INSTITUTE OF ASTRONOMY
PUBLIC OPEN EVENING

— 20 November 2019 —

Star ejected from our Milky Way by black hole

An artist's impression of the star S5-HVS1, which is travelling at around 6 million kilometers per hour. Image credit: James Josephides

A star in our Milky Way has been spotted travelling at a blisteringly fast 6 million kilometres per hour.

The star was first spotted using a combination of the Anglo-Australian Telescope (AAT) and the Gaia satellite, which is mapping the stars in our Milky Way. While studying stars in the Southern Stellar Stream (streams of material stripped from dwarf galaxies which collided with our Milky Way in the distant past), an international team of astronomers spotted the fast-moving star. "The velocity of the discovered star is so high that it will inevitably leave the galaxy and never return" said Douglas Boubert, a co-author on the study based at Oxford.

The precision of GAIA allowed the team to backtrace the star's motion, to find the origin of its extreme velocity. The answer: Sagittarius A*, the supermassive black hole in the centre of our Milky Way.

"This is super exciting, as we have long suspected that black holes can eject stars with very high velocities. However, we never had an unambiguous association of such a fast star with the galactic center", said Sergey Koposov of Carnegie Mellon University, who led the study.

This new finding provides the first observational proof of a (previously theoretical) effect known as the Hills Mechanism. Proposed by astronomer Jack Hills in 1988, this is where a binary star passes too close to a supermassive black hole. One star gets captured by the extreme gravity, while its twin gets ejected at extreme velocities. The star therefore originated in our Galaxy's centre -- a very different environment to the location of our Sun.

TONIGHT'S SPEAKER

Nicole Pawellek

Music of the Spheres - Music and Astronomy

Our weekly welcome

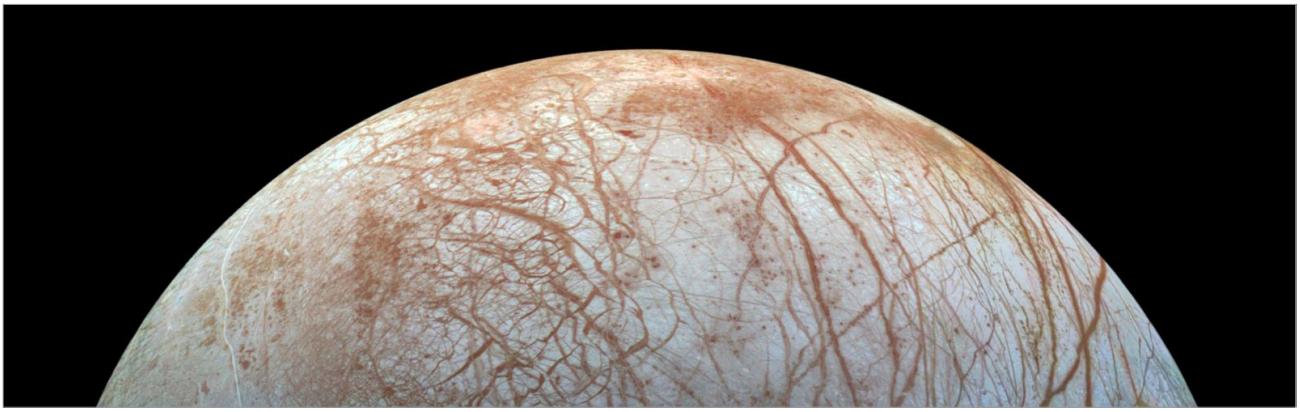
WELCOME to our weekly public open evenings for the 2018/19 season. Each night there will be a half-hour talk which begins promptly at 7.15pm. Please note that the talk will be recorded and archived for online streaming.

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

Water vapour found on Europa



Jupiter's moon Europa, as seen by the Galileo spacecraft. Credit: NASA

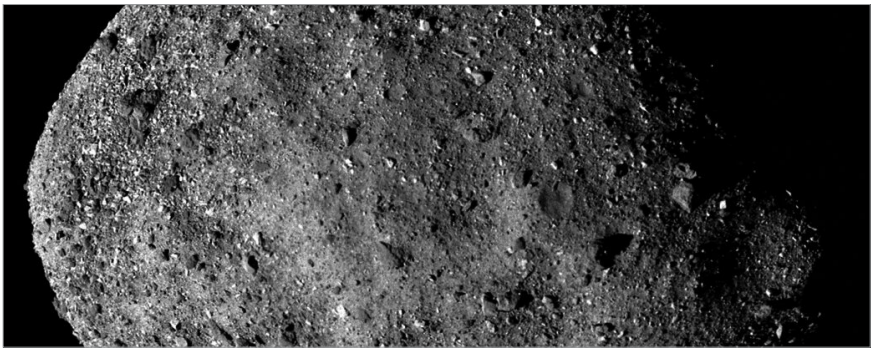
Europa has long fascinated astronomers. A moon of Jupiter (and slightly smaller than our own Moon), Europa's amazingly smooth surface implies that it is very young (otherwise it would be strewn with craters), suggesting that we are looking at an icy surface covering a liquid ocean. As such, Europa has long been thought of as an excellent potential candidate for extraterrestrial life, and scientists are keen to get a better understanding of the subsurface oceans.

One clue might come from studying the giant geysers which occasionally erupt from the planet's surface.

A team of astronomers have used the Keck telescope in Hawaii to study the gas vapour around Europa, finding evidence of water which must have been ejected in the enormous geysers.

Finding this water vapour adds weight to the suspicion that the ocean under Europa's surface might contain liquid water -- and therefore increase the possibility that it might be suitable for life.“Essential chemical elements (carbon, hydrogen, oxygen, nitrogen, phosphorus, and sulfur) and sources of energy, two of three requirements for life, are found all over the solar system. But the third (liquid water) is somewhat hard to find beyond Earth,” said Lucas Paganini, a NASA planetary scientist who led the study. “While scientists have not yet detected liquid water directly, we’ve found the next best thing: water in vapor form.”

Clues to life's origin found in meteorites



An international team of astronomers have found ribose, arabinose and xylose (all sugars which are classed as "bio-essential") in two different meteorites. These compounds can be added to the list of the important building blocks of life which have been found in spacerocks, including amino acids (components of proteins) and the components of our DNA. Yoshihiro Furukawa of Tohoku University, who led the study, said "The research provides the first direct evidence of ribose in space and the delivery of the sugar to Earth. The extraterrestrial sugar might have contributed to the formation of RNA on the prebiotic Earth which possibly led to the origin of life."

RNA is thought to be an important precursor to the DNA used as a 'blueprint' for terrestrial life. The sugar ribose is a critical component of RNA.

"The sugar in DNA (2-deoxyribose) was not detected in any of the meteorites analyzed in this study," said Danny Glavin (NASA Goddard), who coauthored the study. "This is important since there could have been a delivery bias of extraterrestrial ribose to the early Earth which is consistent with the hypothesis that RNA evolved first."

Of course, this is just two meteorites. But this discovery provides additional evidence that life could have been 'seeded' by chemicals from space.

Joke of the Week

Please don't call astronomers geeks if you see them using two keyboards at once. That's just stereotyping.