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Return to the mainstream: The torturous track

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In 1957, when I was thirteen, I had just entered Std. IX in a co-educational school in New Delhi. The Delhi Board required a student to branch off into either the sciences or the humanities at that early stage. The science group was sought after because of better job prospects. Owing to the shortage of lab space, entry was restricted to students with marks above a cut-off.

I was among them, and chose the science group. The principal addressed our class, and urged the girls who had opted for science to give up their seats in favour of boys with lower marks. The girls, he said, were depriving those boys of good jobs in the future – because the only jobs that the girls would ever take up after getting married would be in the ‘ladle-office’ (the kitchen). I don’t remember my reaction to this sarcasm, but the principal was merely echoing the mindset of the times. He presumably felt that he was giving the girls good advice, with their future happiness in mind. But I had always enjoyed and done well in the science-related subjects I’d been taught till then, and was quite sure I wanted to continue studying science.

This was my rather tremulous entry into science, with a probable future in the ladle office looming large. I did well in the

Board Exam in 1960 and got admission to Physics Honours at Delhi University, a course reputed to be challenging and among the very best in India. Very few women even applied for it. Well-meaning family friends whose sons had taken this course opined that, as a woman, I would feel extremely isolated and hence find the course even tougher. But as I had always found physics to be interesting and enjoyable, I joined the course, and went on to complete my M. Sc. in 1965. By this time, many of the girls among my classmates in school and college were married. My parents might have liked to see me similarly settled, but when I wanted to do my PhD in the US, they gave me unstinting support and encouragement. They were exceptionally broad-minded and liberal, and I am eternally grateful to them.

I worked for my Ph.D. at Brandeis University, and in 1970 defended my thesis (one of the very earliest studies of quantum crystals) on the effects of helium four impurities in solid helium three. My adviser, Prof. Robert Lange, gave me constant encouragement and full freedom to try out my ideas and also offered to arrange for a postdoctoral fellowship in the US. When I told him of my decision to return to India, his prescient words were: "As a woman physicist, you will need to produce twice as much work as a man to get half the recognition. The prejudice and chauvinism of many men (no matter where they are from) towards women physicists is appalling." I shall not describe the struggles during the decade that followed in trying to stay active in theoretical physics by publishing papers from home, while coping with raising children and the formidable difficulties encountered in finding employment commensurate with one's qualifications, without breaking up the family.

Let me 'fast forward' to the 1980s. I am sincerely grateful to Prof. P. M. Mathews, for enabling me to work at the Department of Theoretical Physics, University of Madras, from early 1982 to early 1987 as a Research Associate (CSIR and UGC), and to Prof. E. C. G. Sudarshan, (then) Director, IMSc, for his support which led to my permanent position there in early 1987.

Around 1980, I had started studying nonlinear phenomena and solitons, and this became my major research interest in

the succeeding years. At IMSc, I worked on the applications of solitons and the inverse scattering method to classical and quantum magnetic chains, superfluid helium, geometric phases associated with moving curves, etc. I got Fulbright grants for visits to Los Alamos National Lab, became a Senior Associate at ICTP, Trieste, and held CNRS visiting professorships in France. I have had the opportunity to collaborate with physicists from China, England, France, Poland, and the USA, in addition to colleagues, students and postdocs in India. From the 1990s, I have been studying the deep connections between nonlinearity and the differential geometry of curves and surfaces. I received the Tamil Nadu Scientists Award in the Physical Sciences (1999) for this work, and INSA's Professor Darshan Ranganathan Memorial Lecture Award (2005) for original and pioneering contributions in nonlinear dynamics.

In spite of setbacks and grave disappointments, my life as a researcher in physics has been extremely enjoyable. After my formal retirement in 2004, I am actively continuing my research at IMSc as a CSIR Emeritus Scientist. Over the years, things have changed considerably, and for the better. The RA schemes of the CSIR, UGC, etc. serve a vital purpose. The title of this article has been inspired by a recently-introduced scheme of the DST, offering fellowships to women scientists with a career break who desire to return to mainstream science.

To all those talented young women who love physics but are hesitating to take it up, I have this to say. People like you are needed to bring in new ideas to solve the many fascinating and challenging problems in diverse areas of physics today. Motivation is as important as innate intelligence to succeed in creative research. When the going gets tough (as it surely will), hold your head high, work hard, and do not give up! Take inspiration from the heroic lives of Sophie Germain, Ada Lovelace, Sonya Kovalevskaya, Marie Curie, Lise Meitner, Emmy Noether, Cecilia Payne-Gaposchkin and Maria Goeppert-Meyer.

The joy that one derives out of original research, however small one's contribution may be, cannot be explained in words. It has to be experienced.