



ASTRONOMY

Pushing back the boundaries

The opening of the Detroit Observatory in 1856 marked the beginning of research at the University of Michigan, with astronomers studying our solar system and the stars around us. Today, we are unmasking heavenly phenomena never imagined by those pioneers—black holes, stellar birth, the nature of the Milky Way, and gravitational lensing by massive galaxy clusters. And although Michigan’s research observatory was one of the first established in the Midwest, the Department of Astronomy is young and vibrant because we’ve spent the last decade hiring exceptional faculty and investing in world-class telescopes, surveys, and computing resources. Faculty and students have made a variety of important discoveries that received international attention—such findings include the birth of stars, planet-forming disks, and life-supporting chemistry; measurements of dark matter from small dwarf galaxies to massive galaxy clusters; finding and peering into black holes, which unleash plasma jets that profoundly modify their environments.

The Department of Astronomy operates three research telescopes at two different sites. We also use the most advanced ground-based and space observatories, including the Hubble Space Telescope. As a result, faculty and students have excellent access to some of the best facilities in the world. Students gain a hands-on understanding of methods and techniques for studying the universe. The training that undergraduate astronomy majors receive in computer programming, statistics, and analytical thinking prepares them to apply their skills readily to fields like computer science, industrial research, and image processing. Graduates also frequently build careers in areas such as teaching, public outreach, science writing, and the aerospace industry. In fact, according to a recent study, astronomy and astrophysics majors have a near-zero percent unemployment rate.

As Michigan enters its third century, our mission is to continue pushing back the boundaries of this amazing field. In the future, we expect to study planets around other stars, searching for Earth-like planets that support life and to look far into the depths of space to witness the formation of the first stars and galaxies when the universe was young. These and many other discoveries await, and we ask you to join us to ensure the continued leadership that the University of Michigan began more than 150 years ago. To meet these ambitious goals, we will draw upon the broad intellectual strengths of U-M through a novel think-tank center. Discoveries will be shared with the entire Michigan community, enlivening classes and stimulating public activities.

THE “DOC” LOSH UNDERGRADUATE STUDENT SUPPORT FUND

Professor Hazel “Doc” Losh was a legendary teacher who inspired generations of undergraduates. Following her legacy, we strive to bring our undergraduates special opportunities of lasting value. Examples include sending students on trips to our mountaintop observatories, providing them with one-on-one research opportunities with faculty, or bringing a distinguished outside visitor into a small class setting, which can be done with an endowed gift of \$1M or \$50,000 annually.

INSTRUMENTATION AND EQUIPMENT FUND

Our excellent ground-based telescope facilities are making leading discoveries in several branches of astronomy, from dark matter in galaxies to the formation of new stars. These discoveries point the way toward some of the greatest questions of our time, including the nature of planets around other stars, how galaxies like the Milky Way came into being, or the mystery of dark energy. Answering these challenges requires even more powerful and sophisticated instruments. Cutting-edge research demands that innovative instruments be designed and built to meet the new and ever-changing needs of scientists. Such instruments require prototype designs and testing before application to national agencies for the full funding. This instrumentation and equipment fund supported by endowed gifts of \$2M to \$5M or \$100,000 annually will greatly improve our ability to obtain federal funding for the forefront instrumentation and equipment that we need to remain leaders in astronomy and astrophysics.



“Astronomy is so interesting because it can take you from the very specific to the vastest topics. It’s amazing that we can observe stars and extrapolate when they were born and what they are composed of. And I love that there are still intriguing mysteries, like dark matter. There’s so much to discover,” said **Andrea Carrillo, B.S. ’16**, who successfully published a paper in her senior year about a dwarf galaxy in the M83 group. **“I wasn’t experienced when I asked to do research, but Professor Eric Bell and his graduate student walked me through all the programming and the science behind it.”**



MICHIGAN INSTITUTE FOR RESEARCH IN ASTROPHYSICS

Research on the frontiers of astrophysics takes place in a number of departments at the University of Michigan, and many of the most urgent problems span traditional disciplinary boundaries. Recognizing this, we propose to establish the Michigan Institute for Research in Astrophysics (MIRA) at the university, hosted by the Department of Astronomy, with the goal of supporting researchers from any U-M department in their efforts to focus on the most urgent frontiers in astrophysics. A crucial feature of this center is nurturing interdisciplinary and interdepartmental collaborations. One example of this is the study of planets around other stars and whether life can develop. This involves astronomy and astrophysics, planetary sciences, geology, atmospheric studies, and biology, which are areas of expertise in six different departments and two colleges.

The main activity of the MIRA is to identify and foster these interdisciplinary activities through semester- or year-long focused campaigns. These campaigns will bring together the relevant scientists on campus and invite external world experts to visit and participate in workshops, colloquia, and casual interaction. This will raise the activity level beyond that ordinarily possible, leading to new and exciting results. This center will offer wonderful new opportunities for students, research fellows, and faculty. Public presentations will connect center activity to the public at large.

Funding for elements of this center:

- A visitors program to bring two to five outside experts at all levels to campus: \$2.5M endowed / \$100,000 annually
- Workshops and seminars: \$2M endowed / \$100,000 annually
- Appointment of the most creative recent Ph.D.s to participate in programs as center fellows: \$4.5M endowed / \$210,000 annually (3 Postdocs each \$1.5M endowed / \$70,000 annually)
- Graduate student fellowship for engagement in center programs: \$1M endowed / \$50,000 annually
- The entire center: \$10M endowed / \$450,000 annually

WAYS TO FUND YOUR GIFT

Your gifts of cash, pledges, or appreciated securities change lives. Wills, estate, and planned gifts allow you to create a lasting legacy that will enable the best and brightest minds to experience a liberal arts education, solve problems in a changing world, and yield ideas and innovations that will make a difference in Michigan and around the globe.

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