



SCIENCE@NASA

+ NASA Home
 + Search NASA Web
 + Pagina en Español
 + Contact NASA

SEARCH SITE via Google

+ GO

- HEADLINE NEWS

+ SATELLITE TRACKING

+ ABOUT

+ MAILING LISTS

+ STORY ARCHIVES

+ OTHER LANGUAGES

FEATURE

Giant Ribbon Discovered at the Edge of the Solar System

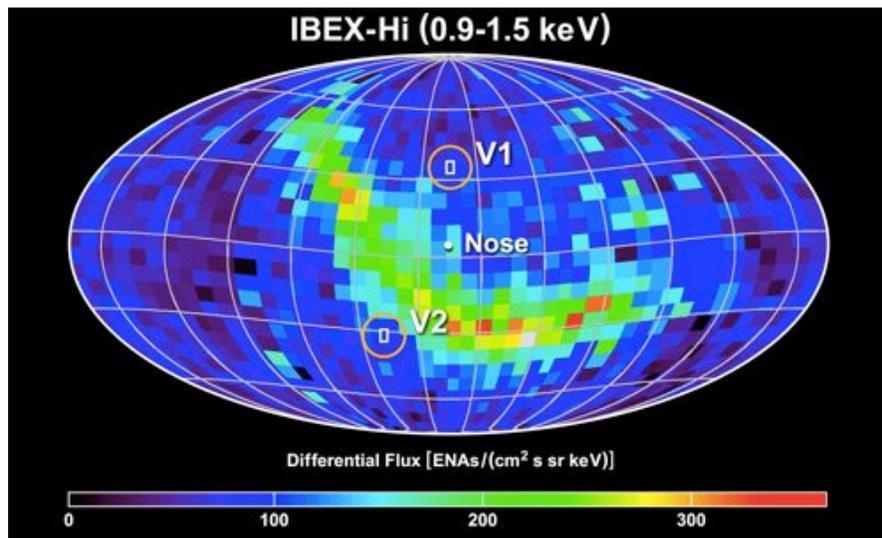
10.15.2009

+ [Play Audio](#) | + [Download Audio](#) | + [Email to a friend](#) | + [Join mailing list](#)

October 15, 2009: For years, researchers have known that the solar system is surrounded by a vast bubble of magnetism. Called the "heliosphere," it springs from the sun and extends far beyond the orbit of Pluto, providing a first line of defense against cosmic rays and interstellar clouds that try to enter our local space. Although the heliosphere is huge and literally fills the sky, it emits no light and no one has actually seen it.

Until now.

NASA's IBEX (Interstellar Boundary Explorer) spacecraft has made the first all-sky maps of the heliosphere and the results have taken researchers by surprise. The maps are bisected by a bright, winding ribbon of unknown origin:



Above: IBEX's all-sky map of energetic neutral atom emission reveals a bright filament of unknown origin. V1 and V2 indicate the positions of the Voyager spacecraft. [[more](#)]

"This is a shocking new result," says IBEX principal investigator Dave McComas of the Southwest Research Institute. "We had no idea this ribbon existed--or what has created it. Our previous ideas about the outer heliosphere are going to have to be revised."

Although the ribbon looks bright in the IBEX map, it does not glow in any conventional sense. The ribbon is not a source of light, but rather a source of particles--energetic neutral atoms or ENAs. IBEX's sensors can detect these particles, which are produced in the outer heliosphere where the solar wind begins to slow down and mix with interstellar matter from outside the solar system.



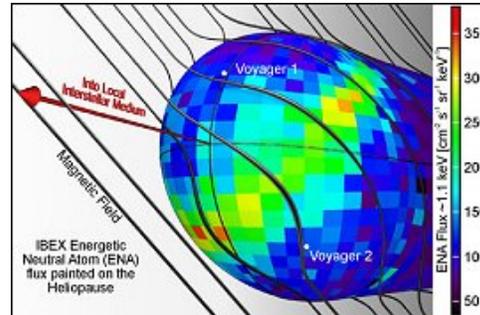
"This ribbon winds between the two Voyager spacecraft and was not observed by either of them," notes Eric Christian, IBEX deputy mission scientist at NASA's Goddard Space Flight Center. "It's like having two weather stations, but missing the big storm that runs between them."

Unlike the Voyager spacecraft, which have spent decades traveling to the edge of the solar system for *in situ* sampling, IBEX stayed closer to home. It is in Earth orbit, spinning around and collecting ENAs from all directions. This gives IBEX the unique "big picture" view necessary to discover something as vast as the ribbon.

The ribbon also has fine structure--small filaments of ENA emission no more than a few degrees wide: [image](#). The fine structure is as much of a mystery as the ribbon itself, researchers say.

One important clue: The ribbon runs perpendicular to the direction of the galactic magnetic field just outside the heliosphere, as shown in the illustration at right.

"That cannot be a coincidence," says McComas. But what does it mean? No one knows. "We're missing some fundamental aspect of the interaction between the heliosphere and the rest of the galaxy. Theorists are working like crazy to figure this out."



Understanding the physics of the outer heliosphere is important because of the role it plays in shielding the solar system against cosmic rays. The heliosphere's size and shape are key factors in determining its shielding power and, thus, how many cosmic rays reach Earth. For the first time, IBEX is revealing how the heliosphere might respond when it bumps into interstellar clouds and galactic magnetic fields.

"IBEX is now making a second all-sky map, and we're eager to see if the ribbon is changing," says McComas. "Watching the ribbon evolve--if it is evolving--could yield more clues."

Stay tuned for updates.

Author: [Dr. Tony Phillips](#) | Credit: [Science@NASA](#)

more information

[IBEX Home Page](#) (NASA)

[IBEX Mission Page](#) (SWRI)

IBEX is the latest in NASA's series of low-cost, rapidly developed Small Explorers space missions. Southwest Research Institute in San Antonio, Tx., leads and developed the mission with a team of national and international partners. NASA's Goddard Space Flight Center in Greenbelt, Md., manages the Explorers Program for NASA's Science Mission Directorate in Washington.



- + Freedom of Information Act
- + Budgets, Strategic Plans and Accountability Reports
- + The President's Management Agenda
- + Privacy Policy and Important Notices
- + Inspector General Hotline
- + Equal Employment Opportunity Data Posted Pursuant to the No Fear Act
- + Information-Dissemination Priorities and Inventories



Curator: [Everett Alexander](#)
 NASA Official: Dr. Raymond G. Clinton
 Last Updated: June 9, 2005
 + Contact NASA

+ USA.gov - Your First Click to the US Government
+ ExpectMore - A Program Which Determines
Whether Government Programs Are Effective