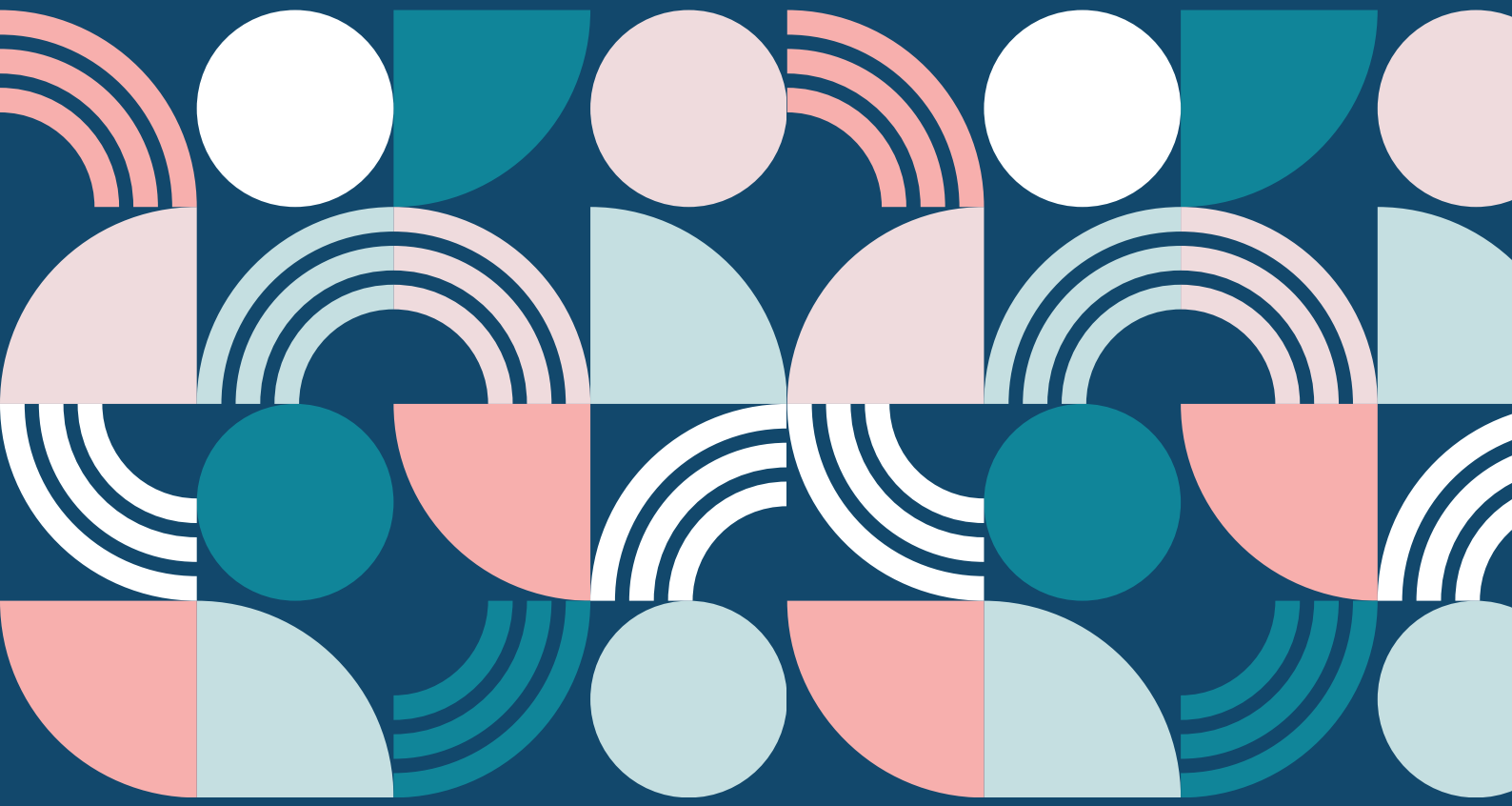
THE QUANTUM WONDER REPORT

2023



ABOUT

RAM FOUNDATION

Raising A Mathematician Foundation is a not-for-profit organization that aims to develop mathematical thinking in students and build a research mentality from a young age. The foundation tries to achieve its objectives by conducting various pure and applied mathematics programs.

THE QUANTUM WONDER

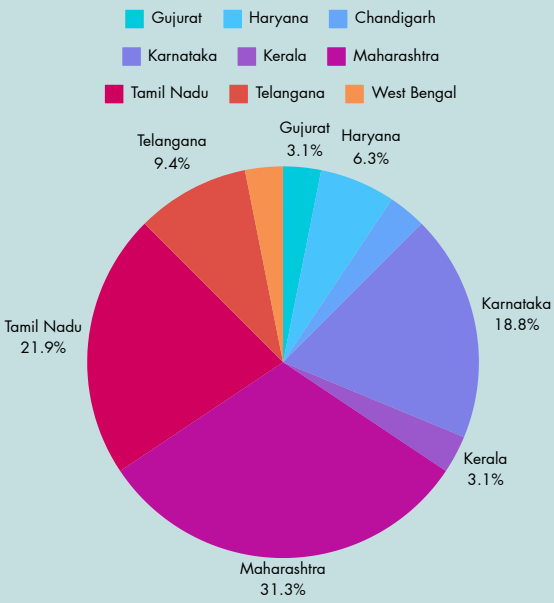
The Quantum Wonder is a biennial workshop by Raising A Mathematician Foundation under the tutelage of Dr. Hariom Jani. The workshop is aimed at kindling the passion for physics in curious minds aged 13-17. It also aims to inculcate a scientific temperament, an inclination towards research, and a greater appreciation for Quantum Mechanics.

PROGRAM SCHEDULE AND PEDAGOGY

In this workshop, students were exposed to the history of quantum physics, it's development and insights into what is happening in the quantum world today. Students were engaged in learning higher order concepts, hands-on experimentation with the online tools available, etc. through a highly interactive and immersive week-long program. One of the ideas of The Quantum Wonder was to break the exam-oriented learning and to encourage students to understand the concepts and to conduct healthy discussions and debates.

STUDENTS

33 students attended the camp. The pie chart below illustrates the distribution of students from different states of the country. We had one student from Indonesia as well.



ABOUT THE FACULTY

DR. HARIOM JANI

Dr. Hariom Jani completed his Ph.D. from National University of Singapore in the Integrative Sciences and Engineering Program. He is a top notch researcher and has several publications in top journals like 'Nature and Science'. He is currently a Marie Curie Post doctoral fellow at Oxford University and his research interfaces the disciplines of materials design, spintronics, topological order, and X-ray Spectro microscopy. He is interested in building cross-disciplinary solutions to research problems (e.g., energy efficiency in devices).

Dr. Jani's accolades include receiving the Young Scientist Award 2023, The Emerging Investigator Prize and Medal 2021, among many other notable recognitions.

TOPICS COVERED

- Introduction of Classical Physics with focus on the division between particles and waves.

- Introduction to the Quantum world, discoveries that form the crux of the quantum world were discussed, including the photoelectric effect, the Crompton experiment, the Heisenberg Uncertainty Principle, and Schrodinger's wave equation.

- Journey in Science - a session by the teaching assistants Kaushik, Tanvi, Shreya and Shreyansh, led by Dr. Hariom Jani, spoke about their research and journey as scientists and budding scientists. The discussion also highlighted good research practices and careers in science.

- Applications of quantum physics in areas like quantum dots, solar power, scanning tunneling microscopy, quantum tunneling composites, and ultrasmall light antennas.

- Discussion on philosophical revolution by quantum physics. The students were posed with a question- 'Does the moon exist if nobody is looking?'. The class was divided into two groups who debated for and against. A very enthusiastic and exciting debate followed between the two groups.

- Discussion on experiments like 'Quantum Erasure' and 'Delayed Choice' to discuss how the observation of wave nature or particle nature of a quantum object is exclusive to each.

- Research paper reading from The Scientific American. Students were split into groups and a mentor was assigned who helped them in paper reading. They presented their understanding of the research papers and presented it on the last day.

TEACHING ASSISTANTS

Kaushik Iyer
PhD student
KTH Royal Institute of technology,
Stockholm, Sweden.

Tanvi Nikhar
PhD Student in Electrical and
Computer Engineering
Michigan State University, USA

VOLUNTEERS

Mokshit Kothari
Pursuing Chartered
Accountancy &
Actuarial Science

Shreyansh Shete
UG fresher,
IISER Bhopal.

Pranathi
2nd Year of B.Tech in AI & ML
Osmania University, Hyderabad

STUDENT FEEDBACK

"I learnt that the quantum world is a very interesting one which is starkly different from our classical world. Everything from the matter waves to the uncertainty principle to the quantum erasure experiments and tunneling have laid my foundation in understanding quantum physics."

"I have learned how to read and understand scientific papers."

"Philosophical insight into physics, Quantum world basics, fueled my fire to learn more and research beyond what is assigned."

"A lot of the topics and equations covered in the workshop, I had seen before, either during my preparation for JEE or in college courses, however then we were directly given the equations and taught use to solve problems. I feel that this course covered the gap left then - why and how those equations came. And I believe that it is very important to understand that. I am very happy that I got the opportunity to think more and learn more through this workshop."

CONCLUSION

The workshop was a huge success and achieved its objective of inspiring students to get deeper insights into science, quantum physics and through an inquiry-oriented approach.

CONTACT US

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