

# **The Physics Society**

**St Stephen's College, Delhi**



## **ANNUAL REPORT : 2022-23**

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# 1). FLAGSHIP EVENTS

## 1.1). The 27th Annual Popli Memorial Lecture Series 2023

**Title of the Talk** : Quantum Computer: What is it , and How to build one

**Speaker** : Prof. R. Vijayaraghavan | TIFR, Mumbai

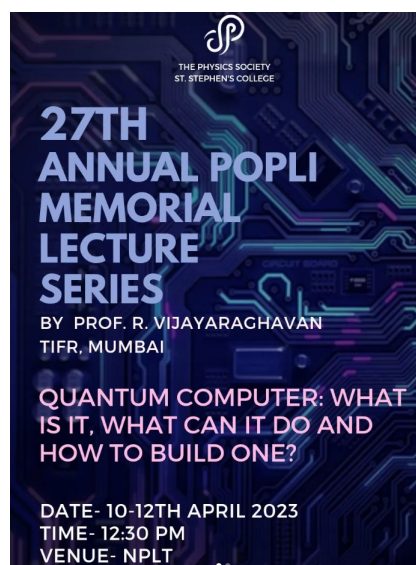
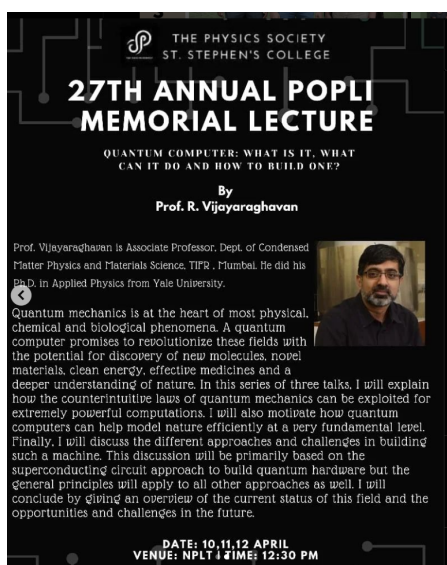
**Date & Time** : 10th- 12th April 2023 | 12.30-2.00 P.M

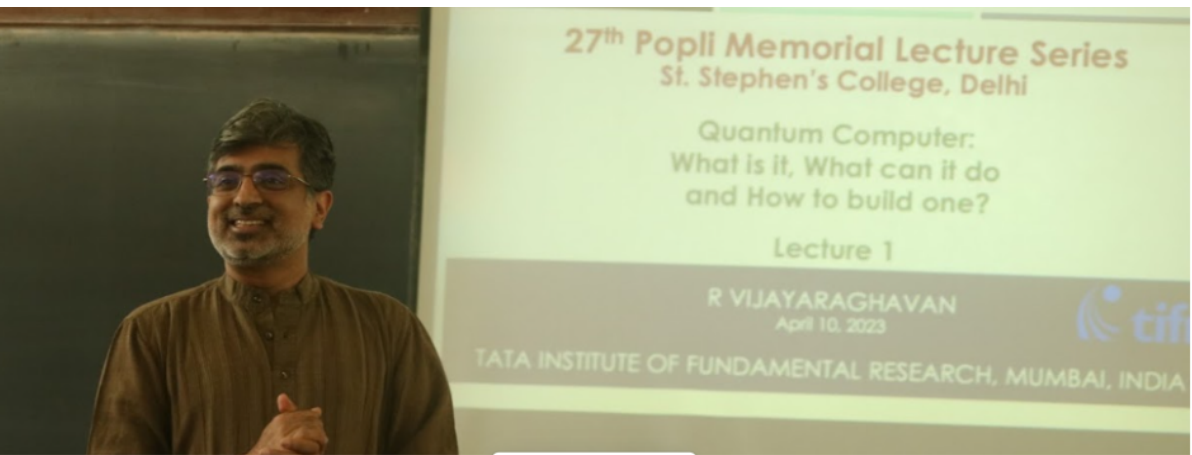
**Mode/Venue** : In Person (Open) / NPLT, Science Block

**Number of Attendees:** 100 (app)

**You Tube URL** : [Click here](#)

**Abstract of the Talk** : Quantum mechanics is at the heart of most physical, chemical and biological phenomena. A quantum computer promises to revolutionize these fields with the potential for discovery of new molecules, novel materials, clean energy, effective medicines and a deeper understanding of nature. In this series of three talks, I will explain how the counterintuitive laws of quantum mechanics can be exploited for extremely powerful computations. I will also motivate how quantum computers can help model nature efficiently at a very fundamental level. Finally, I will discuss the different approaches and challenges in building such a machine. This discussion will be primarily based on the superconducting circuit approach to build quantum hardware but the general principles will apply to all other approaches as well. I will conclude by giving an overview of the current status of this field and the opportunities and challenges in the future.







## 1.2). Annual Meera Memorial Paper Reading Competition

**Participating Teams** : 22

**Abstracts Selected** : 28

**Registrations** : 45

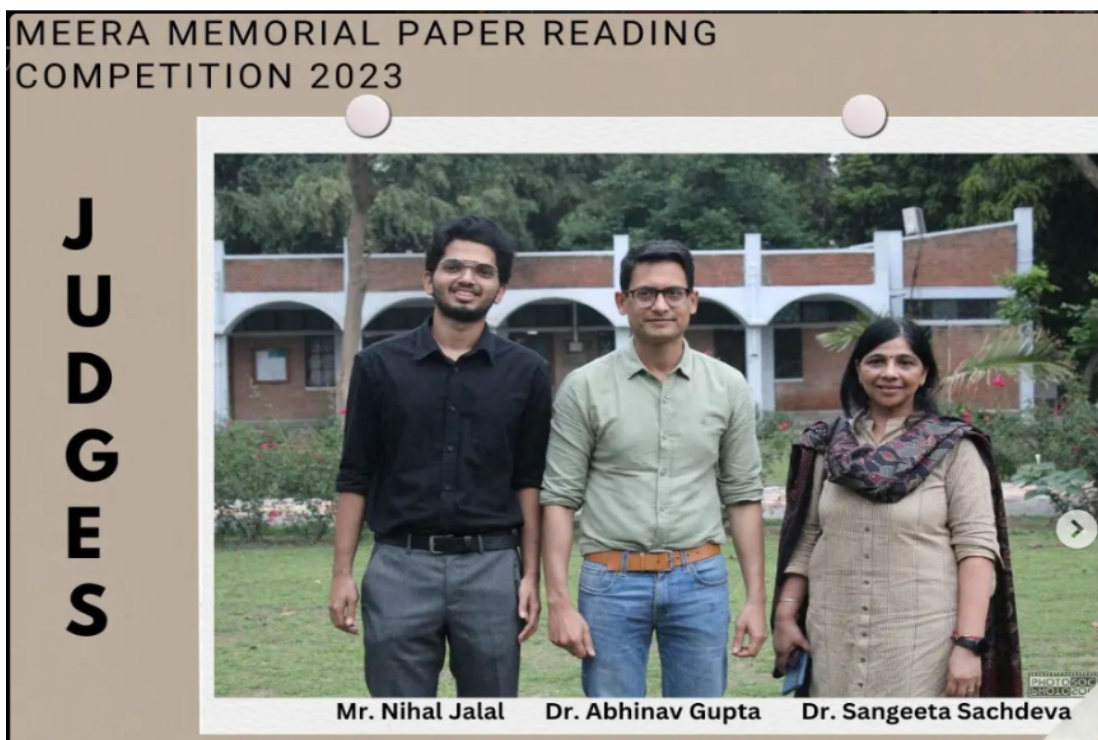
**Date & Time** : 31st May , 1st April , 2023 | 12.30-5.00 P.M

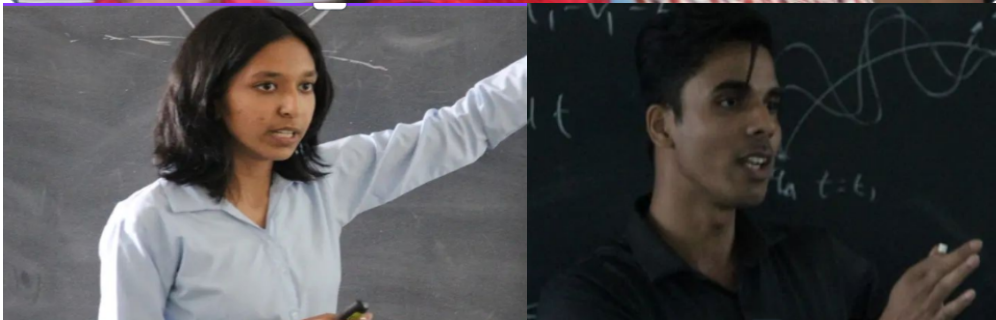
**Mode/Venue** : Offline / NPLT, Science Block

**Judges** : Dr. Abhinav Gupta, Dr Sangeeta Sachdeva and Nihal Jalal

**Keynote Speaker** : Dr. Jacob Cherian

**You Tube URL** : [Click Here](#)





## 1.2). Annual Ranjan Roy Memorial Lecture

**Title of the Talk :** Our wondrous and complex world

**Speaker :** Prof. Ramakrishna Ramaswamy.

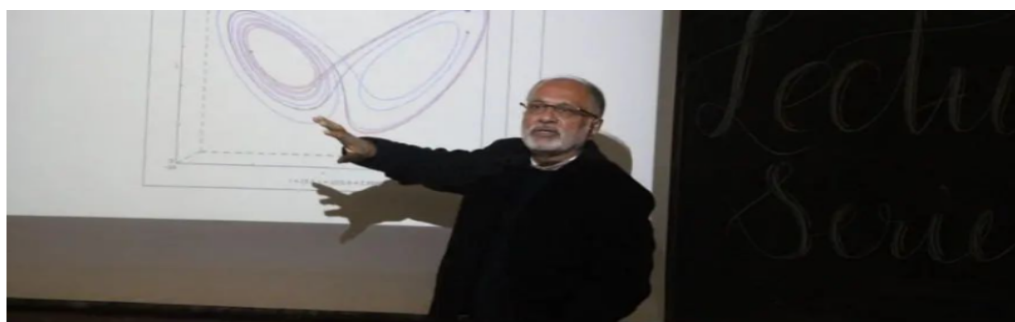
**Date & Time :** 13th January , 2023 | 12.30 P.M

**Mode/Venue :** Offline / OPLT, Science Block

**Number of Attendes:** 80 (app)

**You Tube URL :** [Click Here](#)

**Abstract of the Talk :** In the past few years we have increasingly become aware of the interrelatedness of many phenomena on the “human scale”. Many such phenomena cannot be analyzed through a reductionist approach and need to be understood at a systems level. This has given rise to the area termed complexity science and in this talk, the speaker will discuss this field through select examples.





## 2). FEYNMAN CLUB

The Feynman Club's primary motive is to **illuminate active research** in Physics and it's adjacent fields. We achieve this by organizing a variety of Feynman talks and Journal Reading Group sessions. This year the Feynman club held sessions on a wide variety of topics including **stealth technologies, neural networks, fractal theory** and several others. Overall, the Feynman Club has had a successful year. The club's activities have helped to foster a culture of scientific temper and rational skepticism amongst students and the council members are looking forward to continuing their efforts to promote science and research in the coming year.

S. No	Date	Speaker	Topic	Report
1	23 Sept, 2022	Dr. Bikram Phookan, Ashoka University	An Infinite LC Circuit	<a href="#">Feynman Talk 1</a>
2	14 Oct,2022	Dr. Ratnamala Chatterjee, IIT DELHI	Stealth Technology	<a href="#">Feynman Talk 2</a>
3	28 Oct,2022	Dr. Anirban Mandal Ashoka University	Prospects Of Computer Science At Ashoka	<a href="#">Feynman Talk 3</a>
4	11 Nov,2022	Dr. Sanja Jain University of Delhi	The Origin of Life: Evolution of Prebiotic Cells	<a href="#">Feynman Talk 4</a>
5	3 March,2023	Rashika Gupta	Simulation of Electron Detection Systematic Errors for the UCNA+ Experiment	<a href="#">Feynman Talk 5</a>

### 3). PROBLEM SOLVING CLUB and APPLIED PHYSICS VERTICAL

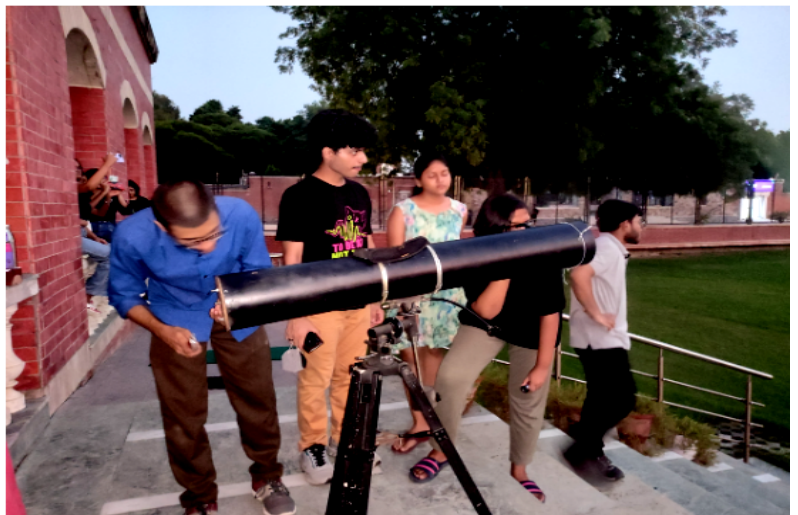
- The Problem Solving Club began its activities by circulating a problem suggestion sheet where students could suggest problems to be included in the problem sets. The problem sets were introduced in a preliminary discussion session and follow up discussion sessions were organized in offline or online mode to keep the discussion active.
- We introduced Problem Set 1 specifically for third years. This problem set involved question from quantum physics as the target audience were third years. Problem set 1 was introduced in a formal offline discussion session and a follow-up discussion session was kept for the continuation of the discussion of the problem set.
- We discussed the hydrogen atom as a two body quantum problem. Solved the Schrodinger equation using analytical techniques and found out the wavefunctions and energy eigenvalues. The discussion sessions provided a great opportunity for discussion of various quantum concepts among the third years.
- The problem sheet also considered a problem on casimir effect. Using the hints given in the question and some preliminary concepts from quantum physics, we arrived at the expression for casimir force. This question also helped in the understanding of quantum properties of free space.
- The second problem set was prepared by second year students. Since the target audience were first and second year physics students the problems were selected accordingly. The problem set was introduced in a formal offline discussion session. A follow-up online discussion session was also conducted to discuss the problem set.
- The second problem set consisted question to model a slinky. It was discussed how a very basic slinky model can be made by considering the slinky as a series of masses attached by springs. The corresponding equations of motion were derived and solved for each mass.
- The problem set also consisted of a balloon problem which involved finding the condition for balancing a helium balloon in air using a thread and then involved studying its motion subject to an electric field and finding conditions for vertical equilibrium by puncturing a small hole.
- Apart from the problem sets the problem solving club also released quiz sets to keep the students engaged. These were posted on the physics society blog. The quiz sets were aimed at students outside the physics department as well and therefore consisted questions that generally didn't involve knowledge of physics but involved considerable brainstorming.



- The **Applied Physics vertical** held sessions on mathematical modelling of neurons, use of wavelet transforms in analysing biophysical data, fractal theory and machine learning with neural networks among others. A final report on a neuron modelling problem was produced and published in the annual journal.

## 4). ASTRONOMY CLUB

- This year, **The Astronomy club** under **Physics society** has conducted sessions under **Sky viewing, Astro- Ed, Stellar dynamics, Radio Astronomy and Data Analysis** verticals in order to propel the interests of the participants in the field of **Astrophysics**.
- With the beginning of a regular academic year in offline mode, The club started with **offline sky viewing** sessions of **earth's moon** and **Jupiter-earth's opposition event** in the college sports ground. Followed by this, **Astro-ed** sessions were conducted to introduce the **basics of Observational Astronomy, Celestial Coordinate** systems and **Spherical trigonometry**, mounting of telescopes and hands on session to set the Alt azimuth mount before fixing the telescope.
- Introductory sessions were taken under **Stellar Dynamics and Data Analysis** vertical in order to solve the **n body and other problems in the field of Astrophysics**. Sessions on **Non dimensionalization** to solve the equations of various classical and quantum systems, solving differential equations using symplectic and non symplectic integrator algorithms like RK, leapfrog and verlet, introduction to lagrangian mechanics were conducted as a pre necessity for studying stellar hydrodynamical systems.
- Under the **radio astronomy** sub vertical, a session to **introduce Radio Astronomy and Radio Frequency Interference** was taken which included demonstration on the use of sdr or software defined radio. It was discussed how such devices could be used to perform RFI studies.





## 5). ECHO: ANNUAL JOURNAL AND BLOG

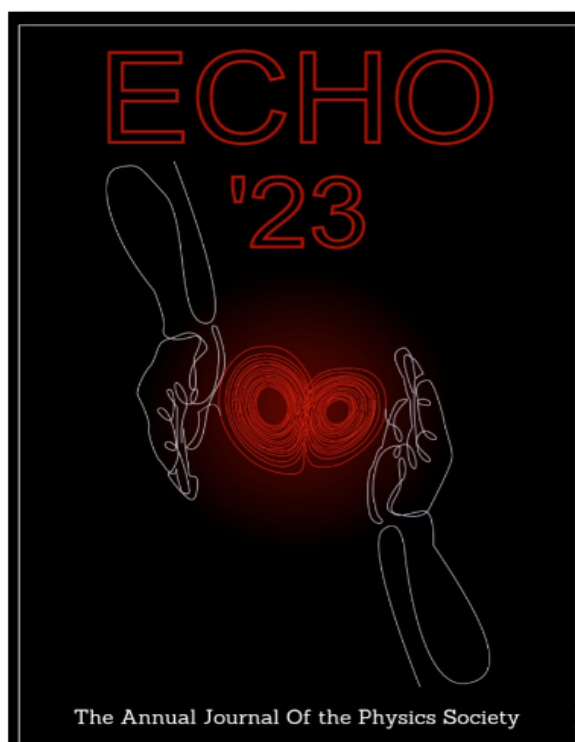
As the academic year full of riveting discussions and stirring talks comes to an end. Collecting each intriguing thought, bringing together every discussion and capturing all the precious moments, the Physics Society is elated to present its Annual Journal Echo 2023.

The primary objective of the journal is to inspire students to pursue their research interests and showcase their findings. This edition highlights the potential of intuition, knowledge, and the occasional lack of knowledge. It is a collection of contributions, ranging from excellently written articles by both students and faculty to captivating artwork.

We extend our appreciation to all the individuals who dedicated their time and permitted us to showcase their incredibly impressive works.

[Link to Echo Journal 2023](#)

[Link to Echo Blog](#)



## **6). INCLUSIVITY , DIVERSITY , EQUITY AND ACCESIBILITY DIVISION**

### **6.1). A Socio-Economic Survey of the Physics Department in St.Stephen's College Delhi**

Motivated by the changing admission procedures across the country, The Physics Society, St. Stephen's College Delhi, spent a couple of months collecting socioeconomic data of the students of the Physics Department in college for admission years of 2020, '21 and '22. The data collected was studied with respect to gender distributions as well as the varied admission conditions for the three batches and several conclusions were drawn most notably the increasing value of the gender ratio(male:female) and impact of admission interview removal in the latest batch. Data related to safety and accessibility in college was also collected and has been reported. The former was notably largely positive.

**Scan the following QR code to access a copy of the report and survey provided, data collected and all the analysis done including some graphs not explicitly included in the report**





## 6.2). First Lecture Under IDEA vertical

**Title of the Talk** : Why should you care about diversity and inclusion in science

**Speaker** : Ankur Paliwal | Science Journalist

**Date & Time** : 16th February , 2023 | 3.00 P.M

**Mode/Venue** : Offline / Seminar Room

**Number of Attendees:** 50 (app)

**You Tube URL** : [Click Here](#)

**Abstract of the Talk** : “Representation of the world, like the world itself, is the work of men; they describe it from their own point of view, which they confuse with the absolute truth”-- Simone de Beauvoir. The Physics Society had its first event under its Diversity, Inclusivity, Equity and Accessibility Initiative. Science, especially the field of physics, has been predominantly \*male-driven\* and \*exclusionary\* to women and other minorities. The complete erasure of the contribution of women in STEM, the inability of the socially weaker sections to pursue pure sciences and go into research are issues of great concern, especially to undergraduates who are pursuing this field. As a Society, we engaged in these discussions and look for ways to slowly work towards the eradication of any structure that enforces these confinements.





## 5). BUDGET REPORT

The report contains fund allotted for each event against their spending.

Events	Fund available (Rs)	Expenses (Rs)	Balance (Rs)
Feynman Lecture Series	18000	1975	16015
Meera Memorial Paper Presentation	7000	6024	976
R K Popli memorial Lecture Series ( includes remuneration, accommodation)	35000	25979	9021
Ranjan Roy memorial Lecture	8000	5485	2515
Annual Journal		4973	
<b>Total expenses</b>		<b>  Rs 44436/-</b>	

# THANK YOU

Report By

The Physics Society , St Stephen's College. (30/04/23)

