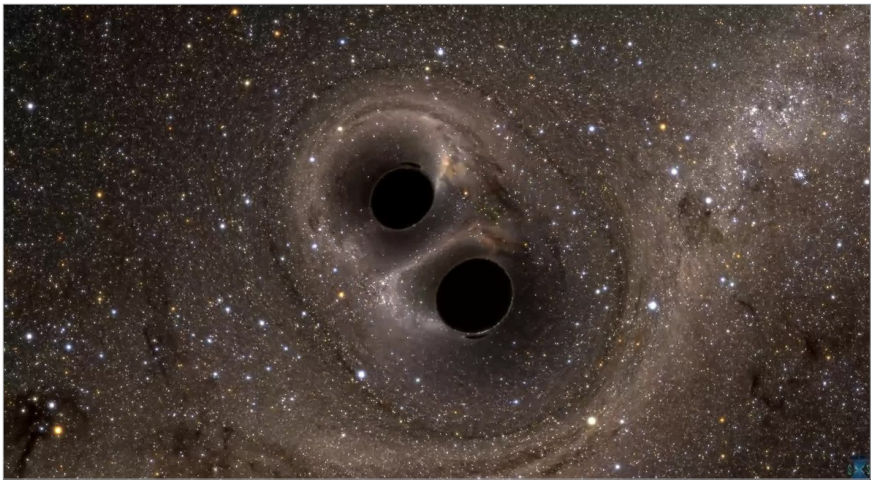
INSTITUTE OF ASTRONOMY
PUBLIC OPEN EVENING

— 15 JANUARY 2020 —

Mysterious gravitational waves detected



A simulation of two merging black holes.

Astronomeres may have detected an "unknown or unanticipated" burst of gravitational waves, originating from deep space.

The detection was made by LIGO (the Laser Interferometer Gravitational-Wave Observatory), which uses laser interferometry to detect the miniscule ripples in space and time caused by extreme astrophysical events, like black holes and neutron stars crashing together.

The signal came in at 4am on Wednesday, January 15th 2020, and was part of an 'unmodeled search', meaning the observatory was spreading its net wide in an attempt to see as many potential events as possible. The downside of this type of search is that when gravitational waves are detected in this way, it can be hard to pinpoint their origin.

'Our latest candidate is not quite in our cosmic backyard: its most likely distance is about 1 gigaparsec, or just over 3 billion light-years,' said the team at LIGO.

So, what caused these waves? LIGO has detected several pairs of merging black holes over the past few years, and these signals are very well understood. Whatever caused these new gravitational waves is likely to be more unusual. Possible candidates right now are an intermediate mass black hole binary, an eccentric black hole binary -- or something completely new. Though, according to LIGO scientist Chris Berry on Twitter, "It's probably not aliens".

As the event happened so recently, as of now there are no clear answers. Astronomers worldwide are currently scouring the sky, to see what might have caused this strange signal.

TONIGHT'S SPEAKER

Will Coulton

The science behind this year's Nobel prize

Our weekly welcome

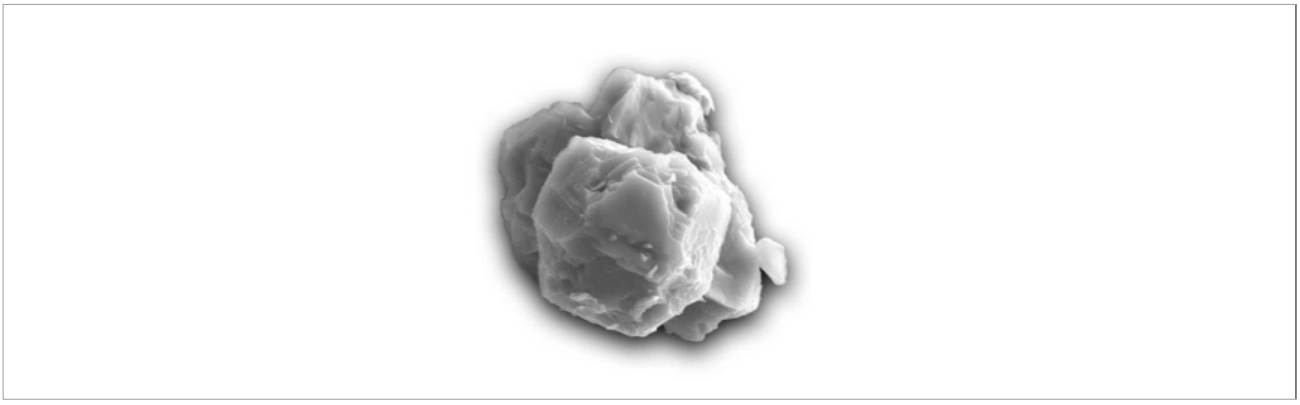
WELCOME to our weekly public open evenings for the 2019/20 season. Each night there will be a half-hour talk which begins promptly at 7.15pm. Please note that the talk will be recorded and archived for online streaming.

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

The oldest material on Earth?



A scanning electron micrograph of a dated presolar silicon carbide grain. Credit: JANAINA N. AVILA, Janaína N. Ávila/AFP via Getty

Astronomers have dated a meteorite (which landed in the 1960s), finding that parts of the spacerock are around 7.5 billion years old. This means the meteorite (known as the 'Murchison meteorite') was around for billions of years before our Sun and Solar System was formed.

So how do you date a meteorite? The answer, is you can use cosmic rays. Cosmic rays are high-energy particles which travel through space, and can easily penetrate solid matter. The longer a material is exposed to cosmic rays, the more damage it takes (in the form of new elements being created in the rock by the high energy particle). And while most grains from the Murchison meteorite were around 5.5 billion years old, around 10% of the material studied dates back over 7 billion years, long before our Solar System formed. As such, the old grains are known as 'presolar' grains.

"This is one of the most exciting studies I've worked on," said Philipp Heck, who led the study. "These are the oldest solid materials ever found, and they tell us about how stars formed in our galaxy. They're solid samples of stars."

"With this study, we have directly determined the lifetimes of stardust. We hope this will be picked up and studied so that people can use this as input for models of the whole galactic life cycle," Heck said. "It's so exciting to look at the history of our galaxy.

New giant radio telesope is ready to go

The biggest single dish telescope in the world is opening up to astronomers across the globe.

The Five-hundred-meter Aperture Spherical Radio Telescope (FAST) replaces the Arecibo Observatory in Puerto Rico as the largest single-dish telescope in the world, having more than double the collecting area. Being made up of 4400 aluminium panels (which are manipulated by around 2000 mechanical winches), FAST is now the most sensitive radio telescope in the world.

FAST has a range of science objectives, including a project to map the Universe's supply of cold gas (the fuel for future stars), detecting pulsars, and the search for extraterrestrial intelligence.

The observatory has been in a testing phase since 2016, and has already made significant discoveries (including finding over 100 pulsars).

It is also hoped that FAST might provide the first radio detection of an extra-solar planet, which up to now have been far too faint to see. FAST's impressive sensitivity might allow it to glimpse polarised radiowaves, emanating from planets with magnetic fields (like Earth's).

This groundbreaking observatory should very soon be made available for worldwide use. As LI Di, FAST Chief Scientist put it, “Our hope for FAST is an open-sky policy, with the goal of advancing the work of humanity."

Joke of the Week

Q: What’s a light-year?
A: The same as a regular year, but with fewer calories.