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| Mira is one of the best-studied stars in the sky, yet it's kept a stunning secret that scientists have only just discovered in the glow of ultraviolet light. | *?* |
| [Titles] | *Titles* |
| Today the Hidden Universe is taking a break from our usual Spitzer Space Telescope discoveries in infrared light. Instead we're going to visit the other side of the visible spectrum. NASA's Galaxy Evolution Explorer, or GALEX, is an Earth-orbiting telescope with an ultraviolet eye to the universe. | *(wide)* |
| The ozone layer in our atmosphere screens out most of the incoming ultraviolet light. That's great for cutting down on sunburns, but it means astronomers need space-based telescopes like GALEX if they want to see what's going on out there. | *Earth from space* |
| And what's going on turned out to be quite a surprise when a team led by Dr. Chris Martin of Caltech stumbled across this ultraviolet marvel. | *(wide, image to side)* |
| Do you think it's a comet? At first glance so do a lot of astronomers, but it's nothing so ordinary. Comets, which travel within our solar system, are seldom longer than the distance between the Earth and Sun. This spectacular discovery surrounds the star Mira and spans 13 light years. That's three times further than from us to the next star! | *Picture*<br><br>*(tight at end)* |
| What's pretty cool about this discovery is that not only was it unexpected, it was kind of an accident. Dr. Mark Seibert, part of the research team, explains. | *(wide)* |

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| [quote about how this was an unexpected discovery, largely because it's only visible in the UV] | *Mark* |
| So what do we know about Mira and why would it have such a unique tail? It's a well-known variable star that appears red to the naked eye, when it's bright enough to see. It's 400 light years away but still can appear bright because it's become a red giant. This is typical of stars like our sun as they exhaust their nuclear fuel and swell up near the end of their lives. Even though it's only 20% more massive than the sun, Mira is so large that it would swallow even the orbit of Mars! | *Solar system/Mira gfx* |
| Because of their size, red giants lose their gravitational grip on their outer layers, blowing material away in a kind of stellar wind. | *Timed to animation* |
| Over the course of tens of thousands of years, this material forms a trailing tail. We see this tail because Mira is moving unusually fast relative to its neighboring stars. Where its wind slams into the local interstellar medium a leading shock wave, or bow shock forms. The researchers theorize that hot electrons from this shock mix with the wind and stream around and behind, forming the tail. Excited hydrogen molecules to glow. Hydrogen naturally emits in the ultraviolet, and so was just waiting to be discovered by GALEX. | *Timed to animation* |
| [shooting star comment, bullet] | |

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| Since our sun will also become a red giant in several billion years, Mira gives us a chance to look into our own system's future. By looking back along Mira's tail we see progressively older material tracing its outflow history back as much as 30,000 years. It's a kind of fossil record of the final breaths from a dying star. | *Age graphic*<br>*(* |
| [cosmic recycling comment] | |
| It's remarkable that even after 400 years of scientific scrutiny Mira still harbors astounding secrets. Missions like the Galaxy Evolution Explorer open our eyes to new ways of seeing what's all around us, and sometimes lets us catch a shooting star. | *(wide)* |
| For the Spitzer Science Center I'm Dr. Robert Hurt, reminding you there's a hidden universe waiting to be discovered. | *(tight)* |
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