI), directed by Astronomy's Stella Offner.
- UT's Texas Science Festival runs February 21 through March 6. It includes science talks, demos, shows, and tours. The livestream of Adam Kraus's Great Lecture in Astronomy is included as a festival event.

Board of Visitors members enjoy a reception in the great hall of the Texas Science & Natural History Museum, surrounded by dinosaurs. Credit: Emily Howard, McDonald Observatory.

Opening Remarks

Karl Gebhardt. Credit: Cara Arlauskas, McDonald Observatory.

Karl Gebhardt, Astronomy Department Chair

- Current federal funding discussions add instability to our budgets. Understandably, this is a subject of concern for many of Astronomy's postdocs, graduate students, and undergraduate students.
- Gebhardt recently returned from the inaugural trip of a new undergraduate science program. He accompanied four students to McDonald Observatory for five nights of observations. In addition to connecting participants to the Observatory's research, the program will help train a team of observers for large projects.

- Faculty updates:
  - Stella Offner was promoted to full professor. In 2024, she started the NSF-Simons AI Institute for Cosmic Origins (CosmicAI).
  - Caroline Morley won a Scialog: Early Science with the LSST award to study white and brown dwarfs with the Rubin Observatory.
  - Mike Boylan-Kolchin's research continues to redefine our understanding of the early universe. Read a recent news release about his work.
  - Steve Finkelstein's research provides some of the most revealing observations available of early galaxy formation. Read a recent news release about his work.
  - Pawan Kumar's model of fast radio bursts was confirmed by researchers at MIT's Kavli Institute for Astrophysics and Space Research.
  - Keith Hawkins is using McDonald Observatory and the Gaia space telescope to expand our understanding of the Milky Way.
- Centers and Projects
  - HETDEX completed observations in July 2024. So far, the data looks promising.
  - The Cosmic Frontier Center is leading the world in early universe studies.
  - The NSF-Simons AI Institute for Cosmic Origins (CosmicAI) launched in September 2024.
  - The Center for Planetary Systems Habitability continues to expand our understanding of exoplanets.
  - The Wootton Center for Astrophysical Plasma Properties simulates the interiors of stars here on Earth.
- Thank you to the Board of Visitors for its continued support, which enables graduate fellowships and upcoming facility upgrades.

Opening Remarks

Taft Armandroff, McDonald Observatory Director

- The Immersion Grating Infrared Spectrograph (IGRINS) has returned to the Observatory's Harlan J. Smith Telescope. IGRINS is adept at studying young stars, gas, and exoplanets thanks to its high-resolution observations in a broad range of wavelengths.
- We are raising funds to replace the 20-year-old Segment Alignment Maintenance System (SAMS) on the Hobby-Eberly Telescope. This is the system responsible for aligning the 91 segments in the HET's mirror. The project is expected to cost $3.4 million and take five years to complete. Costs will be split between the telescope's partners and philanthropic foundations. Fundraising is ongoing.
- Recent VIP visitors to the Observatory include UT Systems Regent Jodie Jiles, current and incoming justices on the Texas Supreme Court, and a delegation of judges and legal experts from Mongolia.
- Giant Magellan Telescope (GMT) updates:
  - Three of the seven primary mirror segments are complete; the remaining four are at various stages of fabrication.
  - Northwestern University joined the GMT consortium in December 2024.
  - Most funding to date has been from non-federal sources. However, GMT has been pursuing grants from the National Science Foundation. With the uncertainties in the federal budget, GMT is intensifying its efforts to secure additional private sources.

Top: Board of Visitors members enjoy telescope views of planets during the opening reception of the 2025 winter meeting. Credit: Cara Arlauskas, McDonald Observatory.

Bottom: Dinner on the pavilion of the Texas Science & Natural History Museum. Credit: Emily Howard, McDonald Observatory.

Science Talks

Teaching and Education Best Practices, Highlights, and Impacts of McDonald Observatory and the Department of Astronomy

Keely Finkelstein, Astronomy Department Associate Chair and Associate Professor of Instruction

"We are scientists. We can use the framework of the scientific process and apply it to our teaching."

Education and teaching have always been part of McDonald Observatory and the Department of Astronomy's mission. In her talk, Finkelstein shared the important role of the Observatory in educating UT Austin students, as well as K-12 teachers and their classrooms. Using the Observatory's teacher workshops as an example, Finkelstein shared the science behind how courses are designed – from identifying overarching goals, to creating engaging activities, and assessing success. Since these workshops launched in 2001, over 2,100 teachers have attended, impacting an estimated one million or more students.

Top: Teachers participate in a workshop at McDonald Observatory. Credit: McDonald Observatory.

Right: Keely Finkelstein shares the science behind McDonald Observatory's award-winning education programs in her Board of Visitors talk. Credit: Lara Eakins, UT Astronomy.

Science Talks

Probing the Limit of the Star Formation Process with JWST

Matthew De Furio, Postdoctoral Fellow

"The universe makes a lot more 10 Jupiter-mass things than five Jupiter-mass things, and a lot more five Jupiter-mass things than three Jupiter-mass things."

The Flame Nebula, located 1,400 light-years away from Earth, is a hotbed of star formation. The processes driving stellar birth also create "failed stars" that are so small their cores will never fuse hydrogen like their full-fledged siblings. These are brown dwarfs. Because they cool into very dim and cool objects, only young brown dwarfs are reasonably visible to telescopes. However, the dense dust and gas surrounding them at birth make these objects difficult to view. De Furio shared his research using the James Webb Space Telescope to explore the Flame Nebula and find an abundance of brown dwarfs. JWST is able to view such objects down to half the mass of Jupiter; however, the smallest found were roughly two to three Jupiter-masses. This may be the smallest size possible for brown dwarfs.

Read about De Furio's work, which was published in The Astrophysical Journal on March 10. His talk offered a sneak peek of the research.

A visible light view of the Flame Nebula as captured by the Hubble Space Telescope (left). On the right, two section of the Hubble shot are captured in the near infrared by the James Webb Space Telescope. Much of the dark, dense gas and dust, as well as the surrounding white clouds within the visible-light image, have been cleared in the near-infrared images. Credit: NASA, ESA, CSA, M. Meyer (University of Michigan), A. Pagan (STScI).

Science Talks

Uncovering Earth-Sized Diamonds with the Otto Struve Telescope

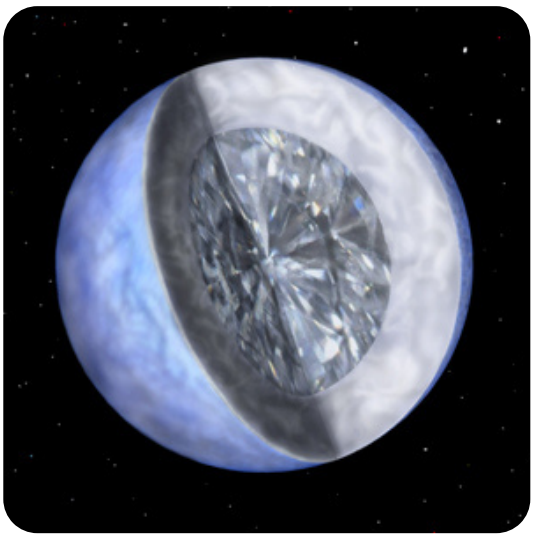
Malia Kao, Ph.D. Student

"We all know that the universe is very old, and that the Milky Way is very old. But how do we know their ages?"

White dwarfs are the final stage of life for most stars, including our Sun. After expanding into a red giant and blowing off their atmospheres, these stars contract into a dense core that slowly cools over time. Because of this, scientists can calculate a white dwarf's age based on its temperature – and from that calculate the age of our galaxy. However, as the stars cool, their cores start to crystallize (into massive diamonds!), releasing extra heat and making them seem younger than they really are. To better understand this process, Kao used a technique called asteroseismology to study star vibrations and identify those with crystallizing interiors. Using McDonald Observatory's Otto Struve Telescope for over 150 nights of observing, Kao found a significant number of these stars, growing the catalogue of known "crystallizing pulsators" from seven to 24. With these, astronomers will be able to better understand how stars evolve and refine their estimates of the Milky Way's age.

Right: Graduate student Malia Kao discussing her search for white dwarfs using McDonald Observatory's Otto Struve Telescope. Credit: Lara Eakins, UT Astronomy.

Bottom: Artist's impression of a white dwarf crystallizing into diamond. Credit: Harvard Smithsonian Center for Astrophysics.



Science Discussion Groups

The Great Lecture: The Evolution of Planetary Systems Across Time and Space

Adam Kraus, Professor

"We can track these stories from the prologue of star and planet formation to the final chapter of planetary systems after five billion years."

While planetary systems are common throughout the universe, many of them look very different from our own. Kraus shared how researchers use an array of instruments – in particular, the Kepler, TESS, and Gaia space telescopes and the Habitable-zone Planet Finder at McDonald Observatory – to identify and learn about planets outside of our solar systems. This has expanded our understanding of young planets' atmospheres (which may remain "puffed up" for a billion years after formation) and how they interact with their host stars (migrating quickly inward). In 2024, Kraus helped identify the youngest planet yet found using the transit method, which detects a planet when it travels between the host star and observer. This accomplishment was made possible thanks to an unexpected geometry, with the planet orbiting outside of the system's disk of debris, gas, and dust, rather than within it.

Kraus added that binary star systems offer a unique opportunity to learn about planetary systems. That's because they provide examples of how different variables within a similar environment can give rise to distinctly different planets. In the future, Kraus hopes to learn more about how binary stars, supernovae, stellar flybys, and other factors affect planetary evolution.

Watch the 2025 Great Lecture in Astronomy

Adam Kraus discussing the evolution of planetary systems. Credit: Lara Eakins, UT Astronomy.

Save the Date!
Board of Visitors
Summer Meeting

July 25-26, 2025
McDonald Observatory in West Texas

We look forward to seeing you again at the Board of Visitors Summer Meeting. It will take place July 25-26 at McDonald Observatory in Fort Davis, Texas.

Event details will be posted at sites.utexas.edu/bov/meetings as they become available.

The Otto Struve Telescope at McDonald Observatory. Image credit: Michael Ortiz