MIT Kavli Institute for Astrophysics and Space Research

Summary

The MIT Kavli Institute (MKI) for Astrophysics and Space Research is one of the world's leading centers for research in astrophysics. Its faculty, research staff, and students are committed to pursuing a deeper understanding of the underlying physics that governs the universe, with a special emphasis on building new instrumentation, telescopes, satellites, physical simulations, or other technologies that further this objective.

MKI houses the research programs of resident faculty and research staff, and provides an interdisciplinary focus for faculty and students from other departments with interests in astrophysics. MKI works closely with the Departments of Physics; Aeronautics and Astronautics; and Earth, Atmospheric and Planetary Sciences.

MKI has its roots in MIT's Center for Space Research (CSR), founded in 1963. Following the merger of the CSR and MIT's Division of Astrophysics, a generous gift from the Kavli Foundation in 2005 established the MIT Kavli Institute. One of MKI's unique strengths is its technical heritage from a series of flight programs and observatories over several decades. Only a handful of US universities have the technical capacity to support such NASA programs at the mission level.

During the past academic year, MKI celebrated many significant milestones. New developments include the successful start of operations for the Transiting Exoplanet Survey Satellite (TESS), third Observing Run (O3) of the Laser Interferometer Gravitational-Wave Observatory (LIGO), and two new major instrumentation programs awarded by the National Science Foundation (NSF) for MKI's optical astronomy program. This year also saw a change in MKI's director and the arrival of two new resident faculty. In 2018–2019, MKI looks toward the future of ground-based astronomy in the US with 20- to 30-meter optical telescopes, an extended mission for TESS, and future opportunities for NASA science missions in the next decade.

Demographics, Promotions, and Hiring

MKI supports the research of 180 scientists, including 25 resident faculty (seven of which are emeritus), 13 affiliated faculty, and 38 research scientists (six of which are senior level and ten of which are principal level), and 37 postdoctoral scholars.

Director's Office

After 16 years as MKI's founding director, Professor Jacqueline Hewitt returned to the full-time teaching faculty in January 2019. During an interim sabbatical year, she will lead MIT's role in commissioning the Hydrogen Epoch of Reionization Array (HERA) radio telescope in South Africa's Karoo wilderness, supported by a major gift from the Gordon and Betty Moore Foundation.

Hewitt is succeeded by Professor Robert Simcoe, a member of the MIT astrophysics faculty and an MKI resident member since 2006.

Professor Robert Simcoe, who succeeded Professor Jacqueline Hewitt as director of MIT Kavli Institute in January 2019.

Faculty

MKI welcomed two new resident faculty—Kiyoshi Masui and Erin Kara—as assistant professors of Physics (Astrophysics Division). Masui studies the large-scale clustering of galaxies as a measure of fundamental physics, as well as the enigmatic cosmological objects called "Fast Radio Bursts." Kara is an expert on the dynamic X-ray sky, particularly using time variability of compact objects to study their physical structure on smaller scales than telescopes can resolve. Professor Paul Schechter joined the ranks of MKI emeritus faculty, and several other emeriti moved into a newly renovated communal office on the fourth floor of the McNair Building (Building 37).

Research Scientists

One member of the research staff, Dr. Gabor Furesz, was promoted to the role of principal research scientist. Furesz is a co-investigator and principal architect for two major optical instrumentation programs selected by the NSF for construction during the past year.

Postdoctoral Scholars

Nine MKI postdoctoral fellows and associates departed MIT this year, with a very strong record on the faculty job market. Seven of these nine will take up tenure-track positions at US research universities, while two will move to the NASA Jet Propulsion Laboratory (JPL) as staff scientists. Five new postdoctoral scholars have accepted new positions at MIT for 2020, including two NASA Hubble Fellows (MIT's maximum allotment).

Students

Eight PhD students at MKI successfully defended dissertations and are bound for new positions as astrophysics postdoctoral scholars, or in the engineering or financial industry. Ten new students have accepted offers to the graduate program; eight will matriculate in the fall; and two have deferred to fall 2020. Astrophysics was represented on the Physics graduate admissions committee by Professors Matthew Evans and Michael McDonald.

Research Highlights

NASA Transiting Exoplanet Survey Satellite

Image of the Southern sky obtained by the MIT Kavli Institute-led Transiting Exoplanet Survey Satellite (TESS), which is searching each star in the field for signals of transiting planets. Credit: NASA/TESS.

TESS is an MIT-led NASA mission that surveys the entire sky to identify exoplanets around bright stars nearby. Using the so-called transit method, TESS searches for periodically repeating dips in stellar brightness from planets that are not seen directly, but which briefly occult a fraction of a percent of the much brighter stellar disk if the system is oriented edge-on toward the Earth.

Launched from the Kennedy Space Center in April 2018 on a SpaceX Falcon 9 rocket, TESS was inserted into a lunar-resonant elliptical orbit (two passes per month) in summer 2018, allowing two-week observation windows for each orbit. After adjustments to the pointing model, TESS began science operations with observations for the primary mission in July 2018, starting in the Southern Hemisphere.

MKI is host to the TESS Payload Operations Center, which receives raw science data from NASA's Deep Space Network and provides uncalibrated pixel data, target selection, and spacecraft configuration data to NASA for calibration. The calibrated data are relayed back to the TESS Science Office (represented at MKI by Professor Sara Seager, in conjunction with the Smithsonian Astrophysical Observatory) for scientific analysis, and dissemination of public alerts for "objects of interest" that merit further follow-up as likely planet candidates.

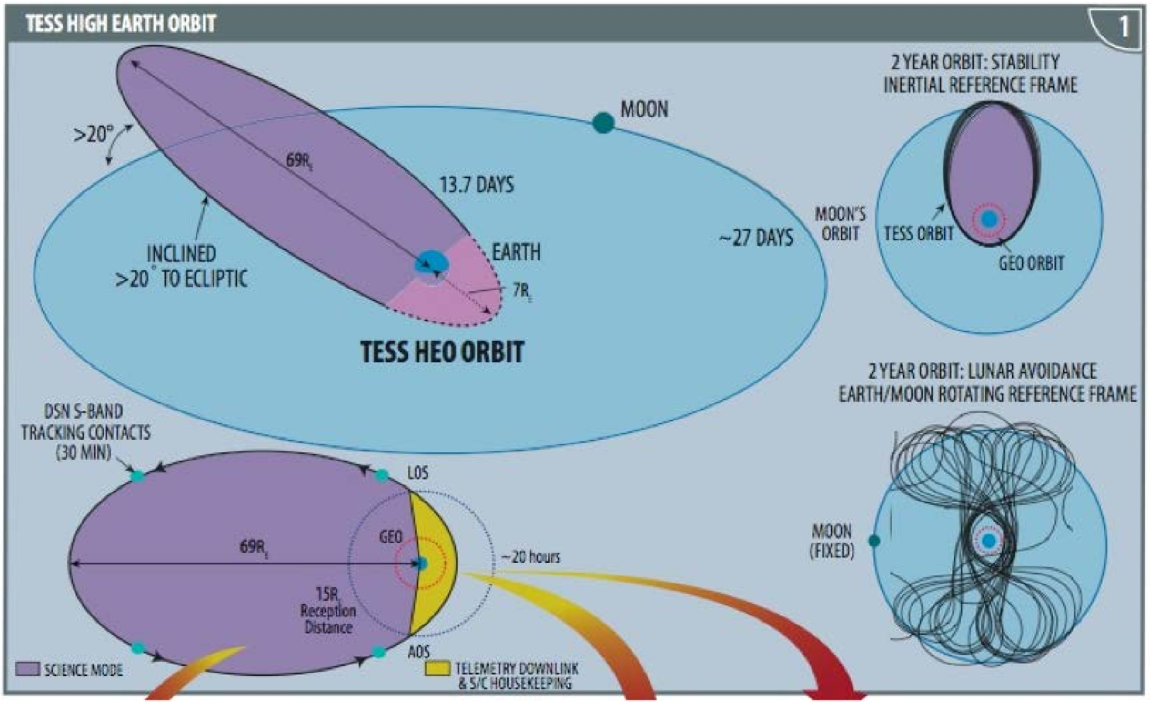


Illustration of the unique, highly elliptical orbit of the Transiting Exoplanet Survey Satellite (TESS) that takes the spacecraft past the Earth-Moon distance every two weeks, allowing for long continuous observation windows (violet shading) between data downlink sessions when the spacecraft passes near Earth (yellow shading). Credit: NASA/TESS.

TESS has enjoyed extremely high scientific productivity during its first year, and is well ahead of schedule for achieving its stated mission goal: to identify at least 50 transiting planets with diameters smaller than four times that of the Earth, and measure their masses. A dynamic group of faculty, postdoctoral fellows, and students supported by the mission, and also through the Torres and Hubble postdoctoral fellowships, have been leading the MIT science effort.

Publications using TESS data have reached a steady rate of approximately one every two days, with 55% pertaining directly to exoplanets and 45% covering other areas of astrophysics. These other areas include:

- Near-Earth and main-belt asteroids (analyzed in collaboration with MIT Lincoln Laboratories)
- Astro-seismology, which charts the vibration of stellar surfaces to study their interior compositions
- Supernovae, whose temporal evolution can be traced with TESS backward through the exact moment of explosion
- Tidal disruption events, which are rare events in which stars are shredded during close passage near a supermassive black hole

TESS has been invited by NASA to propose for an extended mission operating into the next decade. The team submitted this proposal in spring 2019 and awaits the result of NASA's senior review of active missions, which will determine whether TESS can continue its search for longer-period planets similar to that of Earth.

Laser Interferometer Gravitational Observatory

MKI continues to host the MIT LIGO Laboratory. Following the excitement of first detections for binary black hole mergers and binary neutron star mergers, and the subsequent award of the Nobel Prize in Physics to Professor Rainer Weiss, LIGO has completed technical upgrades and entered its third Observing Run (O3).

Consistent with expectations from past runs, O3 operations have yielded a bountiful harvest of black hole merger events, at a rate of approximately one per week. With dozens of events recorded, MKI scientists can now study the population demographics of massive black holes rather than single systems, ushering in the transition of LIGO from a physics experiment to a true observatory. Intriguingly, LIGO seems to find many mergers of black holes 30 to 50 times larger than the mass of the Sun. Such objects were heretofore unobserved and the mechanism to produce them is not yet explained.

For binary neutron star mergers, there remains great excitement in the optical and infrared observing community to chase fading counterparts similar to that observed with optical telescopes on August 17, 2017, the first such historical event. Accordingly, in O3 LIGO has implemented its first public alert system to broadcast information on these events rapidly to the community. The LIGO pipeline now creates machine-generated webpages on each event and rapidly posts coordinate information for threshold-crossing detections to the NASA/Gamma-Ray Coordinate Network (GCN) telegram service, available to the public by free subscription. Many astronomers interface with this system using a free app that sends an audible alert to smartphones and directs users to the details needed for electromagnetic follow-up.

Even as LIGO observations continue, MKI researchers are now also turning attention toward the next generation of gravitational wave detectors. As part of the Astro2020 Decadal Survey of Astronomy and Astrophysics, the LIGO Laboratory submitted white paper concepts for a "Cosmic Explorer" facility that would expand the lab's reach for such observations over much of the cosmic volume and back in time to the early universe.

The Magellan Telescopes and Extremely Large Telescope Initiatives

The Magellan Telescopes

MKI operates MIT's 10% share in the 6.5-meter diameter Magellan telescopes at Las Campanas Observatory in the Atacama Desert in Chile. MIT Magellan time is open for science proposals from faculty, research scientists, postdoctoral fellows, and graduate students. It is used primarily for stand-alone science investigations, but also for strategic support of spaceflight programs and other specialized missions.

For example, during the past year, Magellan has played a key role observing targets flagged by TESS as exoplanet candidates. TESS transit measurements yield the diameter of these planets, but ground-based spectra are needed to confirm the planet's mass via the Doppler shift induced upon the host star by the orbiting planet. Besides fulfilling its obligation to measure 50 planet masses (NASA's primary mission requirement), the mass and radius estimates together yield planet density, which distinguishes iron-core exoplanets from "rocky Earths", or gas giants.

In a very different science application, MIT investigators recently joined in Magellan's discovery of the most distant cosmic object known, whose light began traveling to Earth when the universe was just 4% its present age. Using a specialized infrared spectrometer built at MKI by Professor Robert Simcoe, the team discovered the extremely red object and classified it as an ultra-distant accreting supermassive black hole. Measurements of gas in the immediate foreground of the black hole indicate that intergalactic matter at this time had not yet been exposed to starlight, suggesting that Magellan is now probing into the epoch of the very first stars.

In September 2018, the NSF awarded MKI a $5.4 million grant to upgrade Magellan's instrument suite with a new "hyperspectral imager," named the Large Lenslet Array Magellan Spectrograph (LLAMAS). This instrument, which is custom-designed by MKI Principal Research Scientist Gabor Furesz and fabricated in Building 37, creates 3D images of the universe by splitting the telescope's focus into a grid of 3,000 pixels, each of which is fed into a fiber-optic cable.

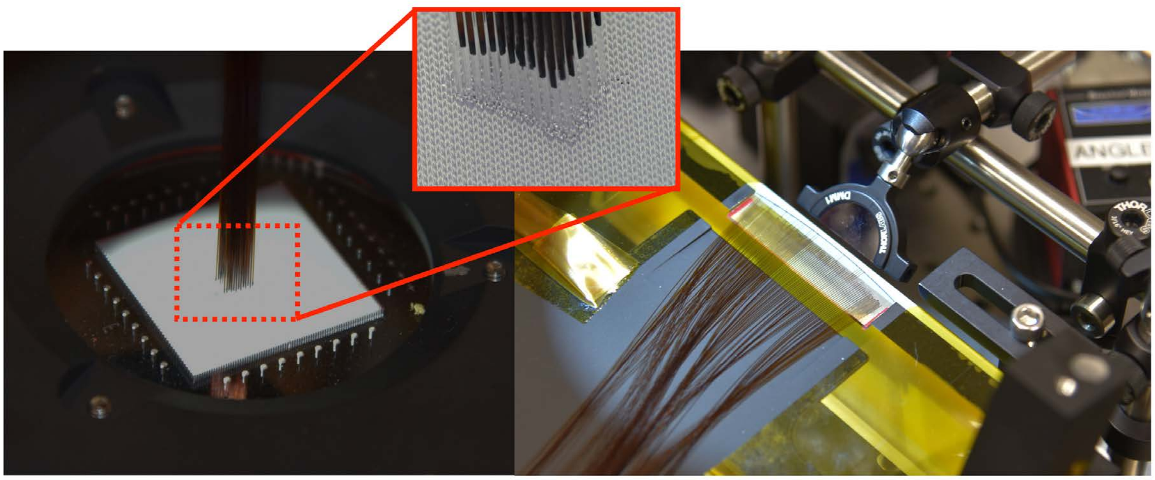


Illustration of fiber-optic light routing for the Large Lenslet Array Magellan Spectrograph (LLAMAS) under construction at MIT Kavli Institute. Starlight from the telescope is injected into a 2D grid of optical fibers, each of size similar to a human hair (left, inset). The light emerges 4 meters away inside the science instrument, now reformatted into a 1D linear array suitable for spectroscopy (right). Credit: Gabor Furesz.

Light is thus routed off the telescope to a set of eight spectrometers that record the light intensity of each fiber in 6,000 separate wavelength channels. LLAMAS will be the first facility instrument commissioned at Magellan since 2010, and will be open for use by all Magellan partners and the US astronomy community through an arrangement with the NSF.

Next-Generation Telescopes

MKI scientists have also been involved in the process to bring a new generation of Extremely Large Telescopes (ELTs) to the US astronomy community. Two projects: the 25-meter Giant Magellan Telescope (GMT) and the Thirty Meter Telescope International Observatory (TIO) are now entering construction phase while continuing to raise funds toward a private-public partnership. Together with a European-led effort, these telescopes will be the world's flagship astronomical facilities for the next 50 to 100 years.

Construction site for the 25.4-meter Giant Magellan Telescope, on Las Campanas Peak, Chile. Dome excavation trench is visible on the summit, with residences at lower left and laboratory building site at center. The 6.5-meter Magellan Telescopes, currently in use by MIT Kavli Institute researchers, are visible on the adjacent peak along the ridge access road, at the top center of the photo. Credit: Giant Magellan Telescope Organization.

MKI's involvement in Magellan brings researchers naturally into proximity with the GMT partnership, since GMT is located on the same site in Chile, and all of the Magellan partners (except for MIT) are also partners in the ELT initiatives. Indeed, Professor Paul Schechter was a member of the original team that defined GMT's conceptual design more than a decade ago. MKI faculty participate as community-at-large members in the GMT Science Advisory Council, serve on project scientist teams for its instrumentation suite, and advise on technical matters.

GMT and Thirty Meter Telescope (TMT) are preparing major construction proposals to the NSF. In 2018, the GMT Science Books were updated accordingly, and the organizations prepared a set of representative community Key Science Projects (KSPs) that NSF investment would enable. Professor Ian Crossfield served on the KSP definition committee (representing exoplanets) and Professor Anna Frebel contributed to the panel on star formation in the early universe. Professor Robert Simcoe is a co-author of the GMT Science Book chapters on the first stars and intergalactic matter.

Both GMT and TIO will be reviewed by the Decadal Survey of Astronomy and Astrophysics, a study committee that has been tasked by the National Academy of Sciences to produce a report in 2020 recommending major priorities for investment by NASA, the NSF, and the Department of Education. Decisions on these observatories by the agencies and MIT will have a major impact on the opportunities and directions available to MKI researchers in the coming decades.

A New Observatory for MIT: Data Mining the Infrared Sky

MKI's ground-based, astronomical telescopes have all employed the "classical" scheduling model adopted by large observatories, in which nights are allocated four to six months in advance of observations, to view static targets on the sky. More recently, advances in astronomical surveys with wide-field cameras, together with big data algorithmic processing, have opened up the temporal dimension of the night sky. These methods have revolutionized studies of periodically varying objects and explosive astrophysical transients. Robotically controlled telescopes of smaller aperture provide a nimbler platform for this emergent field.

Accordingly, in fall 2018, MKI committed funding toward a new 1-meter diameter robotic telescope, purchased with support from the Bruno Rossi Fund for Astrophysics, the Department of Physics, and MIT's Vice President for Research. The telescope will be installed at Palomar Observatory in Southern California, and operated in collaboration with the California Institute of Technology.

The NSF approved construction funding for the first instrument on this telescope, as part of the Major Research Instrumentation grant program. The Wide-field Infrared Transient Explorer (WINTER) will be the first instrument dedicated to studies of the dynamic infrared sky, complementing the large array of optical temporal survey instruments now in operation. It is expressly optimized to find the fading infrared counterparts of binary neutron star mergers detected by LIGO.

Using novel indium gallium arsenide (InGaAs) sensor technology developed at MKI, the telescope will allocate a majority of its time to film an infrared time-lapse movie of the night sky. Time not given to the general survey will be open to MIT researchers for targeted observations, and for educational projects in the Physics Junior Lab curriculum.

The Hydrogen Epoch of Reionization Array

Atomic matter in the early universe existed in an electrically neutral state from the time that the universe cooled below T=3,000 Kelvins (379,000 years after the Big Bang) until illumination of the first stars, some 300 to 500 million years later. At this moment, radiation from the first stars permanently stripped hydrogen atoms of their constituent electrons, forever ionizing the cosmic volume. The primordial stellar sources driving this transition have only been crudely characterized, and the quest to understand this process constitutes the frontier of modern cosmology research.

The Hydrogen Epoch of Reionization Array (HERA) is a new array of radio telescopes—supported by the NSF and the Gordon and Betty Moore Foundation—which seeks to observe the physical evolution of hydrogen gas directly in the early universe. Rather than searching for the stars and galaxies, HERA images tenuous intergalactic matter directly, leveraging a slight difference in energy between aligned and anti-aligned states of the quantum spins of the hydrogen nucleus and electron. This technique is routinely used to map neutral hydrogen in the Milky Way and nearby galaxies. HERA represents a major step forward in sensitivity and calibration stability to detect much weaker signals from the early universe.

Led by Professor Jacqueline Hewitt, MKI's role in the HERA collaboration has been to commission detector feeds with an exceptionally broad frequency response, including low frequencies that probe the earliest cosmic epochs but also encroach on the FM radio band. Accordingly, the project has sought out remote sites far from human-induced radio-frequency interference, settling finally on the South African Karoo Highlands desert.

Dishes of the radio telescope Hydrogen Epoch of Reionization Array (HERA) that act in concert to observe intergalactic matter in the early universe. MIT Kavli Institute leads commissioning of the wide-band instrument feeds seen at each dish's focus.

During the past year, HERA deployed prototype examples of the feed design and began collecting data and testing reduction software using a subset of the final array. The team is preparing to issue contracts for construction feeds for the full array, in anticipation of operations at design sensitivity starting in 2021.

MIT and the Canadian Hydrogen Intensity Mapping Experiment

Professor Kiyoshi Masui is a member of the collaboration operating the newly-commissioned Canadian Hydrogen Intensity Mapping Experiment (CHIME) radio telescope in Western Canada. CHIME is a non-steerable survey instrument with high sensitivity, time resolution, and mapping speed—enabled by advances in commoditized communications hardware, digital signal processing, and computing.

Nighttime image of the Canadian Hydrogen Intensity Mapping Experiment (CHIME) radio telescope in Western Canada, which has revolutionized the study of Fast Radio Bursts. Credit: Andre Renard.

In January 2019, CHIME announced a major breakthrough in studies of so-called "Fast Radio Bursts" (FRBs). FRBs are enigmatic events wherein a burst of energy from a cosmologically distant source (i.e., far beyond the Milky Way) arrives in a flash of radio waves lasting only milliseconds. The astrophysical mechanism that powers FRBs is still unknown. However, researchers are now confident that FRBs come from the distant universe, and that measurements of pulse arrival time as a function of frequency can help locate the distance to these events, and probe the density of intervening intergalactic plasma along the line of sight.

In the decade following the discovery of FRBs, only 60 such events have been observed; in CHIME's first three weeks of pre-commissioning it already discovered 13 new events and has continued to gather many more as its commissioning proceeds to design sensitivity.

Professor Masui is deploying a separate series of outrigger telescopes that work in conjunction with the main CHIME array to better localize the sources of FRBs at the moment they occur. These outriggers are geographically dispersed and observe the whole sky, discarding all data unless CHIME triggers an FRB detection, at which point the outrigger writes its buffered data to disk. Outrigger data are then combined with those from CHIME, acting as a continent-scale aperture with sufficient spatial resolution to pinpoint the FRBs' origins.

NASA Neutron Star Interior Composition Explorer

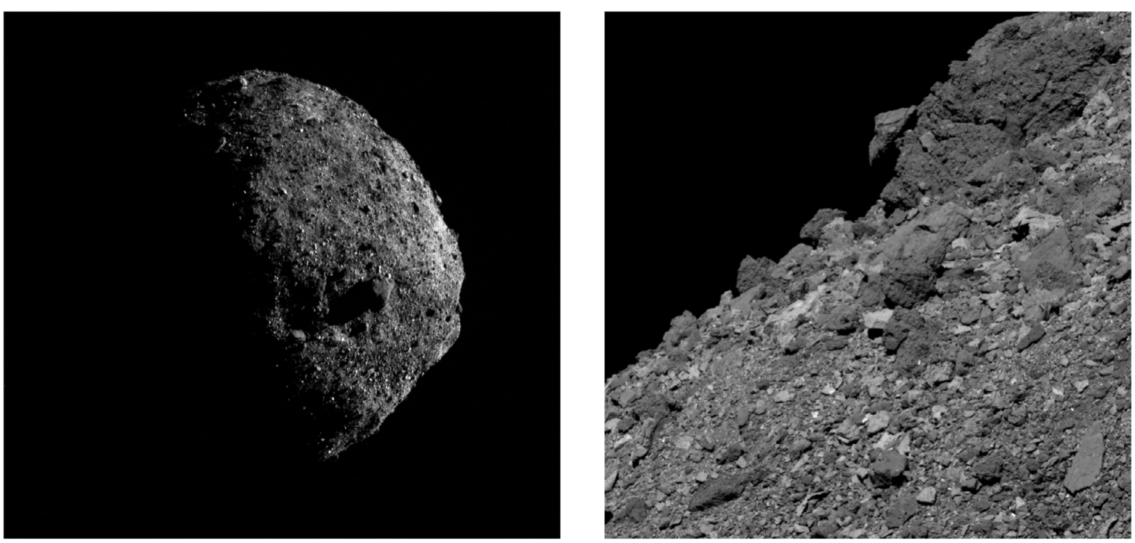
MIT scientists continue to observe with the Neutron Star Interior Composition Explorer (NICER) experiment, which was launched and installed on the International Space Station in June 2017. Built in collaboration with NASA's Goddard Space Flight Center, MKI was responsible for integrating and testing NICER's silicon drift detectors at the instrument focus.

Ronald Remillard, MKI principal research scientist, chairs NICER's Observatory Science Team. In January 2019, he collaborated with Professor Erin Kara on a *Nature* publication using NICER to time X-ray light echoes from matter accreting into stellar-mass black holes. The light travel time of these echoes allows mapping of the hot gas environment near these ultra-compact objects, on spatial scales too small for conventional telescopes to resolve.

Several other MKI researchers, including Professor Deepto Chakrabarty and postdoctoral researchers Jack Steiner and Deeraj Pashem, have used the precision X-ray timing capabilities of NICER to study a variety of high-energy phenomena, including glitches in the spin rate of rapidly rotating neutron stars, potentially revealing information about energy transfer between normal and superfluid components in the star's interior. A major mission objective of NICER is to measure precise radii of neutron stars to study the physics of interior matter at densities and pressures far beyond what is attainable in the lab. The observatory continues to collect data toward fulfilling this requirement, with first science results anticipated in late 2019.

NASA Regolith X-ray Imaging Spectrometer

MIT's student-built Regolith X-ray Imaging Spectrometer (REXIS) instrument is part of a payload orbiting 1,000 meters above the surface of Asteroid 101955 Bennu, a near-Earth object of diameter 500 meters. It is aboard the Origins, Spectral Interpretation, Resource Identification, Security, Regolith Explorer (OSIRIS-REx) mission that will collect and return a soil sample from Bennu's surface.



Images of Asteroid 101955 Bennu, taken by the Origins, Spectral Interpretation, Resource Identification, Security, Regolith Explorer (OSIRIS-REx) spacecraft which hosts the MIT-built Regolith X-ray Imaging Spectrometer (REXIS) instrument. REXIS is now taking measurements of the asteroid's elemental composition.

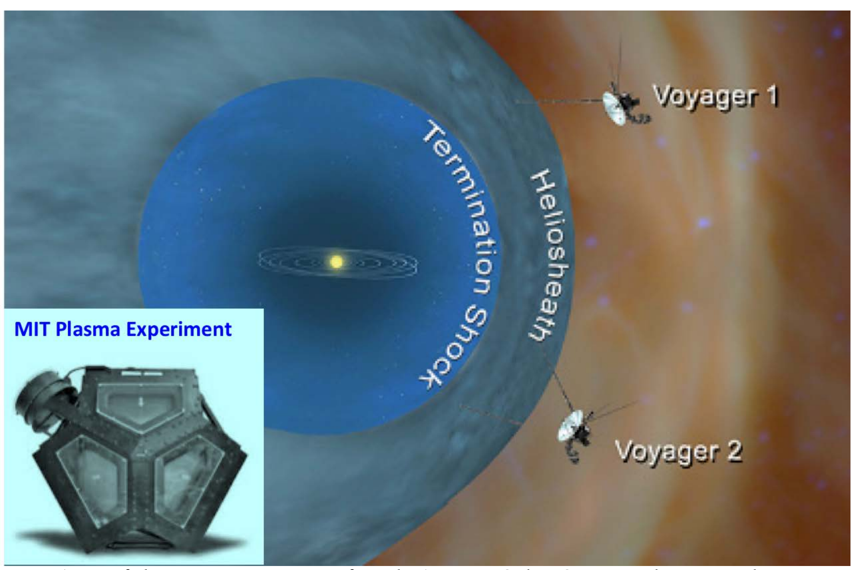
REXIS observes fluorescent X-rays that are re-emitted from the surface of the asteroid after it is bombarded by X-rays and plasma from the Sun. The emergent spectrum is measured using charge-coupled-devices (CCDs) manufactured at MIT Lincoln Laboratory, and contains line peaks characteristic of the asteroid's elemental composition. These measurements will be compared to laboratory composition tests obtained after the soil sample has been returned to terrestrial labs.

OSIRIS-REx arrived at Bennu in December 2018. REXIS has images of the Crab Nebula in X-rays for calibration purposes and is executing its planned asteroid measurements for composition analysis during 2019–2020. The team, led by principal investigator Professor Richard Binzel (Department of Earth, Atmospheric and Planetary Sciences/MKI) and research scientist Rebecca Masterson (Department of Aeronautics and Astronautics/MKI), has trained nearly 100 students at the graduate and undergraduate levels.

NASA Voyager 2 Leaves the Heliosphere

The Solar Wind is a continuous stream of plasma emanating from the Sun's surface that creates the heliosphere, a bubble of solar wind surrounded by the interstellar medium, or matter between the stars. The MIT Faraday Cup Experiments aboard the Voyager 2 spacecraft, led by Professor John Belcher and John Richardson—MKI principal research scientist and principal investigator—measures the density, speed, and direction of these plasmas. In November 2018, the MIT team observed that Voyager 2 crossed a boundary where the outward flowing solar wind disappeared and was replaced by cold, slow, higher-density interstellar plasma. At the same time, the cosmic ray flux, which comes from outside the heliosphere, and the magnetic field, both increased.

Voyager 2 has now crossed out of the heliopause—the outer edge of the heliosphere—and is now making the first plasma measurements of the interstellar medium. This transition occurred at a distance of 11 billion miles from Earth, or 119 times farther from the Sun than Earth.



Locations of the Voyager spacecrafts relative our Solar System planets and an image of the MIT Plasma Experiment aboard Voyager 2. Voyager 2 exited the heliosheath in 2018 and entered the interstellar medium.

Fellowships and Awards

Many MKI researchers have been recognized with MIT, national, or international awards or fellowships during the 2018–2019 reporting period, including the following:

- John Belcher and John Richardson (with Parker Solar Probe team): 2018 Neil Armstrong Space Flight Achievement Award of the American Astronomical Society
- John Belcher: MIT Digital Teaching Award
- Anna Frebel: Earll M. Murman Award for Excellence in Undergraduate Advising
- Jacqueline Hewitt: 2018 Fellow, American Association for the Advancement of Science
- Mark Vogelsberger: Illustris Cosmological Simulation commemorated with a German postage stamp
- Kirsten Perez: Cottrell Scholar, School of Science Teaching Award, Buechner Special Teaching Award
- Lisa Barsotti: 2018 Fellow of the American Physical Society
- Kelley Mahoney: 2019 School of Science Infinite Mile Award
- Slawomir Gras: 2019 School of Science Infinite Kilometer Award
- Kaley Brauer: Department of Energy Computational Science Graduate Fellowship
- Hui Li: NASA Hubble Postdoctoral Fellowship
- David Berdardo: National Science and Engineering Research Council of Canada Graduate Fellowship
- Shuo Zhang: NASA / Einstein Postdoctoral Fellowship

German postage stamp issued in commemoration of the science and visualization achievements of the Illustris collaboration (including Associate Professor Mark Vogelsberger). Illustris is a supercomputing simulation that models the formation of galaxies from diffuse matter over cosmic history.

Community Events

MKI continues to serve as the primary intellectual home and research community for MIT scientists working in astrophysics. The following list summarizes a subset of the regular or weekly activities sponsored by MKI during the academic year.

Astrophysics Colloquium

Organized by Professor Ian Crossfield, the Astrophysics Division hosted 26 speakers from around the world. A highlight this year was a special colloquium from the project scientist of the Event Horizon Telescope, following its release of a dramatic image of the black hole at the center of M87.

MKI Journal Club

Each Friday, MKI hosts a pizza lunch that regularly draws 100 participants to discuss new papers appearing on arXiv, or emerging research from MKI. Each week there are two talks, one from a student and one from a staff scientist, postdoctoral fellow, or faculty member. It is an important and friendly venue for students to practice scientific speaking skills before their dissertation defense or international conferences.

Brown Bag Lunch Series

Each Monday, visiting scientists at the graduate or postdoctoral level give talks on their research.

Astrophysics Graduate Lunch

MKI sponsors a weekly lunch organized by and for PhD students in the department. Each year, every student gives a presentation to their peers on their research project, without faculty present. It is also a venue for students to discuss any issues particular to the student experience, and the MKI director and Astrophysics Division head are invited to one lunch per year to discuss the state of the program.

IAP Seminars

Each year, MKI organizes a seminar series on topics in astrophysics during Independent Activities Period. This year, the series featured ten talks on topics ranging from artificial intelligence in science to giant telescopes, as well as three laboratory tours and a session of solar observing outside the MIT student center.

Women at MKI Lunch

Every two weeks, MKI sponsors a lunch for women working in the organization to discuss professional development and opportunities, and foster mentoring relationships.

MIT Astrogazers and Astronomy on Tap

Led by MLK Postdoctoral Scholar Duane Lee, a group of students and researchers has organized to offer outreach programs to the Cambridge and Boston public school systems. These are organized around a series of sidewalk astronomy events with the MIT Sidewalk Astrogazers, which sets up telescopes in public spaces for nighttime viewing, and also Astronomy on Tap gatherings in which researchers speak about current research themes at local pubs. Both programs are sponsored in part by MKI.

Robert A. Simcoe
Director
Professor of Physics