

**Report of February Meeting
Royal Society
Southern Highlands Branch**

**Speaker: Professor Brian P. Schmidt
ARC Laureate Fellow
Distinguished Professor
The Australian National University
Mt Stromlo Observatory
The Research School of Astronomy and
Astrophysics
Weston Creek, ACT 2611 Australia**

Topic: The Life History of the Universe.

Professor Brian Schmidt was welcomed by an audience of 85 when he arrived to address the February meeting of the Southern Highlands branch at 6.30pm on February 18th in the Drama Theatre, Frensham School, Mittagong.

Brian Schmidt set the scene for the astronomical distances he would be discussing in the lecture by using as a ruler the speed of light, 300 000 km per sec. At this speed, light travels 7.5 times around the earth each second. He described the **Big Bang** as having occurred approximately 14 billion years ago, an estimate he himself had made in his thesis, and which was later confirmed by newer and more sophisticated experiments.

It was thought for many years that the universe would ultimately end in the **Big Crunch**, or the **Gnab Gib**, in Brian Schmidt's words, as gravity pulled back all matter created by the **Big Bang**. However, Brian Schmidt was led to the conclusion from his scientific observations that the universe would become infinitely large due to the factor that he terms "dark energy".

Schmidt's team found that the expanding universe was in fact speeding up as it expanded, rather than slowing down due to gravitational forces. As early as 1916, Vesto Sipher, using the Doppler shift, found that nearby galaxies were moving away from us and that the universe was expanding. The Schmidt team postulated that their finding that the expansion was accelerating was due to some unknown factor pushing the universe further out, in complete contradiction of the traditional view that gravity would slow down the

expansion. The Schmidt team described “dark energy” as the factor responsible for the accelerating expansion. This was an extraordinary discovery, and one that went on to win the prestigious Gruber Prize for Cosmology for Brian Schmidt.

The experimental data of the Schmidt team was largely based on observations of supernovae which are exploding stars typically five billion times brighter than our sun. The team used the largest telescopes in the world. In Australia, the telescopes used were the Anglo-Australian telescope, the ANU 2.3m telescope and also the Great Melbourne Telescope that was located at Mount Stromlo but which burnt down in 2003. Overseas telescopes included the Hubble Space Telescope, the Gemini Telescopes and the KEK telescopes. Brian Schmidt is looking forward to using the Giant Magellan Telescope for which the Australian Government has announced \$88M support. This telescope will use seven 8.4m mirrors combined to create the equivalent of a 24m telescope.

One obvious conclusion which can be drawn from the little understood dark energy, and its effect on accelerating the expansion of the universe, is that galaxies that are in the universe today will all move further and further away from us at an ever increasing rate. The more the universe expands, the faster will be the expansion, so that at some point in time, it follows that the light from these galaxies will no longer be able to reach us. Over the next billions of years as the process goes on, most of the universe will become completely invisible to us because it will be too far for the light to get back to us.

The ultimate outcome is that dark energy will continue to accelerate the Cosmos. The growth of space created by the expansion will occur more quickly than even light can travel. We will live in an empty universe except for our own “super galaxy”. The universe will, at an ever increasing rate, expand and fade away.

At the end of the lecture, Brian Schmidt dealt with as many questions as time allowed. Anne Wood gave the vote of thanks, and the audience showed with warm acclamation how much they had enjoyed this stimulating and exciting lecture.

Anne Wood