



BOK PRIZE WINNER

University of Sydney astronomy student Barnaby Norris has won the coveted Bok Prize for the Best Honours Thesis in astronomy across all Australian universities.



The Bok Prize is awarded annually by the Astronomical Society of Australia (ASA) to recognise outstanding research in astronomy by an Honours student at an Australian university.

The citation notes that Barnaby's outstanding Honours research: "A study of AGB circumstellar dust shells using optical polarimetric interferometry" won in the face of a particularly strong 2011 field.

The judges said that while nominations received for the 2011 Bok Prize were of an excellent standard they were highly impressed by Barnaby's thesis stating, "You were a clear and deserving winner."

Barnaby, a PhD student in the School of Physics, said he was excited to have won the Bok Prize, "This came as a great surprise; given all the amazing work done by Australian astronomers in this field, I feel really honoured to be selected!"

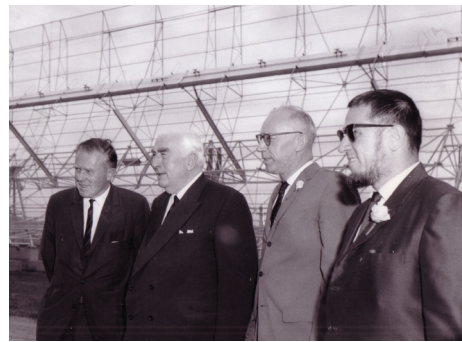
Much of the matter that forms new stars and planets, and even our own bodies, is produced in the last gasps of dying giant stars. Barnaby's thesis helps answer the long-standing mystery of how these dying stars eject their matter into the galaxy.

The Bok Prize was established to honour Dr Bart Jan Bok, the Director of Mount Stromlo Observatory from 1957 to 1966. Dr Bok energetically promoted the undergraduate and graduate study of astronomy in Australia. The prize consists of the Bok Medal, \$500 and ASA membership for a year. Barnaby will present a paper on his Honours research at the Annual Scientific Meeting of the Astronomical Society of Australia, where the prize will be presented.

Many congratulations to Barnaby!

VALE BERNIE

Emeritus Prof. Harry Messel AC CBE pays tribute to Professor Bernard Mills AC FRS



(L to R) Prof. Bernie Mills, Sir Robert Menzies, USA Gov. Rep. & Prof. Harry Messel at the Mills Cross opening

Professor Bernard (Bernie) Mills AC, FRS, was the fabled academic's academic. His sad passing brings to an end the beginning, for he was the last surviving member of the incredible group - Professors Bennett, Butler, Blatt, George, Schafroth, Hanbury Brown, Watson Munro, McCusker and Mills, who during the late 1950s and early 1960s, helped put the School of Physics in the University of Sydney among the top research teams of the world.

His joining the School's team was not easy, for 50 years ago strong research groups appearing at any Australian university, other than the newly founded ANU, or the government's main research arm, CSIRO, were far from being welcomed. This seems quite incredible today, with close ties and collaboration happily being the order of the day. But it sure was not so all those years ago! Bernie Mills was already famous and known throughout the astronomical world by the early 1960s.

He was the inventor of the then amazing Mills Cross - radio astronomy antenna with two crossed arms able to receive radio waves from the deep universe. By 1965 the Mills Cross with two arms, each 1.6km in length was completed at Molongolo, outside of Canberra and there it is still to this day, in the amended version, now carrying out important studies relating to the SKA, the giant square kilometer array, the world's largest radio astronomical facility, hopefully to be constructed in Western Australia.

In the mid 1950s I decided that if the School of Physics was to make an international mark in research, then we should choose fields in which Australia's geographical position gave it a natural advantage. *(continued. on page 2)*

ISS2011 LAUNCHING SOON!

The Professor Harry Messel International Science School (ISS) - *Light & Matter* will once more take place within the School of Physics and the University of Sydney from 3-16 July. The ISS2011 is a free science education program for outstanding Year 11 and 12 science students from Australia, China, India, Japan, Malaysia, New Zealand, Singapore, Thailand, the UK and the USA. The scholars have a jam-packed two weeks of science lectures, challenges and activities. Sir John Pendry, the renowned invisibility research pioneer and Professor Allan Clark, a particle physicist who works on the Large Hadron Collider are two of the key lecturers at the ISS.

The ISS encourages these talented students to pursue careers in science, engineering and technology and is funded by the Science Foundation for Physics. Currently we are seeking donations for this important free science education program through our ISS2011 appeal. If you would like to assist or would like to learn more about the Foundation and/or the ISS please visit: www.physics.usyd.edu.au/foundation/

On Wednesday 13 July from 6-8pm in the Great Hall, The University of Sydney the ISS2011 Gala Reception will be held. Dr Paul Willis, former presenter ABC TV's *Catalyst* program and now the Director, Royal Institution of Australia is our special guest MC. Concert pianist, Ambre Hammond, will perform a special piece at the Reception. Printed and e-invitations will be sent out in mid-June to all our alumni and friends. We hope to see you there! For more information email Alison Muir : alison.muir@sydney.edu.au

VALE BERNIE...

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At the time, we had the Southern Hemisphere to ourselves and thus it was that the fields of astronomy and cosmic rays were chosen, along with theoretical physics and electronic computing for support.

The funding of the School's research was a major obstacle and so the Science Foundation for Physics was founded. For years it, and various USA Federal bodies, provided the basic funding for the School of Physics.

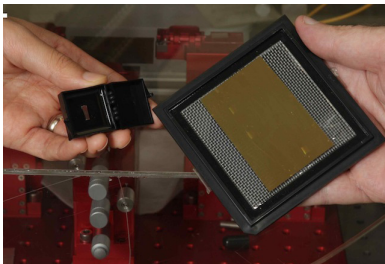
A grant of \$1million US in 1964 from the US National Science Foundation enabled the giant Mills Cross to be built and opened in 1965 by the Australian PM Sir Robert Menzies.

Under Professor Mills the research work on the Cross went from strength to strength and by the mid 1970s over 300 pulsars had been discovered, over two thirds of those found at the time. A book could be written on the prolific research emanating from the Mills team.

His students provided much of the effort at the giant 1000-foot Arecibo Radio Astronomy dish in Puerto Rico via Cornell-Sydney University Astronomy Centre. Bernie was the mentor of many well-known researchers including Professors Dick Hunstead, David Jauncey, John Sutton, Don Campbell, Richard Schilizzi, Peter Shaver and Anne Green - the list goes on and on.

A quiet but wonderful leader he has now embarked on the long last journey; long may he continue to surf the radio waves of the galaxies in the universe.

CUDOS 'MARK II' RESEARCH FIRST!



Groundbreaking research in quantum light sources led by CUDOS researchers will result in information speeds many times faster and data that is almost impossible to hack. The breakthrough, which uses silicon photonic crystals to slow down light, is a collaboration between CUDOS nodes at the School of Physics and Macquarie University, along with colleagues at the University of Bristol and the University of St Andrews (UK), and the Ecole Centrale de Lyon in France. CUDOS researchers have generated individual pairs of photons in the smallest device ever by slowing light down using silicon photonic crystals.

At 100 microns long (approx. the thickness of a human hair) CUDOS's quantum photon device, see image above, is 100 times smaller than the one-centimetre devices used by other groups. Sydney's Dr Chunle Xiong, a co-author and Project Leader of the CUDOS Quantum Integrated Photonics project, says the device's nano-scale means that hundreds of these photon devices can be potentially incorporated into a single chip. This is a key step to building practical quantum technologies that will make communications much more secure and computations many times faster. "We are able to do this by slowing light down through the use of silicon photonic crystals, which means the ultrashort device behaves as a much longer device, so that the photons are generated in only 100 microns," explains Dr Xiong. Macquarie's Assoc. Prof. Michael Steel, co-author and CUDOS Chief Investigator, said: "Current systems use classical light to carry information, which hackers can easily tap into and use to their advantage. But you cannot copy the information encoded in quantum states without being noticed by the system. Single photon devices will ensure communication and information systems are secure from hackers, guaranteeing peace of mind for the users."

This pioneering technology will ensure the next generation of information systems is secure and faster, says Professor Ben Eggleton, Director of ARC Centre of Excellence CUDOS and co-author of the paper. The experiment was outlined in a groundbreaking paper presented at CLEO, a prestigious international conference in the USA for the world's leading researchers in laser and quantum electronics in early May.