



## CASE STUDY

### Collaboration on gravitational wave astronomy

The detection of gravitational waves is one of the biggest scientific achievements of modern physics. The September 2015 discovery of these waves will allow scientists to expand our knowledge of the universe and everything in it.

But what are gravitational waves and how do we measure them?

Gravitational waves are ripples in space-time caused by the movement of heavy objects, such as planets, stars, and black-holes, in space. The heavier the object the larger the ripples produced. If a heavy object moves very fast, for example, when a black-hole orbits another black-hole, the ripples will be large enough to be detected by an instrument on earth called a Laser Interferometer Gravitational-wave Observatory or LIGO.

**A LIGO is the most sensitive optical instrument ever made.** It detects gravitational waves by measuring movements as small as 10 millionths of the width of an atom. Their extreme sensitivity is essential when trying to detect the effects of gravitational waves. The technology and materials used in the LIGO are some of the most advanced in the world and they don't come cheap.

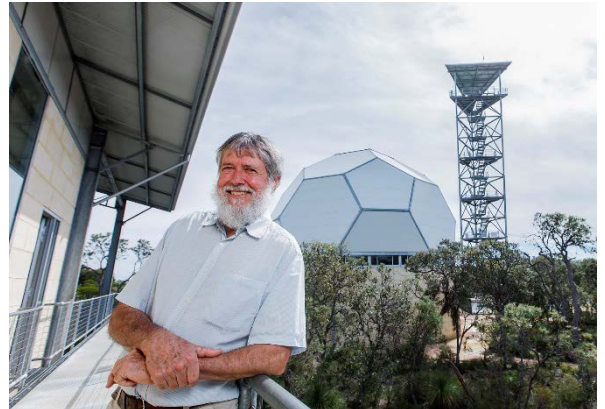


Image: David Blair at the Gravity Discovery Centre, Gingin WA. Courtesy University of Western Australia

### Australia-India Strategic Research Fund

The detection of gravitational waves was a multinational effort only made possible by the dedicated collaboration of international partners. Two of those partners were Professor David Blair from the University of Western Australia, and Professor Bala Iyer from the Raman Research Institute in Bangalore in India. The Australian team's expertise in advanced interferometers complemented the Indian team's strengths in data analytics, orbital dynamics and precision instruments. The Australia-India Strategic Research Fund provided the support to bring their complementary expertise together.

The project successfully raised interest and awareness of gravitational wave studies in our region and helped establish the groundwork for India to succeed in its bid to build a LIGO in India. It also showcased Australia's research capability in this field and sparked interest in the construction of an Australian LIGO.

**Australian Team Leader:**  
Professor David Blair  
University of Western Australia

**Indian Team Leader:**  
Professor Bala Iyer  
Raman Research Institute

Multi-national collaboration was vital to the discovery of gravitational waves. Australia-India Strategic Research Fund support has helped to enable that international collaboration and will continue to contribute to further discoveries in this field.

### **Find out more**

For more information on the Australia-India Strategic Research Fund, visit [www.science.gov.au/aisrf](http://www.science.gov.au/aisrf).