Transcript of 'The Diamond planet' by Matthew Bailes (2012)
Video available from: http://commons.swinburne.edu.au

Matthew Bailes

Hi I'm Professor Matthew Bailes and I'd like to tell you about a fascinating new system my colleagues and I discovered using the Parkes radio telescope.

The Parkes telescope is in New South Wales, Australia, and it is a prolific discoverer of special stars astronomer's call pulsars.

In November 2008 we started a survey of the southern sky looking for pulsars. In fact it was the largest scale survey of its type ever conducted.

Pulsars are neutron stars. They weigh about a half a million times of the earth but they are only 20 kilometres across.

The rotation of their beam of light makes them appear to pulse once per rotation period. And they spin up to an amazing 700 times every second.

The radio waves from the pulsar travel across the galaxy and are focussed by the telescope in what we call the Parkes Multibeam Receiver.

We amplify the minute voltages induced by the pulsar in the receiver and digitise them 800 million times every second.

In 2009, a millisecond pulsar was discovered on our supercomputers amongst some 200,000 gigabytes of data.

Our colleagues at the Jodrell Bank Observatory performed follow up observations of the pulsar and soon realised that the arrival times of the pulsars were systematically modulated.

Our research showed that this was due to the gravitational pull of a small companion planet orbiting the pulsar in a binary system.

The modulation of the radio pulsars told us several things about the planet. Firstly, it orbits the pulsar every 2 hours and 10 minutes and the distance between the two objects is only about 600,000 kilometres. This means the whole system would fit inside our sun.

Secondly, the companion must be around 60,000 kilometres across or about five times the Earth's diameter.

The planet is so close to the pulsar that if it were any bigger, it would be ripped apart by the pulsar's gravity.

Although it is smaller in size, the planet has slightly more mass than Jupiter.

The high density of the planet, similar to that of platinum, provides a clue as to its origin.

The rapid spin of the pulsar, more than ten thousand times per minute, tells us that the system once possessed a massive accretion disc.

The accretion disc was formed when the pulsar stripped matter from its companions star, leaving behind the planet we see today.

But what is the planet made of? Our calculations have shown the planet must be comprised of a crystalline form of carbon.

That is, we have discovered the first ever diamond planet.

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