

Sharing the night sky
Greg Smith - editor

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The “Night Under the Stars” that I had promised a gentleman from my church went well. We used the parking lot across from the fairgrounds as he lived nearby. He was an absolute beginner in that when he asked what the nearest star was, I told him the sun. His first reaction was well of course it is, I went onto tell him that the nearest bright star we could see from Longview was Altair and I pointed it out to him. From there we talked about how we knew the distances to these stars and galaxies. I explained it wasn't till the early part of 1900's that we even knew the existence of galaxies. It was through the finding of certain types of variable stars that we could calculate the distance to the seemingly nebulous clouds of light. When the calculations were figured out, the distances were so huge, is when it was determined that these nebulas were way out side our galaxy. I was able to show him Venus, Jupiter, Saturn and Mars. We went on to see a globular cluster, double stars, and the core of the Andromeda galaxy.

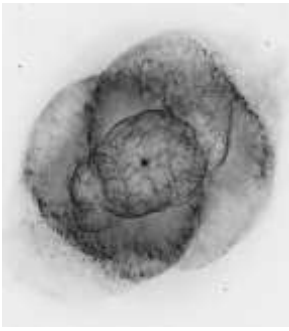
We even had a random person come passing by and stopped and we shared the views of several of these objects. Random acts of learning happen when we least expect it.

The guy was very pleased with his experience.

We have something new with the Friends of Galileo. FOG has a new website: www.friendsofgalileo.com. Roy Gawlick is taking up the chore of getting us back online. He is keeping our Facebook page up to date as well. Follow us on Facebook and you will get updates about the Friends of Galileo. He is doing a great job and needs our support. We have already received inquiries from the site. So it is generating interest. If you look at the bottom of the page you will see that I have placed the website on the bottom of every page of the newsletter for easy reference.

I realize that many of us were frustrated by having cloudless skies but too much smoke to be able to see anything, I know I was too. It delayed my Night Under the Stars by about six weeks. Fortunately the delay allowed us to go out at an earlier time in the evening and not have to stay up so late. So it worked out just fine.

Every Day is a Star Filled Day
Every Night is a Starry Night



*Einstein is
right
again!*



Star Zooms Past Monster Black Hole, Confirms Relativity

By Chelsea Gohd, Space.com Staff Write

For the first time ever, researchers have watched a star race past the supermassive black hole at the heart of the Milky Way, verifying that its motion showed the effects of general relativity, as predicted by Albert Einstein.

The stars of the Milky Way orbit a gargantuan black hole called Sagittarius A*, which is generally quiet as viewed from Earth, except for ripping apart the occasional object that ventures too close. The black hole's mass is 4 million times that of the sun, and it exhibits our galaxy's strongest gravitational field, making it — and a small group of stars orbiting it at high speed — a perfect proving ground for the extreme effects predicted by Einstein's theory of general relativity.

For 26 years, researchers have been observing the center of the Milky Way using instruments from the European Southern Observatory (ESO). "The galactic center was our laboratory to test gravity," Odele Straub, an astrophysicist at the Paris Observatory and co-author of the new study, said at an ESO news conference July 26.

Astronomers have used new infrared observations from the GRAVITY, SINFONI and NACO instruments on ESO's Very Large Telescope in Chile to follow a star, known as S2, which is part of a group of fast-moving stars orbiting the supermassive black hole, located 26,000 light-years from Earth.

In May 2018, these astronomers witnessed S2 pass very close to this black hole. At the time, S2 was moving extremely fast — 15.5 million mph (25 million km/h). By comparing position and velocity measurements taken by GRAVITY and SINFONI and previous measurements taken of S2, the team found that the warped light from the star was consistent with predictions based on general relativity's description of how gravity bends space-time.

The measurements of S2 clearly show an effect known as redshift, ESO officials said in a statement.



An artist's impression of the star S2 passing closely by the supermassive black hole in the center of the Milky Way. By studying this star, astronomers have successfully tested Einstein's theory of general relativity.

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Credit: ESO/M. Kornmesser

"Redshift tells us how gravity affects photons as they travel through the universe," Andrea Mia Ghez, an astronomer and professor in the Department of Physics and Astronomy at the University of California, Los Angeles who was not involved in this research, told Space.com.

The supermassive black hole's gravitational field stretched the light leaving S2, and the change in the wavelength of light from S2 aligns with what is predicted by Einstein's theory, according to the statement.

The new measurements and results don't agree with what would be predicted by the simpler, Newtonian theory of gravity, the researchers said at the news conference. Frank Eisenhauer, senior staff scientist at the Max Planck Institute for Extraterrestrial Physics and principal investigator for GRAVITY and the SINFONI spectrograph, showed a vivid graph highlighting that divergence at the ESO news conference — reading "Einstein 1:0 Newton" — eliciting cheers from the audience.

This is the first time such a deviation from the Newtonian theory of gravity has been observed in a star around a supermassive black hole, the researchers said in the statement, although it was the second time they observed S2 around the black hole; they've been tracking the system for more than two decades. Last time it passed by, 16 years ago, the measurements' resolution wasn't good enough to pick up relativity's effects.

One of hundreds of images collected with the NACO instrument of ESO's Very Large Telescope in Chile over two decades, following the motions of stars orbiting very close to the supermassive black hole at the Milky Way's center.

As human beings on Earth, we fall, we drop things and we don't float off of the planet into space; from an everyday perspective, we understand gravity quite well. However, of the different laws of physics, "gravity is the least tested, although [it's] the one we understand from a human existence the best," Ghez said. This new research helps to solidify our understanding of gravity on a larger scale.

"Getting this law right is super important," Ghez said. Even if you don't have it right, or you work with an incorrect understanding of gravity — even on a small scale — those mistakes may have accumulated on a larger scale, she added.

This work shows how gravity acts near a supermassive black hole, thus improving scientists' understanding of the force and its effects, the researchers said. "Here in the solar system, we can only test the laws of physics now and under certain circumstances," Françoise Delplancke, head of the system engineering department at ESO and co-author of the new study, said in the statement. "So it's very important in astronomy to also check that those laws are still valid where the gravitational fields are very much stronger."

Astronomers will continue to observe and study S2 and hope to soon show general relativity's effect on a small rotation of the star's orbit as it travels away from the supermassive black hole, the researchers said.

The results of the new research were published online today (July 26) in the journal *Astronomy & Astrophysics*.

Minutes of the August Meeting

The meeting was opened by Pres. Greg Smith just past 7pm. There was new business as it was announced that we have a new website in the offing. It was decided to spend the dollars necessary to register a domain of friendsofgalileo.com. It was put to a vote and was passed unanimously. Roy Gawlick is the new webmaster for FOG. He will be keeping the website and the Facebook page up to date. The new website looks very good. Ted Gruber gave the sky report of the month centering on the Perseid meteor shower and the globular cluster M2.

Carolyn Hail gave a funny brief recounting of buying a small scope at Habitat for Humanity. This small scope had all kinds of problems. She related how several had to be overcome. She still has issues with it, but she can see things very well with it.

Mark Thorson gave a photo presentation of the Oregon Star Party, with an emphasis on the scope walk and the innovations people have come up with that dramatically improve the size and weight of large mirror scopes.

It was suggested that we move the club star party to Mike Fiest's on Sept 10th or 11th from Ted Gruber's as he is in the process of moving to a new property.

Sidewalk Astronomy will be held on Aug 17th or 18th at the Starbucks on OB Highway. (After note: the weather was forecast to be bad on the 17th and so we cancelled, turned out to be good. We got a phone call by someone on the night of the 17th wondering why no one was there, as they had read about it in the Columbia River Reader. After apologies, we said that we would be out there the next night. We went and had a couple who had been there the night before.)

FOG Viewing Schedule

SEPTEMBER

19 7 pm Club Mtg. @ Canterbury Park
21>22 Sidewalk Astronomy @ Starbucks @
808 O B Hwy

22 EQUINOX

24 FULL MOON

☞ September 2018 Meeting ☞

DATE: **Wednesday, September 19, 2018**

TIME 7:00 pm

PLACE: Canterbury Park
President's Room
1335 3rd Avenue, Longview

PROGRAM: DVD (Member's Choice)

SNACKS: Becky Kent

DRINKS: Chuck Ring

Friends of Galileo Club Officers

PRESIDENT	Greg Smith
VICE-PRESIDENT/ PROGRAM CHAIR	Ted Gruber
SECRETARY	Becky Kent
TREASURER	Steve Powell
WEBSITE	Roy Gawlick
NEWSLETTER ED.	Greg Smith
ALCOR	Tom Meek

Next Month's Newsletter Deadline

The deadline for items in next month's newsletter is:

**Wednesday, October
10th.**

Please feel free to send in your thoughts and experiences about your astronomical adventure.

Submit your material by E-mail to:

grlyth@msn.com

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