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# Education on Three Continents

Procheta Mallik

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commentary

## Education on Three Continents

—Procheta Mallik (Edited by Brigid C. Casellini)

People often suggest that the life one ends up leading is based on the choices one makes. While this is true at the fundamental level, I feel that one's opportunities also play a major role in determining one's future; and then, of course, there's luck! All these factors have played equally important parts in determining where I am today. This commentary will illustrate what a major role the University of New Hampshire played as it took me from my hometown of Bangalore, India, an ever-growing city of 7 million people, but with scant opportunities for undergraduate education in science; to UNH and then to the Scottish city of Glasgow, where I undertook my PhD research and am presently a post-doctoral fellow.

Eight years ago, I chose to leave all that was familiar to me in my native country of India to pursue my college education in America. I was very apprehensive at the beginning, but my family's encouragement fuelled my resolve and I did what thousands of high school graduates do each year: sit for the SATs and apply to several American universities. After receiving a handful of rejection and acceptance letters from different universities, once again I had to make a choice. Luckily, this was one of the easier choices I've had to make. Everything about UNH, even without visiting the campus in person, attracted me to the University. I had been offered the Presidential Scholarship that would pay half my tuition; I would get to experience cold and snowy New England winters (yes, I love the cold, rain and snow and am not a big fan of the Sun—unless I'm studying it!); and I would be studying at a rural university in the beautiful New England wilderness, far from the madding crowds of a city. It was an opportunity I could not afford to miss. Throughout my four years of college, I felt the academic pressure to perform well so that I could continue to be eligible for various scholarships and awards, but the heaviest burden was the emotional one of leaving my family, home and country behind—all of which I love dearly—to pursue my education.



*Procheta Mallik '05*

My time at UNH was like a dream come true. Everything that I needed to happen happened. From my second year to my last, I was able to fund my undergraduate career almost fully. I got all the scholarships and jobs that I needed, and I thoroughly enjoyed my academic and extra-curricular life. But during this time, the single best opportunity I received came in the form of an International Research Opportunities Program (IROP) grant, which allowed me to broaden my horizons even further.

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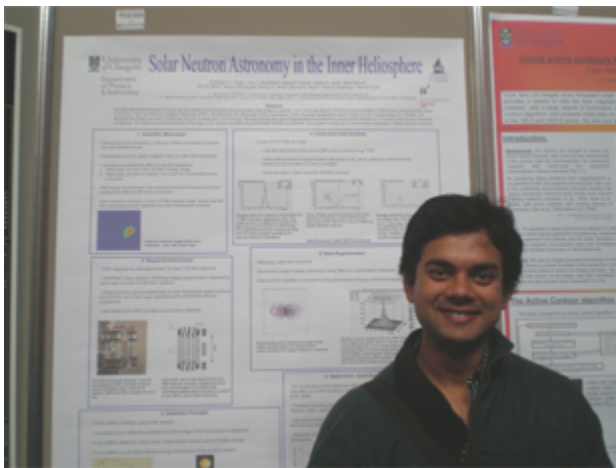
I joined UNH knowing I wanted to pursue physics as my major. My academic adviser and mentor was Professor Jim Ryan from the Space Science Center. In my sophomore year I began working in Prof. Ryan's lab, designing and testing a new-age instrument called FNIT that was being built to detect neutrons emitted by the Sun during solar flares. Solar flares are extremely energetic events that occur on the Sun resulting in the emission of highly energetic radiation as well as particles such as neutrons. Hence, studying flares and understanding how they are produced involve measuring the radiation and particles emitted by the Sun during these events.

I knew Prof. Ryan had several international collaborators, so when I discussed the possibility of IROP with him during my junior year, it excited both of us in equal measure. During the 1990s Prof. Ryan had collaborated with the University of Glasgow (GU) during the instrument development of the hugely successful Compton Telescope on board the Compton Gamma Ray Observatory (CGRO). UNH was one of the principal institutes of CGRO, a NASA space mission in orbit from 1991 to 2000 with several high energy gamma-ray detectors on board, and Prof. Ryan was a co-Principal Investigator (PI). By 2003, when I was a junior, it was time to reignite the UNH-GU connection as Prof. Ryan was now the PI of a project to develop the Fast Neutron Imaging Telescope (FNIT). FNIT too would be a candidate instrument for a future space mission.

Having worked with a prototype of the instrument at Prof. Ryan's lab at UNH, it was now my turn to come to Glasgow and study ways in which to use both lab data (produced by FNIT at UNH) and simulated data (produced by our colleagues at the University of Bern in Switzerland) to better understand how FNIT works and how to optimise its design. The Astronomy & Astrophysics Group at GU is world famous for its mathematical and theoretical expertise in dealing with inversion of data produced by space instruments. These data inversion techniques are the only way to analyse data produced by instruments and convert them to useful information like images and spectra. To get hands-on experience in learning about and using these inversion techniques, I came to Glasgow for my IROP project.

My nine-week IROP project in Glasgow was truly memorable. I fell in love with the place, the people and the work I was doing. All the Scots were so friendly that I blended in as though I was a student at Glasgow itself. To be involved first-hand in cutting edge scientific and technological development is something not many of us have the privilege of experiencing. But here I was, with my work and scientific interpretation along with my supervisors, developing a telescope that would detect solar neutrons in space. Because neutrons are unstable particles with a 15-minute lifetime, after which time they spontaneously decay, to detect a sizeable number of solar neutrons one has to go very close to the Sun. So although FNIT was already actively generating data in the lab for us to analyse, the prospect that it would one day be put into orbit some five times closer to the Sun to detect these heavy yet enigmatic subatomic particles we call neutrons, was a source of great inspiration and excitement. My international mentor, Dr. Alec MacKinnon (who more recently was one of my PhD supervisors), was excellent company and counsel both at work and outside the lab. I was also given the opportunity to attend an international solar physics conference on the Isle of Skye paid for by GU, and that was one of the highlights of my IROP experience.

My GU and UNH experiences were so different, yet they complemented each other ideally. UNH is nestled in the gorgeous seacoast region of New Hampshire, far away from the hustle and bustle I had grown up with. It was the ideal place to pursue an undergraduate education without any urban distractions and with the company of 12,000 fellow students. GU, on the other hand, is a 550-year old university (Britain's fourth oldest) in the middle of one of Europe's most dynamic and vibrant cities with stunning Victorian architecture and a pub around every corner. Nothing about UNH was negative; the same could be said about GU. As a student, living and studying in both places was the perfect blend.



*The author presenting his research at a professional conference in Belfast, Northern Ireland, 2008.*

As you can imagine, two months was scarcely enough to experience all that Europe, Britain, Scotland, Glasgow and GU had to offer. After graduating from UNH in 2005, I took a year off at home in India, travelled around and did what prospective graduate students do: sit for the GREs and apply to graduate schools. My experiences at UNH, especially my research in Prof. Ryan's lab and through my IROP experience, inspired me to pursue graduate school in astronomy. The faculty at GU continued to show an interest in my future by asking me to consider doing my PhD at GU. So, apart from applying to a handful of American universities, I also applied to Glasgow. Much like in the case of my acceptance as an undergraduate to UNH, once I got my acceptance letter, the decision was simple: I wanted to go back to Glasgow. I was given a prestigious Dorothy Hodgkin's Scholarship by a UK Research Council and GU, that would support my three years of postgraduate study.

During my time as a PhD student in Glasgow, I have been able to fulfil so many of my desires: weekly concerts of the Scottish Chamber Orchestra or Royal Scottish National Orchestra at just £5 for students; regular forays into the Highlands or weekends away at London; hosting friends and family from all over the world and showing them a slice of my life in Scotland; working under the supervision of the Astronomer Royal for Scotland, Professor John Brown; and of course, continuing my scientific collaboration with Prof. Ryan, which has allowed me to make two field trips to UNH in the last three years (and experience NH summers for the first time!). The three years of my PhD came to an end in October 2009, and I submitted my 200–page thesis and passed my PhD viva two months later.

All these experiences have been such a privilege born mainly out of luck, but also out of the opportunities that were presented to me and the choices I made. And the perfect UNH–GU blend would be complete if one was able to spend the summers in Scotland and the winters in New England, but that is just being greedy! For now I am content to pursue my post–doctoral research at GU and to thank UNH and IROP for truly giving me the opportunity and experience of a lifetime. I hope future generations of students at UNH take advantage of the opportunities for undergraduate research and cherish them as I have.

*I would like to thank Prof. Jim Ryan, my mentor and adviser while I was at UNH and an overseas adviser while I did my PhD in Glasgow, who also gave me the opportunity to interact with his colleagues abroad through IROP; Dr. Alec MacKinnon for being my IROP overseas mentor and one of my PhD supervisors along with Prof. John Brown; Dr. Georgeann Murphy for her invaluable support through the whole IROP process and beyond; Dr. Donna Brown and everyone else at the Hamel Center for making IROP possible for me; the UNH Honors Program; the Office of International Students and Scholars, without whose support in addition to the Presidential Scholarship I would never have been able to study at UNH; Residential Life for giving me two fascinating years of the RA experience; all my friends and colleagues at UNH and Glasgow; the UK Particle Physics and Astronomy Research Council (now the Science and Technology Facilities Council) for funding my PhD; and of course my family without whose vision, foresight and support none of this would have been possible.*

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### **Author Bio**

*Alumnus author **Procheta C.V. Mallik**, a native of Bangalore, India, graduated from the University of New Hampshire in 2005 with a B.S. in physics (Honors Program). In 2004 he was awarded a grant from the International Research Opportunities Program (IROP) to study the Fast Neutron Imaging Telescope (FNIT) at the University of Glasgow in Scotland. While completing his IROP research, Procheta learned that science isn't always as clear-cut as one may expect it to be. "A lot of questions remain unanswered and research is an eternal search for a more accurate explanation of the truth," he says. "This is even more pertinent for astronomy where we will forever be limited by the distance to the objects we study." After graduating from UNH he returned to the University of Glasgow, where he earned a Ph.D. in astronomy in February 2010. "The IROP project was instrumental in my choosing a Ph.D. project as well as in shaping my academic career," says Procheta. Though he is uncertain of his long-term career plans, he has "an enormous passion for nature and the environment" and sees himself possibly working for renewable energy technology research, sustainable development and wildlife conservation. Procheta currently is a post-doctoral research assistant at the University of Glasgow.*

### **Mentor Bio**

*A member of the Department of Physics at the University of New Hampshire for thirty-two years, Professor **James M. Ryan** specializes in astrophysics and solar physics. A mentor to numerous undergraduates over the years, he says he has "had the privilege of mentoring and training many excellent students. It is satisfying to see them prosper and grow based on the experience they gain here at UNH." Dr. Ryan explains that the instrument Procheta worked on was one of the first prototypes designed to explore solar neutrons. "I knew full well that Procheta would succeed on this, benefiting him greatly but also benefiting his advisor in Glasgow and me. We are still building on the work that he did," says Ryan. "The final incarnation of [FNIT] is now being proposed for the Solar Probe Plus mission to be launched in 2018."*