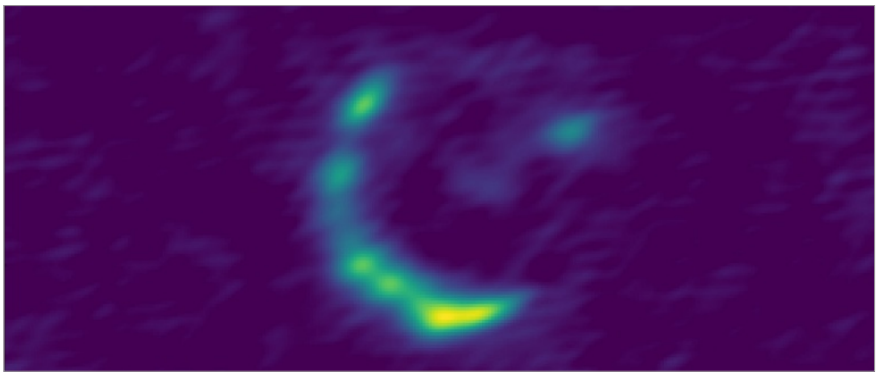
INSTITUTE OF ASTRONOMY
PUBLIC OPEN EVENING

— 8 February 2023 —



The search for an invisible galaxy

An incredibly distant object, once invisible to researchers, has been described for the first time in a study written by PhD student Marika Giuletti and her colleagues.

Giulietti and her team identified the object as a compact, young galaxy forming stars at around 1000 times the rate of our Milky Way. In addition to revealing previously unknown details about the object, these observations will be useful for determining techniques to study similar 'invisible' objects.

"Very distant galaxies are real mines of information about the past and future evolution of our universe," explained Giulietti. "In recent years, several distant galaxies have been discovered that are particularly obscured, appearing completely invisible even to the most powerful optical instruments, such as the Hubble Space Telescope."

Their small size and large distances from our observing instruments means studying such galaxies is best done using a technique known as gravitational lensing. This involves using the fact that massive nearby objects will distort light coming from distant objects that are aligned with them. These massive objects act as lenses that magnify distant galaxies, making it easier to identify and study them. This was the technique used to identify the main object of Giuletti et al.'s recent study.

"We studied this peculiar object by adopting particular codes that enabled us to reconstruct the original shape of the background source and also to understand certain properties of the lens itself. The observations also provided valuable information about the gas content of this source, and we were able to determine how it is distributed." said Giuletti. "Our analysis showed that this object is very compact, presumably young, and forming stars at an extremely high rate. In the future, the James Webb Space Telescope will reveal much more about this galaxy, something that only it can do at the moment."

TONIGHT'S SPEAKER

Vanessa Lopez Barquero
Women in Science

Our weekly welcome

WELCOME to our weekly public open evenings for the 2022/23 season. Each night there will be a half-hour talk which begins promptly at 7.15pm. Please note that the talk will be recorded and archived for online streaming.

The talk is followed by an opportunity to observe if (and only if!) the weather is clear. The IoA's historical Northumberland and Thorrowgood telescopes, along with our modern 16-inch telescope, will be open for observations. In addition, the Cambridge Astronomical Association will provide a floorshow outdoors on the Observatory lawns, relaying live images from their telescopes and providing a commentary. If we're unlucky and it's cloudy, we'll offer you a conciliatory cup of tea after the talk (with perhaps some more astro-information in the lecture theatre for those who want to stay on).

News stories written by Natasha Goodman. If you have any questions, suggestions or comments about the IoA Open Evenings please contact Matt Bothwell at bothwell@ast.cam.ac.uk.

The talk schedule for this term can be viewed at: www.public.ast.cam.ac.uk

Hubble directly measures white dwarf mass for the first time

For the first time, astronomers have managed to directly measure the mass of LAWD 37, an isolated white dwarf (the remains of a Sun-like star that can no longer undergo fusion). Using the Hubble Space Telescope, astronomers measured the dwarf's mass to be 56% the mass of our Sun. This result is in agreement with theoretical predictions and supports the current theories of how white dwarfs evolve once a star dies.

At a distance of only 15 light years, LAWD 37 is relatively easy to observe and has been extensively studied as a result.

"Because this white dwarf is relatively close to us, we've got lots of data on it – we've got information about its spectrum of light, but the missing piece of the puzzle has been a measurement of its mass," said Peter McGill, of the University of California.

To observe LAWD 37, researchers used gravitational microlensing. This involved observing how light from a background star was distorted as LAWD 37 passed in front of it.

McGill and his team used the incredibly precise measurements made by ESA's Gaia space observatory to predict when LAWD 37 would pass in front of a star, before using Hubble to measure how the light of the background star was deflected over the course of several years.

"These events are rare, and the effects are tiny," said McGill. "For instance, the size of our measured offset is like measuring the length of a car on the Moon as seen from Earth."

Amateur astronomers discover nebula near Andromeda

A group of amateur astronomers discovered a previously unknown emission nebula located next to the Andromeda Galaxy and spanning half the width of the galaxy.

Astroimager Yann Sainty used an Oxygen-III (OIII) filter to take images and then analyse them alongside fellow amateur astronomers Marcel Drechsler and Xavier Strottner. They then worked with a team of astroimagers and professional astronomers to confirm their find, which they designated Strottner-Drechsler-Sainty Object 1. An image of the object (reproduced above) was published on the astroimaging website AstroBin and their results were published in Research Notes of the AAS.

Previous OIII surveys using professional-grade telescopes had failed to spot this nebula, as they weren't well-suited to spotting such a faint and extended object. Sainty used a filter with a bandwidth of just 3nm to better isolate the OIII signal from background noise.

The image has raised many questions about the nebula's nature, including whether or not it is physically next to Andromeda. If it lies along our line of sight to the Andromeda Galaxy, it could be part of the Milky Way galaxy while appearing next to Andromeda in the image. There is also speculation over whether it was formed as a result of Andromeda interacting with the Milky Way. To settle these debates, professional astronomers hope to obtain a high-resolution spectrum. With this it will be possible to measure the Doppler shift caused by motion towards or away from the Milky Way - and thus determine whether the object's motion matches Andromeda's own motion.

Joke of the Week

I asked my friend what it was like to research electron spins. She said there are ups and downs.