HER STORY

IIT BOMBAY GEN ZERO WOMEN

Inspiring stories of pioneering women achievers.

CURATED BY RASHMI BANSAL

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Receiving the 'Ordre National du Merite in IISc faculty hall Foyer in Novermber 2021.

ALL THAT MATTERS

In science, you also need to be lucky to hit upon an interesting problem.

PADMA SHRI DR. ROHINI GODBOLE

MSC. IIT BOMBAY, 1974. (SILVER MEDALLIST)

HONORARY PROFESSOR, CENTER FOR HIGH ENERGY PHYSICS, INDIAN INSTITUTE OF SCIENCE BANGALORE.

Early Life

I grew up in a middle class household in Pune. My father studied politics and economics upto B.A. but had to discontinue his studies, despite winning a scholarship, due to financial constraints. My mother studied upto 2nd year of college but despite being first in Sanskrit and winning a scholarship at BHU, she got married due to social constraints.

My mother finished her B.A. and M.A. after we four sisters were born. As you can see, education was a very important aspect of life in my family and we were all encouraged to excel.

The seeds of my life in science were sown when I decided to appear for the 'State Scholarship Examination' which used to be conducted in 7th grade. The examination had a paper in 'General Science'. Since my venerable and highly reputed girls' school taught only 'Home Science' till the 7th grade, it was not a surprise that no student from my school had gotten this scholarship.

My teachers agreed to teach me outside the school hours and on holidays. My math teacher (Mrs. Sowani) asked me to come to her house as her husband (Bhau Sowani) was known to be an excellent science teacher. Not only did he teach me things that I needed to know to succeed in the examination but he opened my eyes to the world of science in general.

He pointed me to a popular science magazine called 'Srishti Dnyan' in Marathi, nurtured my interest in mathematics and encouraged me to participate in science essay competitions. Incidentally, I did get the scholarship (only 10 were given). I was mighty proud as the amount was just 1 INR less than my school fee.

After my B.Sc. from Pune University, I applied to IIT Bombay and IIT Kanpur. IIT Kanpur was rated a little higher for physics at that time, so I wanted to go there. But my parents said, look, if you fall ill, we can come to Bombay in 4 hours. If you are in Kanpur, it will take us 19 hours. So that's why I opted for IIT Bombay.

I must add that I was able to join IIT only because of the National Science Talent Scholarship, of Rs 200 or 250 per month (a princely sum at the time!). My father would not have been able to spend that much money on me, in spite of the fact that he was a high ranking government officer, I had three siblings and salaries back then were modest indeed!

Life at IIT Bombay

Coming from a Marathi medium college in Pune I was worried about fitting in. How will I speak in English? This was a far bigger insecurity in me than being a woman in STEM. There was also a marked difference between the way a subject was taught in IIT vs the university. Quizzes, home assignments, open book exams - these were all new to me.

The B.Tech. girls in the hostel (called LH: the Ladies Hostel) were also not much help as they continuously wondered whether our 'fundaas' were 'gol'! I dare say this impression changed reasonably quickly. We had our share of fun as

Prof. S.H. Patil around his 65th birthday, surrounded by generations of his students !

With two dear friends from IITB LH, taken as a memory while leaving the institute for new abodes

"IIT BOMBAY, TO ME IS: A PLACE WHERE MY JOURNEY INTO THE UNKNOWN BEGAN.

well. Lakeside walks, Sahyadri treks, listening to songs in the night in Mood Indigo, seeing Hindi and English films in the Convo...

Intellectually, the atmosphere was great and so were some of the teachers. Professor S. H. Patil in particular has been a big influence. If I'm a theoretical physicist today, it is because of the 'home paper' that I did with him which made me see the beauty in the subject. I had to work quite hard to reach up to his standards.

We were a class of 17, just 3 girls, but we never ever faced any hostility or any bad treatment from our classmates. To be frank, gender was simply never an issue which affected our interactions. I have checked with my classmates (both male and female) and they agree with me. So this is not a fanciful reconstruction.

Most of the teachers did not discriminate either, at least not in any obvious way. Though when I told Prof Patil that I want to go abroad to do a PhD he said, "Why do you want to go abroad?" Whereas to my junior he said, "Why stay in India, you should go outside". But when I said I have made up my mind, he wrote me a very good recommendation letter.

Professional Journey

I came back to India after my PhD in theoretical particle physics from Stonybrook University. If you look at it professionally, it was not a great decision. I should have done a postdoctoral fellowship after my PhD as I had offers in Europe and USA. But at that time I just wanted to be home. So I joined the Tata Institute of Fundamental Research as a post doctoral fellow (PDF).

I published three papers in a journal called Physical Review Letters in the early days I spent in TIFR (it was like getting a paper in Nature, for physics). I was in my late 20s at the time. Post-TIFR, I worked briefly at the Royal Institute of Science (Mumbai) and then joined the University of Bombay as a lecturer.

Even after joining the University of Bombay, I was very lucky to continue my collaborations with some senior collaborators at TIFR with whom wavelengths matched and also with the younger postdoctoral fellows and PhD students. There was no official MOU between the University of Bombay and TIFR but a true collaboration doesn't need these formal things.


Receiving D.Sc. at IITK in December 2021


In the office at IISc, when I moved there in 1995


Stop by a lakeside while driving to the Olympic Games in Montreal in 1976

RAPID FIRE

If I could, I would: Remove discrimination and ensure that the world is a fair place.
I love: Nature.
I'm passionate about: Particle physics, and women in science
I wish: That we all get to live the life we want. And not what somebody else chooses for us.
The stuff I don't sweat: Politics.
The most important thing to remember when I step into work: Today is a new day.

New Horizons in Physics

With the discovery of the Higgs Boson in 2012, physicists have a complete picture of all the fundamental particles that we know of. But at the same time, there is 'dark matter' for which we have no explanation. The other puzzle is the dominance of matter over anti-matter. So clearly, there is physics beyond the world of standard model, which is known as 'BSM' physics.

One such model which I had worked on is called Supersymmetry. But the same Large Hadron Collider experiments which gave us the evidence for the Higgs have not given any evidence for the particles predicted in these models. So now we are also looking at cosmic microwave background radiation in the universe or light/ neutrinos/ gravitational waves coming from the stars and galaxies for answers.

To make progress on this path we need experts in machine learning to handle the big data, theorists who explore the mysteries of gravitation, experimentalists who probe the universe and cosmos through multiwavelength astronomy. This is the decade of astroparticle physics.

Work-Life Balance

Apart from research, during the early days in Mumbai I used to teach women in a slum to read and write and I was also part of a group against nuclear weapons. I was not particularly interested in 'settling down'. Luckily, my parents really supported me. Then I got the chance to go to Germany for a post-doctoral position. There, I met a German particle physicist Dr Marek Nowakowski and we got married. For 6-8 years, I was in India while he was in Europe. I would travel to Europe in summer, he came to India at Christmas time. I must say that was perhaps one of the toughest time in my life but also perhaps the most exciting. I had chosen to do this, so I didn't feel the pressure. I did some of my most important work in this period.

I constructed my own support bridges - like-minded friends and people who shared my passion. The only seriously negative part in this whole journey was that we postponed having children. And somehow, we didn't have them. But I have nephews and nieces who I am very close to. And young students give me all the affection and the love I need. Dr Nowakowski and I had a beautiful partnership but at some point, we drifted apart. We are no longer married.

Women in Science

The first international conference on Women in Physics was organized by International Union of Pure and Applied Physics in the year 2001. I was invited to speak about my experience as a woman physicist in India who had achieved some measure of success, and it resonated with the audience.

Women from Ghana, Mauritius, Egypt came to me and said that when Western women talk, we feel that they are from a different culture. But when we listen to you, we feel - 'if she can do it, we can do it too!'.

This made me think that if we can share the stories of more women scientists from India, it can inspire young girls to be future scientists of India.

So with Prof. Ram Ramaswamy I started a project on behalf of the Indian Academy of Sciences and its panel for 'Women in Science' of which I was the founding chair. We approached 200 women scientists and finally, 99 stories were published in a book called 'Lilavati's Daughters'. The title is a tribute to Lilavati, a female mathematician in ancient India, as per folklore.

Since that time I have been working in a lot of fora to increase the participation of women in science and make it more effective.

Advice to Young Women

Follow your dream. Choose a problem that excites you and not just what's in fashion.

Honors and Awards

- Padma Shri (2019).
- Distinguished Alumna of IIT Bombay (2004).
- DSC from the Indian Institute of Technology in Kanpur (2021).
- Ordre National du Mérite by the French government (2021).

Among the few women who have been elected to all the three academies of Science in India and The World Academy of Sciences for physical sciences.

TO BOLDLY GO WHERE NO WOMAN HAD GONE BEFORE...

These are the stories of IITB Gen Zero - the pioneers of the 70s, 80s and 90s - who ventured into the male dominated world of science and technology. Bright and ambitious, they did not ask for, or get any special favours.

Being the 'only girl in class' was not easy. But bonding with each other and finding allies in professors and classmates, these girls not only survived, they thrived. Blossoming into confident young women ready to take on the world.

Each one has been a trailblazer, bringing intellect, acumen and grace to her chosen field. Juggling work and family, me-time and community service, they shine a light on a path where 'all things are possible'.

Read. Reflect. Dream. Do.
If they could, so can you.

THE CURATOR

RASHMI BANSAL is a writer, entrepreneur and motivational speaker. She is the author of 10 bestselling books on entrepreneurship — *Stay Hungry Stay Foolish, Connect the Dots, I Have a Dream, Poor Little Rich Slum, Follow Every Rainbow, Take Me Home, Arise, Awake, God's Own Kitchen, Touch the Sky and Shine Bright* — which have sold more than 12 lakh copies and been translated into 12 languages. She is an advocate for women's participation in the workforce, and a mentor to students and young entrepreneurs. Rashmi is an economics graduate from Sophia College and an MBA from IIM Ahmedabad.

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HER STORY: IIT BOMBAY GEN ZERO WOMEN

PROF. SUBHASIS CHAUDHURI
DIRECTOR, IIT BOMBAY

In the earlier days of IITs, the engineering profession was socially considered to be almost a no-go for women. It is worth pondering what a bold step these first-generation women alumnae of our Institute had taken. Ever since it was set up in 1958, IIT Bombay has enrolled extraordinary women students who have been leading very successful and fulfilling lives after graduating from the Institute. This coffee table book and accompanying podcasts showcasing a few of our women engineers who graduated from IIT Bombay are a labour of love for the Institute. The goal is to highlight and applaud the incredible journeys and accomplishments of women alumni of IIT Bombay. The author(s) conducted in-depth interviews with these women as part of a podcast series and then converted it into a coffee table book titled, "Her Story – IIT Bombay Gen Zero Women".

IIT Bombay has always been at the forefront of the gender equality movement. A book like "Her Story – IIT Bombay Gen Zero Women" is timely and essential. While the world slowly takes strides toward gender equality, there is still a significant divide in many fields, including within STEM in academia. I hope that this book will ignite passion in young minds across the globe, especially young girls, and that they will find their future at IIT Bombay.

The list of thirty women profiled in this book is inspiring. They have broken the glass ceiling and created a path not just for themselves but also paved the way for the next generation of women engineers to come forward. American poet Robert Frost once wrote,

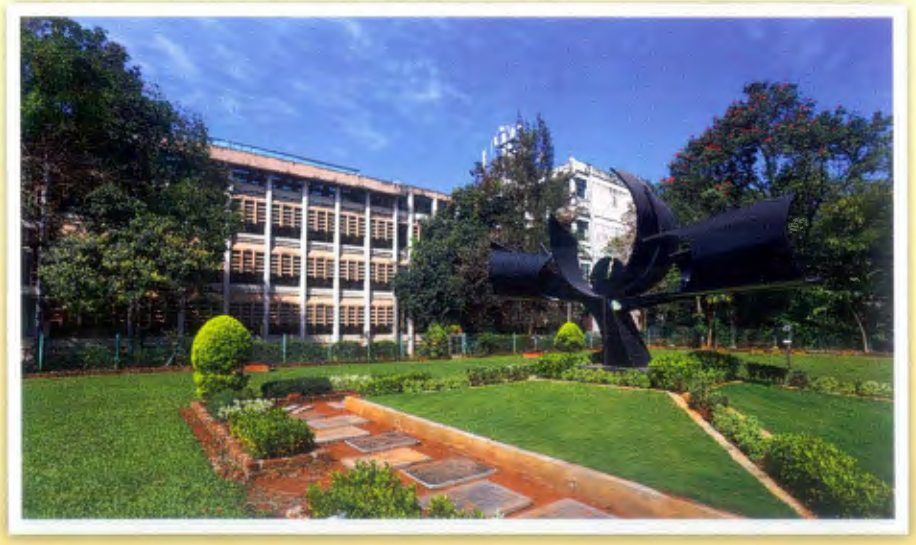
> **"TWO ROADS DIVERGED IN A WOOD, AND I—
> I TOOK THE ONE LESS TRAVELED BY,
> AND THAT HAS MADE ALL THE DIFFERENCE."**

Indeed. The women of "Her Story – IIT Bombay Gen Zero Women" took the tough and difficult roads ahead of them and came out stronger and more successful. And that makes their stories truly inspirational. While each alumna scripted her own story, someone had to take the initiative to stitch all these stories into a coffee table book and that credit goes to one of our very distinguished graduates, Mr. D. C. Agrawal. The Institute is thankful to Mr. Agrawal for the initiative and funding support.

I hope readers will enjoy reading the book.

HER STORY: IIT BOMBAY GEN ZERO WOMEN

It is a matter of immense pride to the Institute that thousands of women have graduated from IIT Bombay since it was set up in 1958. "Her Story - IIT Bombay Gen Zero Women" was conceived to celebrate the achievements of the women who graduated from IIT Bombay within the first forty-odd years of its existence. All of the women profiled here have made stellar contributions to their chosen areas of expertise like research, business, education, technology, public service, and more.



The primary goal of "Her Story - IIT Bombay Gen Zero Women" is to recognize the alumnae of IIT Bombay and make their accomplishments equitable and 'visible' to the larger IIT Bombay alumni community and the rest of the world. They illustrate the journeys taken by these women over the past few decades by having in-depth and one-on-one conversations with each of them. It documents their lives – from the successes and challenges they faced on campus, to their subsequent professional and personal trajectories. It also explores how their educational journeys and networking experiences on campus, especially the personal connections with their hostel batchmates, enriched their lives and made them into the strong and powerful women they are today.

This coffee table book highlights the achievements, experiences, and life lessons learned by these accomplished women and brings their stories to the forefront, where they belong, and makes them 'seen'. We are certain that it will encourage and inspire newer generations of brilliant and diverse minds, especially young women, to make IIT Bombay their first and only choice of college, and blaze the same trails set by the women who came before them.

The Gen Zero initiative, as well as this book "Her Story – IIT Bombay Gen Zero Women" were made possible by a generous grant from Renu and D.C. Agrawal (Class of '69; Mechanical Engineering).

EDITOR'S NOTE

I did not study at IIT Bombay but feel closely connected to it. 7 of the 22 girls I grew up with attended this institution; 5 of them are featured in this book. Our fathers worked at the Tata Institute of Fundamental Research (TIFR) as scientists, mathematicians, astrophysicists.

Was there something special in the air at the TIFR campus? I think so. We never had a clue about what 'girls cannot do'. IIT was simply the norm. Not getting admission made more news than another TIFR kid - boy or girl - embarking on the IIT journey.

I know now that this was highly unusual. That women who joined IITs in the 70s, 80s, 90s were exceptional in so many ways. Being the lone girl in a class of high-achieving nerds would not have been easy. Yet they persisted, they resisted and they thrived.

I am full of awe and admiration for these pioneering women. And that is why I took up this project, as a labor of love. The world needs to hear the stories of IIT Bombay women, and know of their remarkable achievements. Because if they could do it, so can each of you out there.

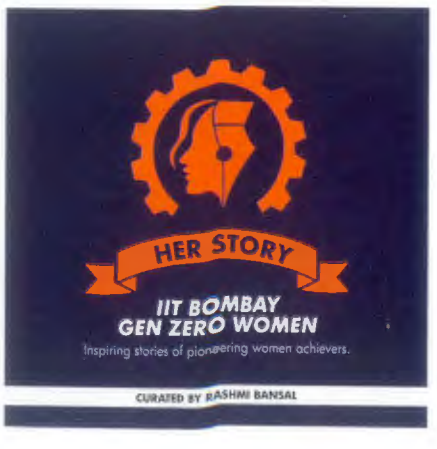
Yes, there is a far higher ratio of girls at IIT now. But it's still not a level playing field. So take inspiration from those who have walked the path before you. Forget about 'patriarchy', about 'discrimination'. Aim for excellence in your chosen field, and be a good human being.

That is what the world can learned from this amazing cohort of women.

I celebrate their grit, their intelligence, their confidence and chutzpah.

IIT Bombay, you were lucky to have them!

Rashmi Bansal
July 2022



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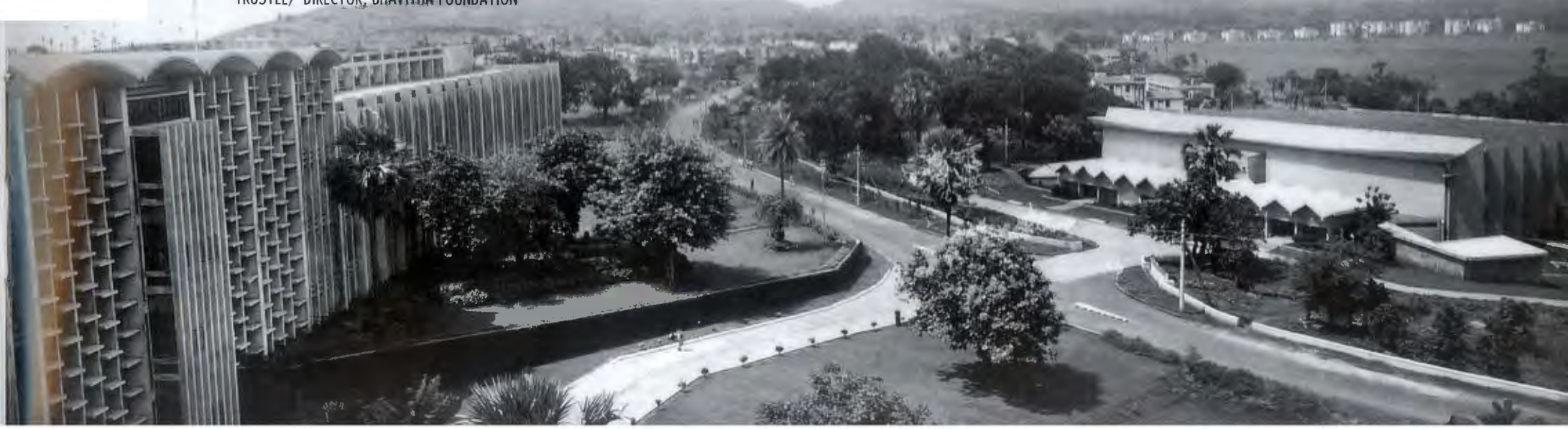

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