

TALL POPPY CAMPAIGN

Investing in Australia's Future

Young Tall Poppy Profile: Prof. Bryan Gaensler

Name: Bryan Gaensler

Title (ie. Dr, Assoc Prof, etc): Professor

Research Field: Astronomy & Astrophysics

More Specifically: Radio astronomy

In other words: Bryan studies the static and crackle of the radio waves produced by stars and galaxies to study magnetic fields in interstellar and intergalactic space.

Abbreviated Qualifications: B.Sc. (Hon I), PhD

Current position: Federation Fellow and Professor of Physics

University/Institution: The University of Sydney

What do you do? (in 100 easy-to-understand words or less)

A remarkable discovery made by 20th century astronomers was that the Universe is magnetic. However, we don't understand what creates astrophysical magnets, or how they have maintained their strength over billions of years. Bryan is using powerful radio telescopes to measure an effect called "Faraday rotation", in which background light is changed when it passes through a magnetised gas cloud. By measuring the Faraday rotation of thousands of distant galaxies, Bryan aims to detect magnetic fields throughout the cosmos, to reveal what these magnets look like, and to determine what role they have played in the evolving Universe.

Why is this research important? How is it relevant to society at large?

Bryan's research involves asking incredibly difficult questions about faint galaxies billions of light years away. Answering these questions requires construction of new equipment and development of new technology that will have wide applicability in other areas (for example, WiFi is based on technology developed by Australian radio astronomers). More generally, cosmic magnetism has played a critical role in the process which began with the first stars and galaxies and which has ultimately led to the existence of life on Earth.

What's difficult about it?

Modern astronomy involves dealing with vast amounts of data. The vast majority of this data is just fluff and static – we are searching for a microscopically weak signal that we need to tease out of our measurements in very delicate ways. So making new discoveries involves a lot of hard thinking about what approach to use, and using sophisticated computer algorithms to process the data.

Why are you passionate about it?

We live on a small planet orbiting an ordinary star in a typical galaxy, which is only one of many trillions of galaxies in the Universe. Astronomy makes one realise how insignificant we are on our speck of dust. But how privileged we are, that we tiny dust motes in an unimportant part of Universe can understand so much of how the cosmos works and our place in it. The Universe is an amazing place, with many bizarre and wonderful objects in it. I find it continually humbling and inspiring to realise that we are very much a part of this, and that I have been able to contribute to our understanding of it.

Why share your research with high school students?

By getting students into science, by teaching them how to ask questions and how to work out the answers, and to get them interested in how the world around us works, we sow the seeds for the next generation of scientists, and thus ensure Australia's future as an advanced, prosperous and developed nation. And beyond recruiting new scientists, it is clear that the students of today will be our politicians, business leaders and journalists of tomorrow. Convince them now that science is a good thing, and we will reap the benefits in the decades to come.

Why study sciences?

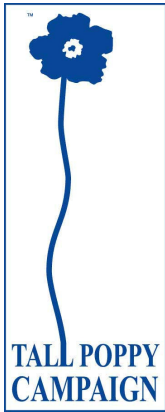
Studying science isn't about memorising the Periodic Table or being able to recite Newton's Laws. Science is a way of looking at the world: a set of rules for gathering evidence, for weighing alternatives, and for making the best inferences given the data available. Studying science provides students with an understanding not just of how the world works, but on how we know what we know.

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The Tall Poppy is a metaphor for excellence and endeavour and symbolises Australia's pride in its outstanding achievers – in all fields.

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**Is it what you've always wanted to do?**

I have wanted to be an astronomer since I was three years old – there was never anything else I wanted to do. Knowing that I'm actually getting to do this great, amazing stuff for a living is incredibly fulfilling.

What else are you into? (ie. What are your hobbies and interests when you're not researching)?

Rugby league, cricket, alternative music, baseball, squash, American football, science-fiction, musical theatre, constitutional law.

Public profile (Please list the science promotion activities you have taken part in – incl. University Open Day activities, community programs, talks etc and media articles featuring you/your research):

Bryan has a long-standing record as a passionate science advocate. He gave the 2001 Australia Day Address to the nation, presented a keynote address on Australian innovation at Australia Week 2007 in New York City, and has delivered invited lectures to the Garvan Institute, the Science Teachers' Association of Victoria and the School of the Air. He also has given over 100 science lectures to schools and to the general public. In 2008, Bryan was selected as a delegate to the "Australia 2020" summit in Canberra, where he argued for the importance of basic research. Bryan has written 21 popular articles and opinion pieces on science, including work published in *The Sydney Morning Herald*, *The Age*, *The Australian*, *The Bulletin*, *Black & White* and *The Sydney Magazine*. He has also advocated the need to support Australian science on both TV (Sunrise, The Panel, The Today Show) and radio (Dr. Karl, Margaret Throsby). Reports on Bryan's discoveries have appeared in all the major international media, including *The New York Times*, CNN, BBC, *Le Monde*, *New Scientist*, *The Jerusalem Post*, CBS Evening News, *The Washington Post* and *The Times of London*. Bryan's work has also been the subject of feature articles in *The Age*, *Sky & Telescope* and *The Weekend Australian Magazine*.

Your achievements - How did you get where you are today?

Your HSC subjects: 4 unit Maths, 4 unit Science, 3 unit Latin, 3 unit English

Degrees:

Bachelor of Science (1st class honours and university medal), The University of Sydney, 1995
Doctor of Philosophy (majoring in Physics), The University of Sydney, 1999

Some of your previous position/s:

1998-2001: Hubble Fellow, Massachusetts Institute of Technology, USA
2001-2002: Clay Fellow, Smithsonian Institution, USA
2002-2006: Assistant Professor of Astronomy, Harvard University, USA
2006: Associate Professor of Astronomy, Harvard University, USA

Current position:

(since 2006): Australian Research Council Federation Fellow & Professor of Physics, The University of Sydney

Relevant awards and prizes you have received as part of your studies/research/work:

1994: Deas-Thomson Scholarship in Physics, The University of Sydney
1995: University Medal for Physics, The University of Sydney
1998: NASA Hubble Postdoctoral Fellow
1999: Young Australian of the Year
2003: NASA Long Term Space Astrophysics Award
2001: National Australia Day address
2005: Alfred P. Sloan Research Fellow
2005: Harley Wood Lecturer, Astronomical Society of Australia
2006: Newton Lacy Pierce Prize in Astronomy, American Astronomical Society
2007: Keynote speaker, Australia Week 2007, New York
2008: Delegate, Australia 2020 Summit, Canberra

Summary of published works:

Bryan has published more than 150 scientific articles, including lead-author papers in the world's two most prestigious journals, *Nature* and *Science*. His publications have received over 3600 citations. He has also published more than 100 conference proceedings, three book chapters and has edited the proceedings of two scientific conferences.

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