TASC Talk - Exoplanets and how to find them

By Professor Andrew Norton from the Open University

Probably for as long as we have existed, Man has asked questions about his place in the Universe, The meaning of existence? Is there a God? And are there others like us out there?

The first 3 questions are firmly in the realms of philosophy, metaphysics and theology however the last question , "are there others like us out there?" may be getting closer to being answered. Over the past few years there have been projects such as the Search for Extra-Terrestrial Life or SETI, the Kepler mission and others which have been searching for clues for the existence of ET and the worlds that he/she/it may inhabit.

In 1961 Dr Frank Drake came up with an equation, the "Drake Equation", which tried to quantify the chances of intelligent life existing elsewhere in the galaxy. We are now able to fill in some of the blanks within the first half of this equation, the second half still only contains best guesses. But someday this may change. The hunt for exoplanets, these are planets orbiting other suns other than our own, has in recent years seen many new developments which are beginning to bear fruit. From the development of new telescopes to some novel technology such as the "Giant Starshade" which NASA is currently working on, the hunt for exoplanets is accelerating.

Our speaker for July was Professor Andrew Norton from the Open University, who is one of those in the forefront of this search. He told us all about the quest for these worlds and what is involved in the hunt for them. "Exoplanets and how to find them" was a fascinating and enlightening talk and discussion on where we are today with our research and where we hope to be in the not too distant future in this quest. He outlined the four main methods used to find exoplanets and how they are bringing us closer to finding Earth 2!

Method one will only work with extremely large Jupiter size exoplanets which are orbiting suns at very large distances allowing the exoplanets to be seen and photographed without the glare from the sun obscuring the image.

The second method uses the fact that when an exoplanet passes between its sun and us, the distant suns light diminishes ever so slightly. Our current day, earth bound, and orbital telescopes have found many exoplanets this way. However this only works when the exoplanet and its sun lie on the same plane as the earths.

Another method utilises the Doppler affect. An exoplanet or a number of exoplanets orbiting a sun cause the sun to wobble slightly, as the centre of gravity is displaced from the centre of the sun to somewhere nearer its surface. This wobble shows itself as a blue or red shift of the spectral lines produced by the sun as it approaches then recedes from us. This wobble can also be analysed to not only tell us that the sun has a planet or planets orbiting it, but by using special computer algorithms, the number of planets can be worked out, their individual masses and much more as well.

Lastly Gravitational Lensing effects can be used to infer the existence of exoplanets hidden behind their sun or suns. In fact we seem to inhabit a bit of an unusual solar system as most planetary systems seem to have more than one sun at their centre. A little like Tatooine in Star Wars.

Marius Stuart – 22/07/15