Life of Bryan

The passion for astronomy began early for Young Australian of the Year Bryan Gaensler and, writes **Graeme Leech**, it's led him to the edge of the universe

IF it seems that Young Australian of the Year Bryan Gaensler has packed a lot into his 25 years, it's because he started early. He was three years old when his parents gave him a book on astronomy to go with those on dinosaurs and aeroplanes. A precocious and voracious reader, he was immediately hooked. He says astronomy found him, rather than the other way around. "My parents were throwing books at me to shut me up. The book on astronomy just leapt out at me."

His father Frank has no recollection of the book that Gaensler still treasures, but he remembers young Bryan's sponge-like absorption of information. "He had a lot of books at that age. He also got a telescope when he was five or six and I remember he said we've got to get away from the city lights that were spoiling his view of the night sky," Gaensler snr recalls.

That's how promising careers are sometimes launched: a parent buys a book for a child and within two decades he has left his mark on the University of Sydney — Australia's oldest, perhaps most venerable university — had his PhD approved without the slightest amendment, and has won a rare NASA Hubble Fellowship to any US university he chooses.

"I could have unrolled a map of the United States and picked my favourite uni," Gaensler says.

He chose the Massachusetts Institute of Technology in Boston where he is studying neutron stars, the remnant cores of stars that have shone for billions of years until they decayed and contracted so that their colossal masses became packed into spheres perhaps a mere 10km in diameter. In theory, a teaspoonful of matter from a neutron star would weigh many millions of tonnes. It would mean that a star originally the size of our sun, nearly 1.4 million km in diameter, would fit into an area easily encompassed by Sydney or Melbourne's urban boundaries.

So great is the gravitational attraction of these weird stars that if they become black holes, as some of them do, they can curve the so-called space-time continuum in on itself so that nothing — not even light — can escape.

"No one is ever going to be able to say, 'look there's a black hole'. We can smell it, we can hear it, we can feel it, we just can't see it," Gaensler explains.

"Three or four years ago, people speaking about black holes would always be careful to preface their talk with 'Of course the existence of black holes hasn't been proven'. Now, every serious astronomer would accept that black holes are real. The evidence is completely overwhelming."

Ascendant: Bryan Gaensler with his father Frank at the presentation of his award, right; at the Powerhouse Museum's Sydney observatory, opposite page

Main picture: Paul Burston

"Some black holes, as well as neutron stars, give themselves away by emitting X-rays — a newish branch of research for astronomers. The reason I chose MIT was because there are a lot of very good people there working on neutron stars and, in my opinion, the future of studying neutron stars is in X-ray astronomy."

These stars, some of which are also known as pulsars, are so bizarre that astronomers have taken to describing them as "extreme" objects. They possess extraordinary properties. As pulsars, they have been detected spinning hundreds of times *per second*, travelling through the galaxy at 900,000km/h (fast enough to be flung out of the galaxy's immense gravitational pull). Neutron stars and their extremely intense magnetic fields are pushing the edges of known astrophysics.

Although MIT has the latest X-ray detection satellites to play with, it is in Australia where much of the leading research into pulsars and neutron stars is taking place. One of Gaensler's PhD supervisors, Richard Manchester of CSIRO's radiotelescope at Parkes, NSW, is co-leading the search for pulsars in the southern sky. They have found more than 1000.

"Bryan showed that the structure of gas around old supernova remnants influences the shape of the remnant and he also showed that in very young supernova remnants, the material that comes off the star is very important in determining the shape of the remnant," Manchester says.

This original work was published in a series of excellent — Manchester's word — papers. "He's certainly the best student I've ever had."

For Gaensler, studying neutron stars is a natural progression from his childhood fascination. "When I was about eight or 10, someone told me you could actually be an astronomer, that you could do this for a living. So I abandoned wanting to be a fireman."

Astronomy is more than a career for Gaensler. It gives him perspective; it satisfies his yearning for inquiry; and it shows him that the work of God is to be seen in the poetry and majesty of science.

"I'm quite convinced that everything up there has to have been made by somebody," he says. "What always gets me is the more detail you go into, the more patterns and amazingly beautiful and clever things you can see.

"A lot of people say, 'oh, you're a scientist, doesn't that conflict with religious beliefs?'. I was pretty uninterested in those issues until science showed me how clever God was.

"It's the cleverness of science and nature, rather than any spiritual angle, that made me convinced there is a creator. If you gave me a giant computer and as much pen and paper and as much time as I want, I could never write down one equation that worked — let alone hundreds of equations which all come together and somehow make atoms work and make air and sunlight and people. The more you understand it, the more you come to appreciate just how clever it all is."

The universe reminds Gaensler that we are all, like the stars, part of a cycle. From dust to dust, in fact.

"The atoms and quarks and molecules that make a star shine are the same things that make us live and breathe, that make a violin sound beautiful, that make flowers smell nice," he says. "Every atom in our bodies was once part of a big cloud of gas floating out in space. And that's a humbling thought if nothing else."

Winning the annual Young Australian of the Year award (previous winners include athlete Nova Peris-Kneebone, businesswoman Poppy King and community worker Tan Le) is obviously a mark of high achievement but winners must have qualities beyond academic, sporting or cultural excellence. So, when the head of physics at Sydney University, Richard Collins, was asked to make a nomination, he immediately thought of Gaensler, "the sort of guy who could win the Nobel Prize" but who was also a young man with "no airs about himself" and who contributed to the life of the university.

Gaensler's PhD co-supervisor Anne Green also says he is an exceptional person — smart, well organised, possessed of an extremely good grasp of astrophysics, and a good ambassador for Australia and the university who would "shake MIT up".

"He's very quick, we always knew that," Green says. "We found it very difficult to satisfy his thirst for knowledge."

Collins adds that Gaensler was one of the outstanding students he had encountered since becoming professor in 1980: "Bryan was one of those who stood out in class, asking penetrating questions and who clearly interacted with his peers."

But in 1997, while in the middle of writing his postgraduate thesis, his world turned upside-down. A temporary bridge leading to the opening ceremony for the Maccabiah Games in Israel collapsed throwing his father Frank — a member of Australia's tenpin bowling team — into the Yarkon River. Frank's partner Yetty Bennett was among four Australian competitors who died.

"The first report we got in Sydney was that my dad had died. He was right on the edge. When I got there he was in a really bad way," Gaensler recalls. "It was a long time before life returned to anything like what one would call normal."

The accident brought Gaensler's values into sharper focus. "I was throwing all my time into my PhD thesis. It made me realise that while astronomy is great fun and exciting and answering profound questions, there are other people in the world it's worth spending time with.

"It taught me to ease back a bit and not throw my whole life into astronomy, that there were more important things on a personal level. It told me to value my friends and family."

He was 22 and just beginning to take his father for granted. "My dad and I have done a lot of things together that we wouldn't have done if it wasn't for that accident. I'm very grateful for that. A lot of positives have come out of it."

Frank Gaensler, who wants to have another tilt at the Maccabiah Games in 2001 despite the awful memories and continuing problems with a badly crushed ankle, knows he is blessed with an exceptional son — and that's not for a moment forgetting his younger son Adam, a talented musician.

"[Bryan's] made my problems insignificant," Frank says. "He's made all my pain and suffering seem insignificant." ❑

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