

NASA lends ultraviolet space telescope to Caltech

May 17 2012, By Marcus Woo



This ultraviolet image of the Andromeda Galaxy (left), taken by GALEX, shows ring-like structures that harbor hot, young, massive stars. Dark blue-grey lanes of cooler dust show up starkly against these bright rings, tracing the regions where star formation is currently taking place. Credit: NASA/JPL-Caltech

(Phys.org) -- Caltech has taken over operation from NASA of the Galaxy Evolution Explorer (GALEX), a space telescope that for the last nine years has been surveying the cosmos in ultraviolet light. In this first agreement of its kind, NASA is lending the telescope to Caltech, which has led the mission and will continue operating and managing it through the support of private funders.

Launched in April 2003, GALEX was designed to study how galaxies change and evolve over time. Because young, high-mass <u>stars</u> are



especially hot, they radiate a lot of ultraviolet light, meaning that the brighter the ultraviolet light from a galaxy, the faster its stars are forming. By observing in <u>ultraviolet wavelengths</u>, GALEX has been able to measure the formation rates of stars in millions of galaxies. The telescope has helped astronomers determine how the rates of <u>star</u> formation in other galaxies have changed over the last eight billion years and how that process leads to the evolution of those galaxies.

Now, GALEX is embarking on a new phase in its mission.

Having orbited <u>Earth</u> for nearly a decade, GALEX is no longer a young instrument—which is actually an advantage, says Chris Martin, professor of physics at Caltech and the principal investigator of GALEX. Because it is now entering the late stage of its life, Martin says, astronomers can afford to push the telescope to its limits. Before, the team had to be extra careful not to damage its detectors by overexposing it to really bright stars. But now, he says, astronomers can be bolder in exploring the ultraviolet universe than ever before.



Now that NASA is lending GALEX to Caltech, the mission can finish its goal of completing a survey of the entire sky in ultraviolet wavelengths. So far, GALEX has completed about 80 percent of the survey, seen in this all-sky map. The remaining 20 percent—the areas in white—mainly lies along the galactic plane. Credit: Karl Forster/Caltech



This means that while GALEX has mainly looked at other <u>galaxies</u> in the past, now it can focus on our own. "Our number one goal is to complete the survey of the full sky and the entire Milky Way," Martin says. The survey is still missing roughly 20 percent of the sky—mainly the region along the plane of the Milky Way, where the high density of bright stars once posed too much of a risk to the detectors.

One of the scientific goals of this survey is to help astronomers better understand the lifecycle of stars. The telescope will look at baby stars called protostars, young stars, wispy nebulae that surround old stars, and white dwarfs—dense, Earth-sized objects that are the leftovers of stars that have exhausted their fuel. Another goal, Martin says, is for GALEX to look for flashes of <u>ultraviolet light</u>, which may indicate supernovae—the explosive death throes of massive stars. The telescope will also aid in the hunt for other planets, for example, by pointing astronomers to newborn stars that may harbor alien worlds still warm from their heat-generating formation processes.

Since there are no other ultraviolet survey missions in the works, GALEX will be the one and only telescope of its kind for a while, Martin says. "We're creating a legacy database for the next several decades."

Caltech's GALEX team has already begun collaborating with several groups to pursue new research avenues. The GAMA/Herschel-ATLAS/DINGO consortium—an international collaboration of 16 institutions—will use GALEX as part of their efforts to study cosmology and galaxy formation by observing the universe in ultraviolet to radio wavelengths. With an Israeli group—led by the Weizmann Institute of Science, Tel Aviv University, Technion-Israel Institute of Technology, and the University of Haifa—the GALEX team will survey the sky for ultraviolet sources that brighten and dim, such as supernovae, stellar flares, and active galactic nuclei, which consist of disks of gas and dust



swirling into supermassive black holes. Astronomers from Cornell University will use GALEX to help NASA's Kepler mission search for other planets.

GALEX is also being supported by a variety of private sources, including the Keck Institute for Space Studies at Caltech, as well as by personal contributions from members of the science team. "We're actively seeking additional partners, scientific collaborators, and philanthropic support," Martin says.

NASA's Jet Propulsion Laboratory (JPL) has been managing the mission and built the science instrument. In addition to Caltech and JPL, the GALEX operations team includes members from Columbia University, the Carnegie Institution for Science, the Orbital Sciences Corporation, and the Universal Space Network.

Provided by California Institute of Technology

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