Spitzer sees Milky Way's blooming countryside

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Dozens of newborn stars sprouting jets from their dusty cocoons have been spotted in images from NASA's Spitzer Space Telescope. In this view showing a portion of sky near Canis Major, infrared data from Spitzer are green and blue, while longer-wavelength infrared light from NASA's Wide-field Infrared Survey Explorer (WISE) are red. The jets appear in green, while young stars are a yellow-orange hue. Some of the jets can be seen as streaks, while others appear as blobs because only portions of the jet can be seen. In some cases, the stars producing jets can't be seen while their jets can. Those stars are so embedded in their dusty cocoon that they are too faint to be seen at Spitzer's wavelengths. This is a lesser-known region of star formation, located near the outer edge of our

Milky Way galaxy. Spitzer is showing that even these more sparse regions of the galaxy are aglow with stellar youth. The pink hues are from organic star-forming molecules called polycyclic aromatic hydrocarbons. Stars in the pink regions are a bit older than the rambunctious ones spewing jets, but still relatively young in cosmic terms. In this image, Spitzer's 3.6- and 4.5-micron data are blue and green, respectively, while WISE's 12-micron data are red. The Spitzer data were taken as part of the mission's Galactic Legacy Infrared Mid-Plane Survey Extraordinaire 360, or Glimpse 360 project, which is pointing the Spitzer Space telescope away from the galactic center to complete a full 360-degree scan of the Milky Way plane. WISE all-sky observations are boosting Spitzer's imaging capabilities by providing the longer-wavelength infrared coverage the mission lost when it ran out of coolant, as planned, in 2009. Credit: NASA/JPL-Caltech/University of Wisconsin

(Phys.org) —New views from NASA's Spitzer Space Telescope show blooming stars in our Milky Way galaxy's more barren territories, far from its crowded core.

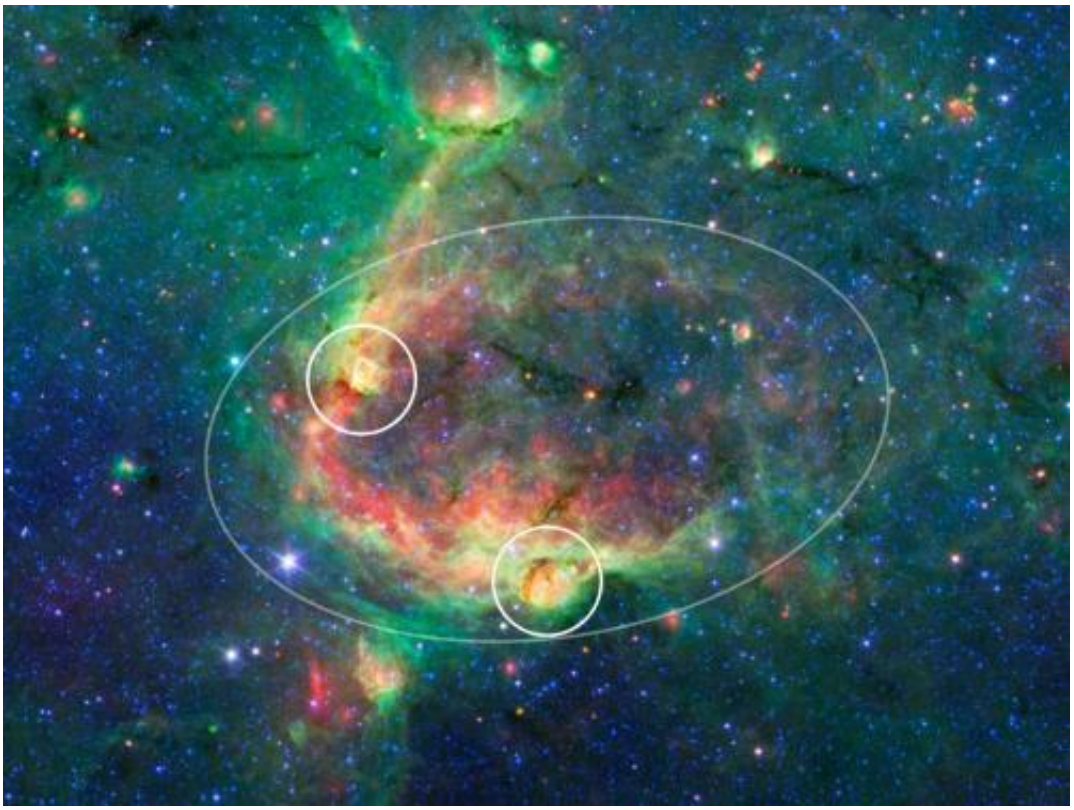
The images are part of the Galactic Legacy Infrared Mid-Plane Survey Extraordinaire (Glimpse 360) project, which is mapping the celestial topography of our galaxy. The map and a full, 360-degree view of the Milky Way plane will be available later this year. Anyone with a computer may view the Glimpse images and help catalog features.

We live in a spiral collection of stars that is mostly flat, like a vinyl record, but it has a slight warp. Our solar system is located about two-thirds of the way out from the Milky Way's center, in the Orion Spur, an offshoot of the Perseus spiral arm. Spitzer's infrared observations are allowing researchers to map the shape of the galaxy and its warp with the most precision yet.

While Spitzer and other telescopes have created mosaics of the galaxy's

plane looking in the direction of its center before, the region behind us, with its sparse stars and dark skies, is less charted.

"We sometimes call this flyover country," said Barbara Whitney, an astronomer from the University of Wisconsin at Madison who uses Spitzer to study young stars. "We are finding all sorts of new star formation in the lesser-known areas at the outer edges of the galaxy."



This infrared image shows a striking example of what is called a hierarchical bubble structure, in which one giant bubble, carved into the dust of space by massive stars, has triggered the formation of smaller bubbles. The large bubble takes up the central region of the picture while the two spawned bubbles, which can be seen in yellow, are located within its rim. NASA's Spitzer Space Telescope took this image in infrared light. The multiple bubble family was found by volunteers participating in the Milky Way Project (see www.milkywayproject.org). This citizen science project, a part of the Zooniverse group, allows anybody with a computer and an Internet connection to

help astronomers sift through Spitzer images in search of bubbles blown into the fabric of our Milky Way galaxy. The bubbles are formed by radiation and winds from massive stars, which carve out holes within surrounding dust clouds. As the material is swept away, it is thought to sometimes trigger the formation of new massive stars, which in turn, blow their own bubbles. The images in the Milky Way project are from Spitzer's Galactic Legacy Infrared Mid-Plane Survey Extraordinaire, or Glimpse, project, which is mapping the plane of our galaxy from all directions. As of June 2013, 130 degrees of the sky have been released. The full 360-degree view, which includes the outer reaches of our galaxy located away from its center, is expected soon. Credit: NASA/JPL-Caltech/University of Wisconsin

Whitney and colleagues are using the data to find new sites of youthful stars. For example, they spotted an area near Canis Major with 30 or more young stars sprouting jets of material, an early phase in their lives. So far, the researchers have identified 163 regions containing these jets in the Glimpse 360 data, with some of the young stars highly clustered in packs and others standing alone.

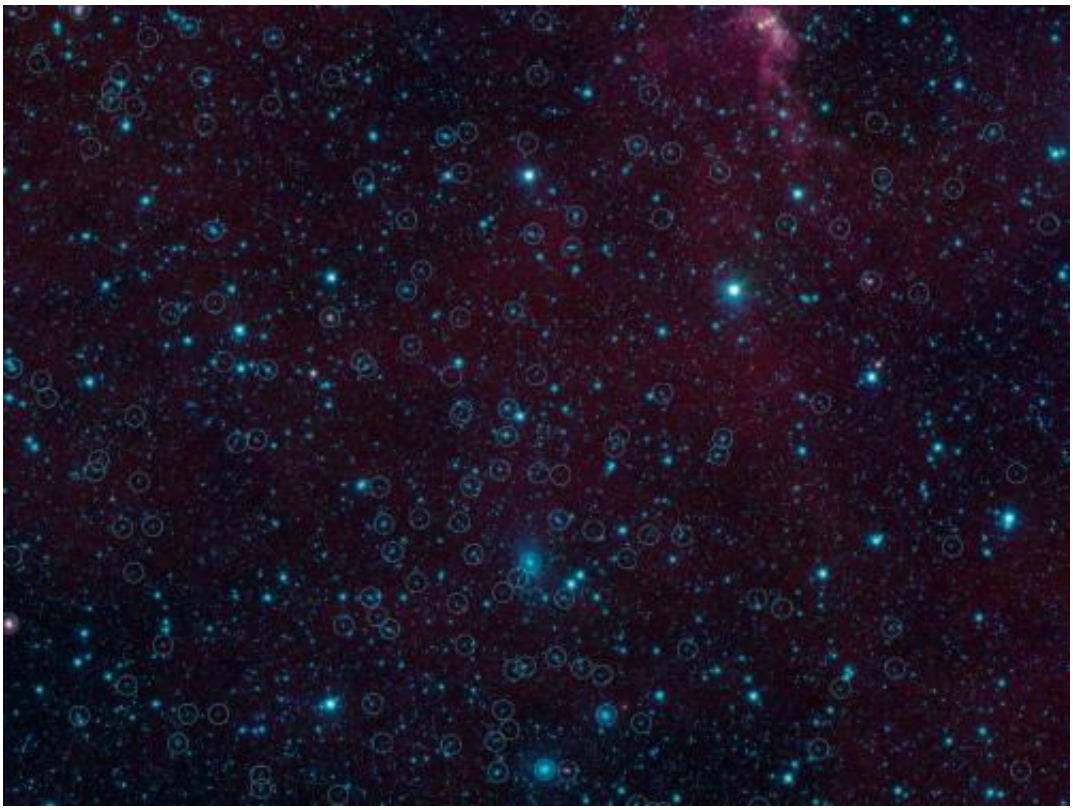
Robert Benjamin is leading a University of Wisconsin team that uses Spitzer to more carefully pinpoint the distances to stars in the galaxy's hinterlands. The astronomers have noticed a distinct and rapid drop-off of red giants, a type of older star, at the edge of the galaxy. They are using this information to map the structure of the warp in the galaxy's disk.

In what may look to some like an undersea image of coral and seaweed, a new image from NASA's Spitzer Space Telescope is showing the birth and death of stars. In this view, infrared data from Spitzer are green and blue, while longer-wavelength infrared light from NASA's Wide-field Infrared Survey Explorer (WISE) are red. The stringy, seaweed-like filaments are the blown out remnants of a star that exploded in a supernova. The billowy clouds seen in pink are sites of massive star formation. Clusters of massive stars can be seen lighting up the clouds, and a bubble carved out from massive stars is seen near the bottom. This region contains portions of what are known as the W3 and W5 star-forming regions. In this image, Spitzer's 3.6- and 4.5-micron data are blue and green, respectively, while WISE's 12-micron data are red. The Spitzer data were taken as part of the mission's Galactic Legacy Infrared Mid-Plane Survey Extraordinaire 360, or Glimpse 360 project, which is pointing the Spitzer Space Telescope away from the galactic center to complete a full 360-degree scan of the Milky Way plane. WISE all-sky observations are boosting Spitzer's imaging capabilities by providing the longer-wavelength infrared coverage the mission lost when it ran out of coolant, as planned, in 2009. Credit: NASA/JPL-Caltech/University of Wisconsin

"With Spitzer, we can see out to the edge of the galaxy better than before," said Robert Benjamin of the University of Wisconsin, who presented the results Wednesday at the 222nd meeting of the American Astronomical Society in Indianapolis. "We are hoping this will yield some new surprises."

Thanks to Spitzer's infrared instruments, astronomers are capturing improved images of those remote stellar lands. Data from NASA's Wide-field Infrared Survey Explorer (WISE) are helping fill in gaps in the areas Spitzer did not cover. WISE was designed to survey the entire sky twice in infrared light, completing the job in early 2011, while Spitzer continues to probe the infrared sky in more detail. The results are helping to canvas our galaxy, filling in blanks in the outer expanses where not much is known.

Glimpse 360 already has mapped 130 degrees of the sky around the galactic center.



There are nearly 200 galaxies within the marked circles in this image from NASA's Spitzer Space Telescope. These are part of the Perseus-Pisces supercluster of galaxies located 250 million light-years away. Normally, galaxies beyond our Milky Way are hidden from view when they happen to fall behind the plane of our galaxy. This is due to foreground dust standing in the way. Spitzer's Galactic Legacy Infrared Mid-Plane Survey Extraordinaire 360, or Glimpse 360 project, is pointing Spitzer away from the galactic center, to complete a full 360-degree scan of the Milky Way plane. It has captures many images in the process, such as this one, revealing hidden objects. Credit: NASA/JPL-Caltech/University of Wisconsin

Members of the public continue scouring images from earlier Glimpse data releases in search of cosmic bubbles indicative of hot, massive stars. Astronomers' knowledge of how massive stars influence the formation of other stars is benefitting from this citizen science activity, called The Milky Way Project. For instance, volunteers identified a striking

multiple bubble structure in a star-forming region called W39. Followup work by the researchers showed the smaller bubbles were spawned by a larger bubble that had been carved out by massive stars.

"This crowdsourcing approach really works," said Charles Kerton of Iowa State University at Ames, who also presented results. "We are examining more of the hierarchical bubbles identified by the volunteers to understand the prevalence of triggered star formation in our galaxy."

For more information about the Milky Way project and to learn how to participate, visit: www.milkywayproject.org .

Provided by NASA