

Towards Gender Equality in High Energy Physics

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January 12, 2022



Lepton Photon - 2021



Outline

- ① Problems related to Gender-Parity in Science
- ② Initiatives taken at various levels to reduce the Gender-gap
- ③ Available Opportunities for Girls/Women in India
- ④ Conclusion

Introduction

- There is no dispute that Women are under-represented in Physics or more generally in STEM careers.
- Scientific Intelligence is not linked to a specific gender.
- A metaphor frequently used is the **leaky-pipeline concept** carrying students from Higher-Secondary school through University and subsequently to jobs in STEM.
- This pipeline leaks students at various stages
- One interesting feature of these leaks is that women leak out more than men do.
- The effect of differential leaking removes one gender from the stream and leaves the other to arrive at the end of the pipe-line, i.e., the farther along the pipeline, the fewer women you find.
- This results the gender-imbalance that is observed today, which is a global issue now.

- At the lower level, women representation is more or less even, but up the ladder, they become more scarce.
- Hierarchical Discrimination leading to 'Glass Ceiling effect'.
- DST has initiated the INSPIRE (Innovation in Science Pursuit for Inspired Research) program in 2008, for nurturing and attracting young talents for a career in Science.
- If one looks at the INSPIRE fellowship holders or the Gold-medallists at Master's level $\sim 50\%$ are women.
- What has happened to these talented Women? Why we do not see the same percentage in the higher levels?
- Though the numbers have improved over the past one decade or so, there is still a long way to go before women are equally represented.
- Diversity, Equality and Inclusion is a high priority for each of us as individuals

Some Statistics on Physics Women Faculty Representation

Institutes	Men	Women	% of Women
T.I.F.R. (DHEP)	7	2	22
T.I.F.R (THEP)	20	0	0
CHEP, I.I.Sc	11	2	15
PRL (Theo. Phys.)	7	1	12.5
IOP, BBSR	20	2	9
HRI, Allahabad	16	2	11
IIT Delhi	39	7	15
IIT Bombay	40	8	16
IIT Madras	53	5	8.6
IIT Kanpur	41	4	9
JNU, New Delhi	28	5	15
Delhi Univ.	33	7	17.5
Univ of Hyderabad	28	5	15
Calcutta Univ.	14	3	17.6

Very Few Women Physics Professors in India

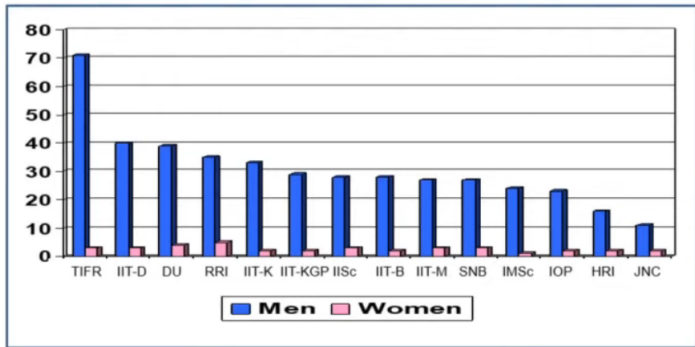


Image Courtesy: S. Narasimhan

Possible Reasons for the under-representation of Women

- The subject of “Women in Science” has attracted a lot of attention from a broad class of researchers who try to understand **why WOMEN leave STEM careers**, some of these are:
- **Implicit or explicit bias inhibits the full participation of Women in Science**
- **Biological differences between men and women**
- **The absence of Female scientists as role models**
- **Family pressure and social obligations, ...**
- **To mitigate the gender-gap, proactive measures are required from all sections of the society e.g. Individual, Institution level, Policy & Decision makers, Govt. sector, ...**
- **It is the responsibility of all of us to contribute whatever possible way that we can.**

Government Initiatives

- Govt. of India has been very proactive in this issue and already introduced several programmes for all levels.
- Recently, in 2020 DST has launched a pilot project “Gender Advancement for Transforming Institutions (GATI)”. It aims to nudge Institutions of Higher Education and Research towards supporting diversity, inclusion of full spectrum of talent for success and progression.
- GATI draws inspiration from the Athena SWAN Gender Equality Charter and accreditation framework operated by Advance HE, UK.
- All the Institutes of national importance, and other autonomous S&T Institutions have been invited to participate.
- The pilot institutions, initially 25, would commit to adopt gender parity principles within their policies, practices, action plans and Institutional culture.

STEM Career opportunities for Girl students

- **Vigyan Jyoti:** programme was launched by DST in 2019 to inspire girl students to pursue HE and career in STEM fields.
- It provides a scholarship, visit to nearby scientific institutions, science camps, lecturers from eminent women scientists, and career counselling.
- **Vigyan Vidushi:** An Advanced Programme in Physics offered by TIFR for women students in first year M.Sc.
- It provides them an exposure to advanced physics topics and research opportunities, and encourage them to take up research in physics as a career option.
- The students get the opportunity to be taught, inspired, and mentored by successful women scientists.

DST supports empowering Women Scientists

- **KIRAN (Knowledge Involvement in Research Advancement through Nurturing)** schemes of DST with the mandate to bring gender parity in S&T through gender mainstreaming.
- Different programs and components of KIRAN deal with various crucial issues (break in career) faced by women scientists in their career path.
- **Women Scientist Schemes:** provide opportunities to women scientists and technologists for pursuing research in basic or applied sciences in frontier areas of science and engineering.
- **SERB POWER Research Grants:** This scheme aims to encourage emerging and eminent women researchers in frontier areas of science and engineering.

Gender in Physics Working Group of IPA

- The Gender in Physics Working Group (GIPWG) was launched in 2017 under IPA with the mandate of evaluating and mitigating the large gender-gap in Physics profession and **coordinating national efforts towards gender parity in Physics.**
- **Objectives: Facilitate deliberation on the issue of gender parity, come up with recommendation from time to time to address the issue, network with IUPAP and corresponding working groups of IPA's International sister-organizations.**
- Organised the first ever Gender in Physics Conference “Pressing for Progress” at University of Hyderabad in Sept. 2019, with ~ 250 participants.
- The outcome known as **“The Hyderabad Charter for Gender Equity in Physics”** a guiding document towards gender equity in physics. The detailed report can be found at:

https://www.tifr.res.in/ipa1970/gipwg/HyderabadCharter_web_12march.pdf

Some of the Recommendations for Institutions from Hyderabad Charter for Gender Equity in Physics

- Work-life balance policies, such as child-care leave and mobility schemes should be gender neutral
- Criteria for hiring should be formulated beforehand, and no hidden norms or criteria should be used
- Status/position/background of life-partner should not be criteria in hiring
- Policies that facilitate spousal hiring, employment in the neighbourhood and/or transfer should be formulated.
- Mentoring mechanisms for young faculty must be made available within institutions
- Action-taken reports and statistics of sexual misconduct enquiries should be filed mandatorily
- Mandatory gender audit of staff at all levels should be published on the organizational webpage

Initiatives towards improving Gender-Parity in HEP

- In the National level High Energy Physics symposium 2020, a special session was dedicated to deliberate the issues related to gender-gap in HEP.
- This has set the precedent for gender diversity discussion at future meetings.
- The gender group in High Energy Physics has been formed in Dec. 2020.
- The group is in the process of organising the Career Guidance Workshop for young women physicists.
- Female role models have had a profound impact on young women's achievement and aspirations, in part because they represent the possibility of overcoming gender barriers to achieve success.
- In this context, A special article in Physics News has been published remembering Dr. Bibha Chowdhuri, the first Woman Particle Physicist in India.

Dr. Bibha Chowdhuri (1913-1991), the Invisible Legend

- She was the first woman particle physicist in India and made significant contribution in the study of cosmic rays and discovery of mesons, using photographic plates.
- After her M.Sc., she worked with D.M. Bose (1938-1942) and published four papers in Nature. **In fact Powell used the same technique to detect pions and muons and won the Nobel prize in Physics**
- She obtained her Ph.D. from University of Manchester, under the supervision of Noble Laureate Prof. Blackett.
- After that she returned back to India and worked in two Research Institutes: TIFR and PRL, but sadly remained practically unknown to the scientific community of India.
- **She came to limelight in 2019, when she was honoured by the International Astronomical Union who named a white yellow dwarf star after her, located 340 light-years from Earth in the Sextans constellation.**

Conclusion

- People of all genders have equal potential to excel and utilization of the talents of all is absolutely essential.
- Time alone will not achieve gender equality and conscious effort is must
- Mitigating the gender gap at all levels of physics practice is a necessary step to achieve equality
- The commitment of institutional leaders is key to make progress.

Thank you for your attention !