Division of Mathematical and Physical Sciences	Research field	Astrophysics	Lab. ID MP12
Laboratory web site	http://astro.s.kanazawa-u.ac.jp		

Research subjects

Welcome to the Astrophysics Laboratory, where we develop X-ray and gamma-ray observation instruments for satellites and use them to conduct observational studies on electromagnetic radiation from high-energy astronomical objects such as gamma-ray bursts, which occur immediately after the birth of black holes. In 2010, we successfully measured the polarization of gamma-ray bursts using a polarization observation instrument mounted on the solar sail "IKAROS." In 2023, we completed the development of Kanazawa University's first 50-kg class microsatellite, "KOYOH." This satellite, developed jointly by groups in the fields of science and engineering, is primarily led by students aiming to pioneer next-generation space observations. The satellite was successfully launched in December of the same year, and we are currently operating it for space observations. Looking to the future, we are also working on planning the HiZ-GUNDAM satellite project and developing fundamental technologies for its onboard instruments. In recent years, we have also initiated a new project for a nanosatellite equipped with a diamond semiconductor sensor to measure charged particles in the Earth's magnetosphere. In addition to developing instruments, we analyze data from satellites such as Swift, Fermi, XRISM, and the James Webb Space Telecope to conduct research in high-energy astrophysics, galaxy formation in the early universe, and cosmology. Since the first detection of gravitational waves in 2015, multi-messenger astronomy, which combines gravitational wave and multi-wavelength electromagnetic observations, has rapidly progressed. We are also riding this wave, conducting optical and radio observations with numerous ground-based telescopes, in addition to X-ray and gamma-ray observations. We are preparing to conduct multi-wavelength observations of various transient celestial objects discovered by the KOYOH satellite, using ground-based telescopes to investigate mysteries such as black hole formation and relativistic effects. Furthermore, we are applying the radiation measurement techniques developed through space observations to cross-disciplinary fields, including medical and environmental imaging technology development.

Master/Doctor course: Education policy, curriculum, typical activity in the laboratory

At the start of the first year of the master's program, your supervisor is chosen according to your interests and your intended path after graduation. You will conduct experimental studies and/or analyze data under your assigned supervisor's guidance. There is a weekly meeting and seminar that all members are expected to attend. During these sessions, you'll present your progress and exchange information with fellow participants. In the seminar, a textbook is chosen based on students' interests, and each person takes turns leading the discussion.

Daily life in the laboratory, etc.

Participation in weekly general meetings, seminars, and group meetings is mandatory. Beyond these, there are few time constraints, allowing students to work independently and manage their own time. The graduate students share a common room, and with a lounge-like space available, it creates an environment where students and faculty can easily have casual conversations. Outside of research, we actively take part in outreach activities such as Furete Science, with students playing a central role in organizing these events. As part of our lab traditions, we hold welcome parties for new members and year-end parties, along with other social gatherings such as informal get-togethers and barbecues, depending on the occasion.

Message or comments by the laboratory faculty staffs

We invite those who are interested in developing detectors to observe the Universe on their own and uncover the mysteries of our cosmos through observations. While astrophysics might not have immediate practical applications in our daily lives, it stands as one of the most fundamental areas of research for humanity. It's truly remarkable that we, as inhabitants of this small planet Earth, are delving into the enigmas of the Universe and gradually unveiling its secrets.

Through experiments and data analysis, you'll not only gain a deeper understanding of physics but also acquire valuable skills in research and development. We welcome both those who aim to continue their education with doctoral studies and those who intend to seek jobs outside of academia upon finishing the master's program. You can be confident that studying astrophysics at the graduate level will provide you with the skills necessary to easily find job opportunities.

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