



NASA/DOE/Fermi LAT Collaboration, Capella Observatory

Above: Large high-energy electron clouds with Giga-electron volt gamma-ray emission discovered using the Fermi satellite, for which Hiroshima University contributed greatly to sensor development; the size of this cloud is several million light-years.

Below: Pre-launch test of the gamma ray observation instrument that Hiroshima University jointly developed and manufactured with the Institute of Space and Astronautical Science, Nagoya University, and the University of Tokyo for Hitomi (Astro-H) satellite.



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見つかるのが面白い

Observation of the universe is interesting.  
Totally unexpected phenomena can be found there.

## 2 Finding new phenomena and celestial objects in observations to explore the mystery of the origin of the universe

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Prof. Fukazawa graduated from the Faculty of Science at the University of Tokyo and went on to study in the Department of Physics of the Graduate School of Science at the same university, obtaining his doctorate in science. He worked as an assistant professor in the same graduate school and then as Associate Professor at Hiroshima University's Graduate School of Science. He has been in his present post since 2008. His specialization covers astrophysics. Mainly conducting satellite-aided observations of X-rays and gamma-rays, he has been involved in the development of numerous X-ray and gamma-ray astronomy satellites.

The extreme universe exhibits extreme conditions that cannot be found on Earth, such as the super high density of black holes and neutron stars and extremely strong gravity or magnetic field. Our research unit, the Core of Research for the Energetic Universe (CORE-U), engages in the most advanced research into the extreme universe. At CORE-U, researchers who work from a macroscopic, or cosmic, perspective and those who work from a microscopic perspective, studying elementary particles, the most basic unit of matter, work side by side, using each other's perspective in their research. While CORE-U is already internationally recognized as one of the most advanced research units in its current field of specialization, we are hoping to collaborate in the future with researchers from other departments of the university and other domains such as engineering and statistics to broaden and enrich our research.

I myself carry out macroscopic research involving cosmic observations of X-rays and

gamma-rays using satellites. These rays are invisible to the human eyes. The universe appears peaceful when we only see what we can see with our eyes. However, with X-rays and gamma-rays, we find out that it is filled with intense energy, with celestial objects bursting. My observations cover the extreme universe, particularly galaxy clusters, active galactic nuclei associated with supermassive black holes, and stellar-mass black hole binaries. I try to find answers to such questions as how black holes have been created and how galaxy clusters grow, by analyzing data sent by satellites. I have been involved in the development of X-ray and gamma-ray observation instruments such as ASCA/GIS, Suzaku/HXD, and Fermi/LAT, Hitomi/SGD, and I am also active in the basic development of observation instruments to realize original research.

I first became interested in the universe because of the books and television programs that I read and watched in my childhood. I was strongly drawn to the

extreme universe in university when I saw a photograph of outer space observed with X-rays, and this has led to my current research. Every day I carry out observations and data analysis, write papers, and conduct various experiments. What is really great about research into the universe is in the moment you discover a cosmic phenomenon or celestial object that no one else has seen yet. The joy and the sense of achievement you feel in that moment is priceless and it wipes away the memories of all the difficulties you have experienced in your day-to-day research efforts. Wanting to savor such a moment again is my motivation for continuing research.

My ultimate goal in research is to elucidate the origin of the universe. But this will happen only in a distant future. I hope to push forward with my research to find the key to uncovering the mystery of the universe that humanity has been searching for so long.