INSTITUTE OF ASTRONOMY
PUBLIC OPEN EVENING

— 11 DECEMBER 2019 —

Astronomers find biggest black hole ever

The galaxy cluster Abell 85, which hosts the most massive black hole ever discovered. Image credit: Matthias Kluge/ USM Wendelstein Observatory/ MPE

Black holes come in two main varieties -- 'stellar' black holes (which weigh roughly as much as a star), and 'supermassive' black holes, which dwell in the centres of massive galaxies and can weigh in at millions -- or even billions -- as times as much as our Sun.

Now, astronomers studying the galaxy cluster Abell 85 have found the most massive black hole ever discovered, weighing more than 40 billion times as much as our Sun,

The giant black hole lives at the centre of the galaxy Holm 15A, which is right in the heart of the cluster. It is thought that Holm 15A (a very massive elliptical galaxy) is the end result of up to eight massive spiral galaxies merging together over the past few billion years.

When galaxies collide and merge (like our Milky Way and Andromeda will in the distant future), their supermassive black holes eventually merge too, forming a larger supermassive black hole in the centre of the post-merger galaxy. But several of these mergers would be needed to create a black hole as large as the one inside Holm 15A.

To measure the mass of the black hole, the team observed the orbits of stars around the centre of the galaxy. Just as observing a planet's speed around the Sun will tell you the mass of the Sun, measuring the stars orbital speeds around the galactic centre allowed scientists to weigh the central black hole -- coming up with the staggering final value of 40 billion solar masses.

“Just imagining a black hole that is so huge is cool,” said Jens Thomas (at the Max Planck Institute for Extraterrestrial Physics), who led the study.

TONIGHT'S SPEAKER

Amy Rankine

Active galactic nuclei

Our weekly welcome

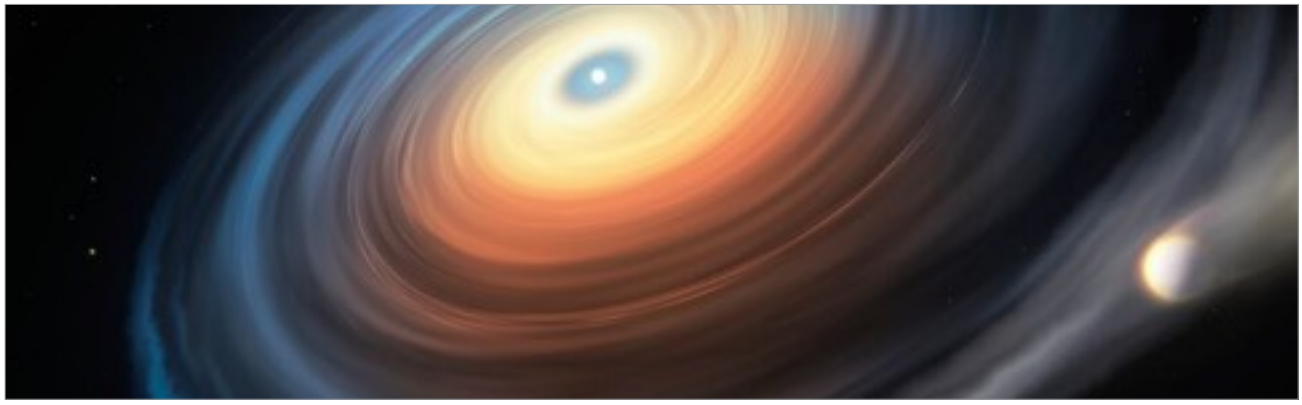
WELCOME to our weekly public open evenings for the 2019/20 season. Each night there will be a half-hour talk which begins promptly at 7.15pm. Please note that the talk will be recorded and archived for online streaming.

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).

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.ast.cam.ac.uk/public

Astronomers find planet orbiting white dwarf



An artist's impression of the planet orbiting a white dwarf. The planet's atmosphere is being stripped away by the intense radiation. Image credit: ESO/M. Kornmesser

Astronomers have spotted a Neptune-sized planet orbiting a white dwarf -- the first time this has ever been seen.

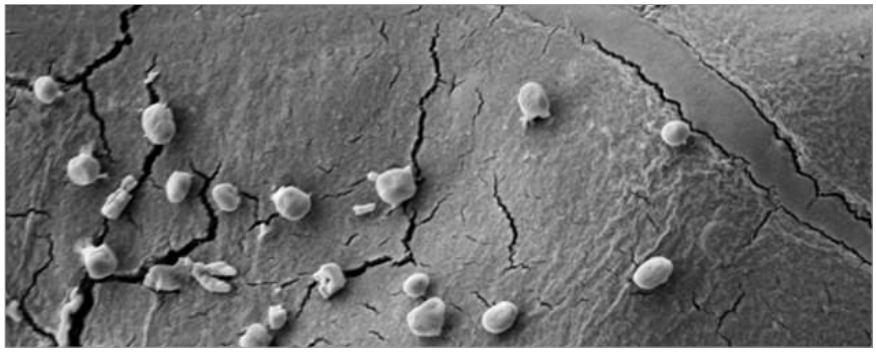
White dwarfs are the dense collapsed remains of a star that has exhausted its fuel supply and exploded. They are around the size of Earth, despite weighing as much as a star (meaning their density is amazingly high; around a tonne per cubic centimetre). This also means that this newly-discovered planet is around 4 times larger than the dead star it is orbiting around!

The planet was first discovered because the system's spectrum showed evidence of unusual elements not typically seen in white dwarfs. "It was one of those chance discoveries," said lead author Boris Gänsicke. "We knew that there had to be something exceptional going on in this system, and speculated that it may be related to some type of planetary remnant".

The strange elements can only have come from the remains of the planet's atmosphere, which have been stripped away by the intense radiation from the white dwarf, forming a gassy disk around the dead star.

"Until recently, very few astronomers paused to ponder the fate of planets orbiting dying stars," said Gänsicke. "This discovery of a planet orbiting closely around a burnt-out stellar core forcefully demonstrates that the universe is time and again challenging our minds to step beyond our established ideas."

Earth organism can colonise meteorites



Astronomers have just discovered a single-celled organism which is able to grow on meteorite rock, metabolising the material and synthesising nutrients. "This process was very enigmatic and exciting, how the chemical energy of a stone fragment can be transformed into the biochemical energy of a living entity," said Tetyana Milojevic who led the study. "To find an answer to understand this process, I think it's a great moment."

The organism in question is Metallosphaera sedula (meaning 'metal mobilising sphere'), which is an 'extremophile' (in other words, a species which thrives in extreme conditions). And when Milojevic and her team introduced M. sedula to a meteorite, they found that the organism thrived on the meteorite's surface, and survived much better than they did on Earth rocks. As the name suggests, the species is adept at metabolising metal, and it was able to grow on the iron content of the meteorite.

Most excitingly, this new finding provides a possible method for detecting extraterrestrial life. The team was able to detect the chemical signatures of colonies of long-dead cells, which they believe will be useful in the search for extraterrestrial life. Milojevic said "This should be helpful in tracing biosignatures for the search of life elsewhere in the Universe. If life ever occurred on another planet, similar microbial fingerprints could be still preserved in the geological record."

Joke of the Week

I put a black hole in my living room. It's great - really pulls the room together.