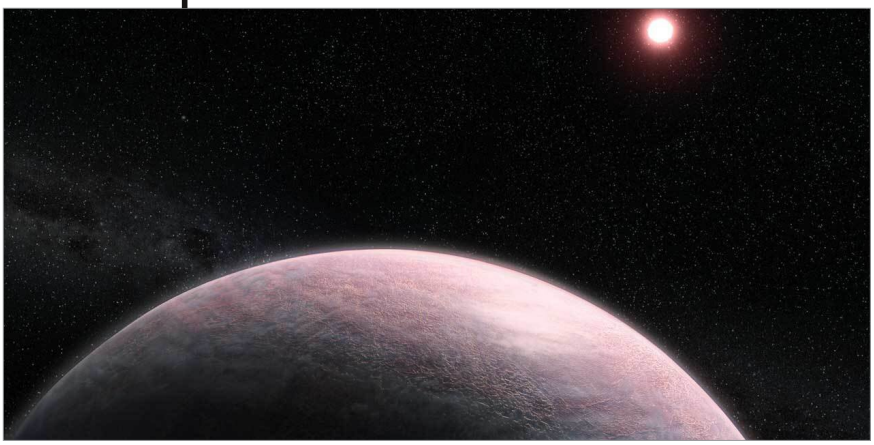
INSTITUTE OF ASTRONOMY
PUBLIC OPEN EVENING

— 4 DECEMBER 2019 —

A new way to find exoplanet atmospheres



An artist's impression of a rocky exoplanet with a wispy, cloudy atmosphere orbiting a red dwarf star. Credit: L. Hustak and J. Olmsted (STScI)

Since the discovery of the first planet orbiting a distant star in 1995 (a discovery which recently won the Nobel Prize!), exoplanet science has gone from strength to strength. With over 4000 known exoplanets discovered to date, the cutting edge of the field is now dedicated to understanding the properties of these exoplanets -- including their atmospheres.

Exoplanet atmospheres are currently best studied using 'transmission spectroscopy', in which light from a star is measured just as a planet passes in front. Get the timing right, and light can be captured which has passed through the atmosphere of the planet, and will be imprinted with the chemical fingerprints of the atmosphere's components.

This technique is slow, however -- but now, a team of astronomers have proposed a new method, which should speed things up.

Using the James Webb Space Telescope (due to launch in 2021), the team proposes to measure the temperature of planets as they pass around the back of the star. "Whenever you add an atmosphere, you're going to lower the temperature of the dayside. So if we see something cooler than bare rock, we would infer it's likely a sign of an atmosphere," said Daniel Koll of the Massachusetts Institute of Technology (MIT), who lead the new study.

The new technique should allow atmospheres to be studied using just one or two 'secondary eclipses' -- rather than the eight needed for current methods.

This new method will allow astronomers to gather large samples of planets, which will hopefully tell us what fraction of rocky planets have atmospheres.

TONIGHT'S SPEAKER

Mallory Thorpe

Cosmic collisions and the fate of the Milky Way

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

Anti-asteroid mission approved by ESA

An artist's impression of the HERA mission approaching an asteroid. Credit: ESA

Good news for people hoping to avert Humanity's eventual fiery doom: the mission HERA, which aims to teach us how to thwart deadly asteroid collisions, has been approved by the European Space Agency (ESA).

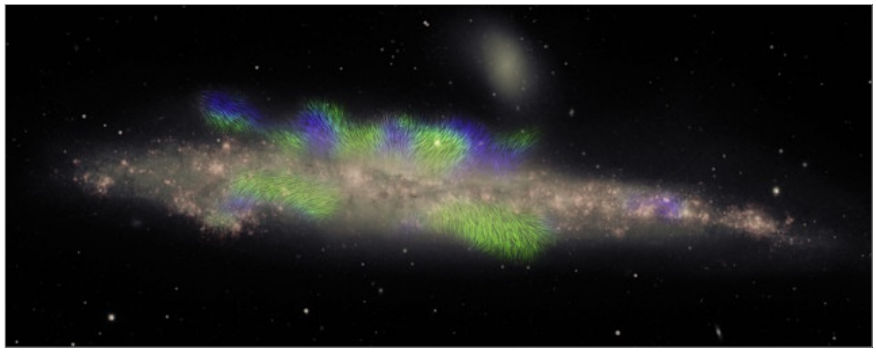
HERA is part of a double mission, being coordinated between ESA and NASA. In 2021, NASA will launch the 'DART' mission, which will deliberately slam into the small asteroid Didymoon (a satellite of the larger asteroid Didymos) in 2022. Then, in 2024 HERA will launch, travel to Didymoon, and assess the damage done.

Didymoon isn't a threat to Earth, of course. But if something roughly Didymoon-sized (roughly the size of the Great Pyramid of Giza) did hit Earth, it could easily flatten a city. The HERA mission will give us important information, letting us know whether we have the ability to reach and potentially deflect any incoming threats (the so-called 'kinetic impactor' strategy).

HERA will gather data using two specially-designed 'Cubesats', miniature briefcase-sized satellites which can be used relatively cheaply.

"We are very pleased by the European Space Agency's decision to fund the Hera mission, a critical part of humanity's first attempt at deflecting an asteroid," the #SupportHera campaign, which has been advocating for the mission, wrote in a statement. "One day, the Hera mission could be crucial to protecting our planet from asteroids."

Galaxy halo has strange magnetic field



The galaxy NGC 4631 is commonly known as 'The Whale'. Lying around 25 million light years away, it is an edge-on spiral galaxy which is rapidly forming stars.

Now, new radio observations of NGC 4631 have revealed complex magnetic fields, spreading outwards from the galaxy for many thousand light years. Most interestingly, the magnetic fields make a regular, alternating pattern (see image, where green marks magnetic fields pointing towards us and blue shows fields pointing away from us.)

“This is the first time that we have clearly detected what astronomers call large-scale, coherent, magnetic fields far in the halo of a spiral galaxy, with the field lines aligned in the same direction over distances of a thousand light-years,” said Dr. Marita Krause, who is at the Max-Planck Institute for Radioastronomy.

Now, the challenge is to understand how these complex magnetic patterns came to be! The most likely explanation relates to the behaviour of plasma in the spiral arms, but right now there are no clear answers.

“Studying magnetic fields is a frontier,” said Jayanne English, an astronomer at the University of Manitoba in Canada and a coauthor on the paper. “We want to know why they're there, how they're there, and then what role they play in galaxy formation, structure and evolution.”

Joke of the Week

I'm visiting Greenwich next week. Any ideas for what I can do in the Mean Time?