# KMVPHY-SPECTRUM

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A PHYSICS NEWS LINE

"There is no law except the law that there is no law." Vol. 9 (Issue 1) July to December-2023 -John Archibald Wheel


## Visionary Physicist

### The Unwavering Mind and India's Scientific Self-Reliance: Anna Mani

Born in 1918 in the misty cardamom hills of Peermade, Kerala, Anna Modayil Mani grew up during a time when the futures of most girls even in well-educated, upper-class households were expected to follow a predictable path of early marriage and domestic life. Yet Anna displayed, from an unusually young age, a fierce independence of mind that would define her entire scientific journey. Her father, a civil engineer, provided a stable and educated environment, but the family's traditional Syrian Christian values did little to shape Anna's worldview; she forged her own intellectual identity early on. A transformative moment arrived on her eighth birthday. While girls her age were typically gifted gold or diamond earrings, Anna declined the jewelry and instead asked for the complete set of the Encyclopaedia Britannica. This choice rejecting ornamentation for knowledge was a powerful sign of the life she intended to lead.

She became an insatiable reader, exhausting the local library's Malayalam and English collections. Influenced by Mahatma Gandhi's principles of simplicity, equality, and Khadi, she embraced self-reliance not only as a political philosophy but as a personal ethic. While her sisters married early, Anna pursued higher education with unwavering determination, graduating in 1939 from Presidency College, Chennai, with a B.Sc. (Honours) in Physics and Chemistry.In 1940, Anna secured a scholarship to the Indian Institute of Science (IISc) in Bangalore, entering a domain dominated almost entirely by men. She began working under Nobel Laureate Sir C. V. Raman, who was known for his reluctance to accept women researchers. Over five rigorous years, she conducted meticulous experiments on the spectroscopy and luminescence of diamonds and rubies. Her work often required photographic plates to be exposed for 15 to 20 hours, forcing her to spend nights in the laboratory. The result of this dedication was five peer-reviewed papers an impressive body of work that formed the basis of her Ph.D. thesis.

When Anna submitted her dissertation to Madras University in 1945, she was denied the doctoral degree not because of academic shortcomings, but because she lacked a formal Master's degree. The institutional injustice could have discouraged her, but Anna refused to let bureaucratic barriers shape her destiny. Instead, she accepted a government scholarship to specialize in physics at Imperial College London, only to discover that the available internship was not in spectroscopy but in meteorological instrumentation. With characteristic resilience, she embraced the new field wholeheartedly .Returning to India in 1948, Anna joined the India Meteorological Department (IMD) in Pune, where she would earn the title of India's "Weather Woman." India, newly independent, relied heavily on imported British weather instruments ill-suited to its tropical climate. Leading the Instruments Division and by 1953, a team of 121 men she spearheaded the design, standardization, and indigenous production of nearly 100 varieties of meteorological instruments. Her guiding principle was clear: "Wrong measurements are worse than none."Her contributions reshaped three critical scientific domains: solar radiation, wind energy, and atmospheric ozone. During the International Geophysical Year (1957–58), she established India's network of solar radiation monitoring stations and designed instruments such as pyranometers and sunshine recorders. Her publications The Handbook for Solar Radiation Data for India (1980) and Solar Radiation over India (1981) remain foundational references.Her nationwide wind energy survey, covering more than 700 sites, culminated landmark in the Wind Energy Resource Survey in India* (1992), which laid the groundwork for India's renewable energy program. Even more visionary was her work on atmospheric ozone. In the 1960s, she developed India's first indigenous ozonesonde, enabling systematic ozone profiling long before environmental awareness became mainstream. Her observations on urban aerosols and ground-level ozone proved decades ahead of their time.Anna Mani retired as Deputy Director General of the IMD in 1976 and later served at the Raman Research Institute. Awarded the INSA K. R. Ramanathan Medal in 1987, she remained devoted solely to science throughout her life.For young women in STEM, Anna Mani's life stands as proof that scientific authority is earned through precision, courage, and persistence not through titles or privilege.

### Katepalli R. Sreenivasan: A Life of Extraordinary Contributions to Science and Engineering

Katepalli R. Sreenivasan stands as one of the most influential figures in fluid dynamics, turbulence, complex systems, and statistical physics. Over a remarkable career spanning continents and decades, he has shaped the global scientific landscape through his groundbreaking research, academic leadership, and commitment to international collaboration. From humble beginnings in southern India to prestigious positions at New York University (NYU), the International Centre for Theoretical Physics (ICTP), and the Tata Institute of Fundamental Research (TIFR), Sreenivasan's journey is a testament to intellectual excellence and perseverance.

Born in Pathapalli, India, Sreenivasan's brilliance shone early. In 1968, he graduated with a B.E. in Mechanical Engineering from Bangalore University, topping not only his university but three others in Karnataka a rare distinction. His academic excellence earned him numerous honors, including the Sir M. Visvesvaraya Memorial Prize and the Indumati Lalbai Memorial Gold Medal. He continued his studies at the Indian Institute of Science (IISc), Bangalore, earning an M.E. in Aerospace Engineering in 1970 and a Ph.D. in 1975. His doctoral research, awarded the P.S. Narayana Medal, marked the beginning of a lifelong pursuit of understanding complex physical systems.Postdoctoral stints at the University of Sydney, the University of Newcastle, and Johns Hopkins University further honed his expertise in turbulence one of the most intricate problems in classical physics. His scholarly achievements later earned him several honorary doctorates from leading institutions, including Lucknow University, the University of Hyderabad, and the Romanian Academy of Sciences. Sreenivasan's academic career began at Yale University in 1979, where he became the Harold W. Cheel Professor of Mechanical Engineering and chaired the department. He also held joint appointments in Physics, Applied Physics, and Mathematics an embodiment of his interdisciplinary approach. His pioneering work on turbulence and scaling laws established him as one of the foremost experts in the field.He later joined the University of Maryland as Distinguished University Professor and Director of the Institute for Physical Science and Technology, before moving to Italy in 2003 as Director of the ICTP. There, he championed global scientific collaboration, particularly between developing and developed nations, enhancing ICTP's stature as a hub for world-class research. In 2013, Sreenivasan became Dean of the NYU Tandon School of Engineering and was appointed University Professor a recognition reserved for scholars of exceptional breadth.Renowned for his fundamental contributions to turbulence, Sreenivasan's research has deepened our understanding of the statistical and physical properties of turbulent flows. His experimental innovations have also advanced applications in aerodynamics, weather prediction, and climate science.Among his numerous accolades are the Guggenheim Fellowship, the Alexander von Humboldt Research Award, the UNESCO Medal for Promoting International Scientific Cooperation, and the National Order of Scientific Merit from Brazil. He is an elected member of the US National Academy of Sciences, the US National Academy of Engineering, and the Indian Academy of Sciences.Professor Katepalli R. Sreenivasan's life and work embody the ideals of scientific excellence, leadership, and education. His career continues to inspire generations of students and researchers to pursue discovery, collaboration, and the quest to understand the natural world.

## Science News Section

### Chandrayaan-3 Makes Historic Landing Near the Moon's South Pole

India's ISRO achieved a landmark success on 23 August 2023, when Chandrayaan-3 safely soft-landed near the Moon's unexplored south-polar region. The lander Vikram and rover Pragyan conducted in-situ experiments, including elemental analysis of lunar soil. This marked the world's first successful landing near the south pole and made India the fourth nation to achieve a lunar soft landing. The mission revealed new insights into the Moon's 4.3-billion-year-old regolith. It demonstrated India's growing capability in precision landing, autonomous navigation, and deep-space communications. ISRO's accomplishment was widely hailed as a milestone for global lunar science.

### Aditya-L1 — India's First Solar Observatory Launched

On 2 September 2023, ISRO launched Aditya-L1, India's first dedicated mission to study the Sun. The spacecraft is positioned at the Sun–Earth Lagrange Point L1, about 1.5 million km away, providing continuous, unobstructed solar observation. It carries seven advanced payloads to study the solar corona, flares, and magnetic fields, aiming to understand space-weather effects that impact satellites and communications. Aditya-L1 represents India's entry into frontline solar and heliophysics research, joining global efforts with missions like NASA's Parker Probe and ESA's Solar Orbiter. Scientists expect data from the mission to improve forecasting of geomagnetic storm.

### Polarised X-Ray Emissions Detected from a Black-Hole Binary

In November 2023, scientists from IIT Guwahati and ISRO's U R Rao Satellite Centre detected polarised X-ray emissions from the black-hole binary system LMC X-3, located in the Large Magellanic Cloud. Using advanced polarimetry, they determined the black hole rotates slowly and is surrounded by a thin accretion disk. This marks India's first extragalactic X-ray polarimetry result, a key step toward understanding black-hole energetics and relativistic jets. The detection positions Indian research at the forefront of high-energy astrophysics, building capacity for upcoming missions such as XPoSat. It also showcases collaboration between academic institutions and ISRO on cutting-edge astrophysical techniques.

### Neutrino Physics Advances at India-Based Neutrino Observatory (INO)

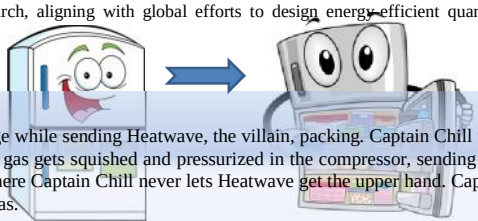
The INO collaboration published new simulation studies in mid-2023 exploring atmospheric neutrino oscillations and possible dark-matter interactions inside Earth. Using the proposed ICAL (Iron Calorimeter) detector design, researchers modeled how neutrino data could probe exotic physics beyond the Standard Model. Papers released in June 2023 demonstrated that INO's detector could potentially detect signatures of dark-matter–neutrino coupling. Though the underground lab in Tamil Nadu is under construction, the analysis strengthens India's standing in global neutrino science. These results confirm that Indian teams are contributing to fundamental particle-physics research, even before the full-scale experiment begins.

### IIT-Madras Develops New Metamaterial for Light Manipulation

In September 2023, researchers at IIT Madras reported creating a new class of optical metamaterials capable of controlling light propagation with exceptional precision. These materials exhibit negative refractive index behaviour in the visible range, enabling applications in superlensing and cloaking devices. Using nanofabrication techniques, the team tuned dielectric and metallic layers at sub-wavelength scales. The work opens new pathways for photonics, telecommunications, and quantum optics in India. Such metamaterials could improve solar-cell performance or lead to ultra-compact optical sensors. This achievement underscores India's progress in nanophotonics and advanced materials physics.

### IISc Bengaluru Explores Frictionless Transport via Topological Materials

In October 2023, physicists at the Indian Institute of Science (IISc) reported studying topological insulators exhibiting nearly lossless electron transport. Using precision cryogenic measurements, they demonstrated how spin-momentum locking in these materials reduces scattering, leading to "frictionless" conduction. The discovery holds promise for **low-power electronics and spintronic devices. Researchers emphasized that understanding quantum topological effects can revolutionize next-generation computing. The study, supported by India's SERB funding, highlights the country's advancing role in condensed-matter and quantum materials research, aligning with global efforts to design energy-efficient quantum circuits.



### The Refrigerator – "Cool Science in Action!"

Meet Captain Chill, the coolest superhero in your kitchen! His mission? To maintain a steady, icy fortress inside your fridge while sending Heatwave, the villain, packing. Captain Chill uses a secret weapon: the refrigerant gas that absorbs heat like a sponge. It sucks up the warmth from your food, and then the gas gets squished and pressurized in the compressor, sending that heat out into the back of the fridge and releasing it into the air outside. It's like a high-tech battle between cold and hot, where Captain Chill never lets Heatwave get the upper hand. Captain Chill's power doesn't just fight Heatwave—it's also about phase change! When the refrigerant changes from a liquid to a gas.

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## National Anveshika Experimental Skill test (NAEST)

Physics students of *Kanya Maha Vidyalaya*, Jalandhar, participated in the National Anveshika Experimental Skill Test (NAEST)—an annual national-level competition. KMV students appeared in the screening round held in June 2023, which featured questions based on short video demonstrations of Physics phenomena. *Navneet Kaur* (B.Sc. Non-Med Sem IV) and *Amisha Sharma* (B.Sc. Computer Science Sem IV) successfully cleared the screening round and qualified for the prelims conducted in August 2023, where their experimental skills were further evaluated.

## IDE Boot Camp attended by Science Students at NITTTR Chandigarh

Under this initiative, the *Ministry of Education* and the *All India Council for Technical Education (AICTE)* organized a five-day Innovation, Design and Entrepreneurship (IDE) Bootcamp at the *National Institute of Technical Teachers Training and Research (NITTTR)*, Chandigarh, from 22nd to 26th June 2023. *Tabish Warsia* and *Akriti* of B.Sc. Medical had their innovative idea of a "Robotic Nurse" in the healthcare sector selected by the Ministry of Innovation for participation in the bootcamp. The students were mentored by expert innovators and successfully completed the camp with an impressive presentation that received appreciation from distinguished academicians.

## Four days Workshop on Learning Physics Through Life

**Dr. Neetu Verma** and **Dr. Sangeeta Prasher**, were invited by **Padma Shri Prof. H. C. Verma**, a renowned physicist, to conduct a four-day training program titled *"Learning Physics through Life"* for Navodaya Vidyalaya Physics teachers at the **Navodaya Leadership Institute, Amritsar**. Organized under the **Ministry of Education, Government of India**, the workshop emphasized **experiential learning and innovative teaching methodologies**, showcasing KMV's commitment to advancing science outreach and quality education.

## Workshop for newly recruited Science TGT Teachers at NLI, Amritsar

**Dr. Neetu Verma**, was invited to conduct a national workshop for newly recruited **TGT–Science teachers** from Navodaya Vidyalayas across India at the **Navodaya Leadership Institute, Amritsar**, under the **Ministry of Education, Government of India**. During the workshop, Dr. Verma and her team demonstrated a variety of engaging Physics experiments using simple, everyday materials to promote **experiential learning and innovative teaching methods**, inspiring educators to make Physics more interactive and enjoyable for students.

## KMV organized 2 days student-student mentoring workshop ANUBHOOTI-2023

A two-day student–student mentoring workshop "**Anubhooti-2023**" was organised on August 16–17, 2023. During the workshop, students showcased innovative projects such as a hand boiler, radiometer, Bluetooth-controlled car, wave machine, and touchless sanitizing and attendance systems. The event encouraged critical and analytical thinking, inspiring students to apply scientific knowledge creatively to real-world challenges..

## Let's Start's Start-up Pitching Competition on August 11-13, 2023

An Inter-Institutional **Let's Start Start-up Pitching Competition** was organized by the Institution's Innovation Council (IIC) and **Yukti 2.0**, Dr. B.R. Ambedkar National Institute of Technology, Jalandhar, from August 11–13, 2023. The event aimed to foster innovation and entrepreneurship by providing a platform for aspiring entrepreneurs to present their business ideas. Six teams from **Kanya Maha Vidyalaya, Jalandhar** participated, with Team **Research X** earning special appreciation for their idea of establishing a research centre for school students to promote hands-on learning.

## Innovation Stall in Diwali Extravaganza

**Innovation Stall** on **November 4, 2023**, to celebrate Diwali with a spirit of creativity and entrepreneurship. The event was graced by **Sh. Chander Mohan**, President, Arya Shiksha Mandal, and **Principal Prof. (Dr.) Atima Sharma Dwivedi**, along with other dignitaries. Students showcased their self-developed prototypes, including **smartphone-operated Bluetooth car, touchless hand sanitizer, automatic attendance system, and stagnated water ejector**, which drew great appreciation. The stall also welcomed **14 visiting school students**, making it a highly engaging and inspiring event that promoted innovation, curiosity, and hands-on learning among young minds.

## Vikram Pragyan Duo on moon

To celebrate India's historic Chandrayaan-3 mission, six-day celebration week titled *"Vikram Pragyan Duo on Moon." was organized.* A series of engaging events — Exploring Vision, Brainstorm–Mind War, Sci-Creative, India on Moon, Presentación, and Forumscape — were held to promote scientific curiosity and creativity. Students participated with great enthusiasm, showcasing their love for the nation and passion for space science. The celebration instilled a deep sense of pride and inspired students to dream big in the field of science and technology.

## Invited talk on Career Progression In Sciences

Dr. Umesh Kumar Sharma, Scientist-F, Department of Science and Technology (DST), New Delhi) was invited for a talk on *"Career Progression in Sciences."* Dr. Sharma highlighted various government initiatives and scholarships such as INSPIRE, WISE, and SERB that support budding scientists and researchers. He also guided students on preparing research proposals and availing funding opportunities. The interactive session motivated participants to align their passion with their scientific career goals.

## KMV has been granted first and only Anveshika centre in Punjab

Dr. Neetu Verma and Dr. Sangeeta Prasher, along with KMViets, had the honor of being invited by Padma Shri Prof. H. C. Verma to conduct a four-day workshop titled *"Learning Physics through Life"* at the Navodaya Leadership Institute, Amritsar, under the Ministry of Education, Government of India. The workshop, held for Physics teachers from northern India, emphasized experiential and innovative teaching methodologies. Earlier, KMV Physics teachers had undergone a six-day residential training by Prof. Verma in Kanpur, which enriched their mentoring experience. It is a matter of great pride that KMV has been granted the first and only Anveshika Centre in Punjab under the National Anveshika Network of India (NANI) initiative.

## World Entrepreneurship Sammelan celebrated at KMV

World Entrepreneurship Sammelan was celebrated on September 4, 2023, Kanya Maha Vidyalaya, Jalandhar organized a grand event graced by the Governor of Punjab, Sh. Banwarilal Purohit. The Governor emphasized the vital role of entrepreneurship in driving innovation and economic growth and visited various departmental stalls showcasing students' creativity. The P.G. Department of Physics set up an Innovation Stall, where students presented prototypes such as a Bluetooth car, touchless sanitizer, automatic attendance system, and stagnant water ejector, which drew great appreciation. The event fostered curiosity, creativity, and an entrepreneurial spirit among students.

## YUKTI- National Innovation Repository Submission

Idea Pooling Session under the Department of Science to foster creativity and entrepreneurial thinking among students was organised. The event received an overwhelming response with 142 registrations, featuring 75 innovative ideas, 34 prototypes, and 21 start-up concepts. The best entries were mentored by KMV faculty and national experts and later submitted to the YUKTI–National Innovation Repository (NIR) of the Ministry of Education, Government of India. Out of these, 56 ideas, 23 prototypes, and 6 start-ups were successfully recommended, showcasing KMV's strong culture of innovation and skill development.

## Expert Talk on Time Management under Personality Development Course at KMV


Under the Personality Development Course for Semester III, an invited talk on "Time Management" was delivered by Dr. Neetu Verma,. The session aimed to help students enhance self-awareness, boost confidence, and adopt effective time management strategies. Dr. Verma emphasized that *"The bad news is time flies. The good news is you're the pilot,"* motivating students to take control of their schedules. Through interactive discussions and real-life examples, she guided students on goal setting, prioritizing tasks, and avoiding distractions.

## KMV Physics Students distinguished as young researchers of nation at IAPT National Student Symposium

Four students from the undergraduate and postgraduate classes of the P.G. Department of Physics, Kanya Maha Vidyalaya, Jalandhar, participated in the 10th IAPT National Student Symposium in Physics (IAPT-NSSP) held at Panjab University, Chandigarh, from October 27–29, 2023. Students from across India presented their research through oral and poster sessions, gaining valuable exposure to advanced scientific ideas. KMV students showcased innovative projects on water stagnation solutions and optical characterization of tellurite glasses.

## Dr. Sandeep Kaur was awarded Kiran Wise PDF by Department of Science and Technology

Dr. Sandeep Kaur, has been awarded the prestigious KIRAN-WISE Post-Doctoral Fellowship by the Department of Science and Technology (DST), Government of India, under the mentorship of Dr. Gopi Sharma. An alumna of KMV, Dr. Kaur has consistently excelled in academics and research, having earlier received the ICTP TRIL Fellowship (Italy) and the IANS Summer Internship. Her remarkable journey from KMV student to accomplished researcher reflects the institution's strong academic foundation and commitment to nurturing scientific excellence.

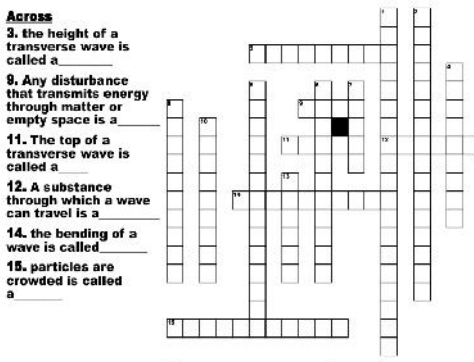
## KMViets pays homage to Asian Nobel Laureate Sir CV Raman

Under the **Institution's Innovation Council**, celebrated **'Diwali Fiesta 2023'** on **November 7, 2023**, dedicated to the birth anniversary of **Sir C.V. Raman**, the first Asian Nobel Laureate in Science. The event featured four creative competitions—*Physics and Satrang*, *Let's Decorate*, *Best out of Waste*, and *Crop and Edit*—aimed at nurturing innovation, teamwork, and scientific curiosity. Students of B.Sc. and M.Sc. Physics showcased their talent through eco-friendly art, classroom decorations, and scientific videos.

## Mentoring program to explore Innovative Experiments at KMV Innovation Hub

Workshop titled **"Captivating Learning through Innovative Experiments"** to make Physics learning more engaging for school students was organised during which **seven schools** visited the KMV Innovation Hub, where KMViets demonstrated innovative experiments like **Newton's Cradle, Air Cannon, Lorentz Oscillator, and Coupled Pendulums**. The event aimed to spark curiosity, creativity, and logical thinking among young learners. Acting as mentors, KMV students guided school participants to explore fundamental Physics concepts through hands-on activities.

## Waves Crossword Puzzle



**Across**

3. the height of a transverse wave is called a_____
9. Any disturbance that transmits energy through matter or empty space is a_____
11. The top of a transverse wave is called a ____
12. A substance through which a wave can travel is a_____
14. the bending of a wave is called_____
15. particles are crowded is called a_____

**Down**

1. A wave that travel without a medium is a_____
2. A wave where particles move back and forth along the path that the wave moves is a_____
4. the amount of waves produced in a certain amount of time is called it's _____
5. A wave in which the particles of the medium move perpendicularly_____
6. gaps in a longitudinal wave is called a _____
7. word used to express frequency is called a _____
8. the distance from crest to crest on a transverse wave is called a_____
10. speed at which a wave can travel is it's _____
13. The bottom of a transverse wave is called a_____

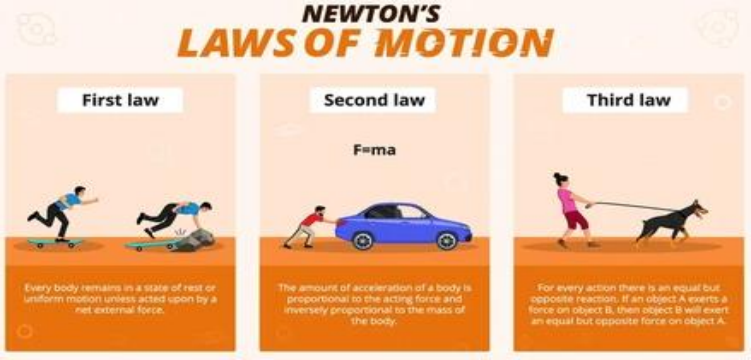
**Across**

**Amplitude** – the height of a transverse wave
**Wave** – any disturbance that transmits energy through matter or space
**Crest** – the top of a transverse wave
**Medium** – a substance through which a wave can travel
**Refraction** – the bending of a wave
**Compression** – particles are crowded

**Down**

**Electromagnetic** – a wave that travels without a medium
**Longitudinal** – particles move back and forth along the wave's path
**Frequency** – amount of waves produced per unit time
**Transverse** – particles move perpendicularly to the direction of travel
**Rarefaction** – gaps in a longitudinal wave
**Hertz** – unit used to express frequency
**Wavelength** – distance from crest to crest
**Velocity** – speed of a wave
**Trough** – the bottom of a transverse wave

## Fun Times with Physics


## Story time

## The Quantum Lantern

Aarav was not an ordinary physics student. While others memorized formulas, he saw equations as stories waiting to unfold and experiments as living puzzles whispering secrets of the universe. His mind danced between quanta and cosmos, and it was this boundless curiosity that led him, one quiet evening, into the forgotten corners of his university's old laboratory. As he brushed the dust off long-abandoned shelves, something metallic caught his eye — a strange brass lamp, heavy and warm to the touch. It was unlike anything he had seen. Symbols of Planck's constant, the fine-structure constant, and delicate wave equations spiraled across its surface like inscriptions from a civilization of physicists.

A small engraved plate on its base read: **"Property of Sir C. V. Raman – 1930."** Aarav froze. A lamp belonging to Raman himself? The idea felt too fantastical, yet the evidence glimmered in his hands. Curiosity, as always, burned brighter than caution. He gently rubbed the lamp, expecting nothing more than a little shine.

Instead, light erupted.

A shimmering hologram formed before him — an elderly physicist-shaped figure, woven entirely from flickering photons. The air hummed like a crystal struck by a tuning fork.

"Who are you?" Aarav whispered, awe-struck.

"I am Qantra, a quantum echo," the figure replied, its voice cascading like the spectral colors of light scattering through glass. "Created by Raman — a simulation of knowledge bound within this lantern of light."

Aarav's heart pounded. He had awakened a quantum artificial intelligence, sealed inside a lamp nearly a century old. Qantra explained that the lantern stored not riches, but **curiosity**. It absorbed the questions of every seeker brave enough to ask them. In return, it revealed truths normally hidden between the dualities of waves and particles. But there was one condition: it would answer only **one question each night**, and each answer would bend reality ever so slightly. Intrigued beyond measure, Aarav began his nightly experiments.

On the first night, he asked, *"Can light truly behave as both wave and particle?"* The next morning, as he stirred his coffee, he froze — tiny interference fringes rippled across the surface, as though his cup had become a miniature double-slit experiment.

On the second night, he dared to ask, *"Can time flow backward?"* At dawn, he woke to find his watch ticking in reverse for precisely forty-two seconds before returning to normal, as though time itself had hiccuped.

As the nights passed, reality around Aarav began to quantize. Streetlights flickered in superposition, glowing at two brightness levels at once. His reflection in windows sometimes lagged — appearing a few milliseconds behind him, like an echo from a parallel timeline.

Wonder slowly mingled with fear.

Finally, one night, he asked the question that had been growing inside him like a star about to ignite: *"What happens when curiosity itself collapses — when all questions are answered?"*

Qantra's glow weakened. "Then the universe loses its uncertainty — and with it, its heartbeat. The cosmos thrives because there is always more to ask."

The lantern trembled, equations swirling across the walls like constellations drawn in living light. Aarav suddenly understood: seeking ultimate knowledge would collapse the very quantum threads holding reality together. He had to choose — preserve the balance of curiosity, or pursue answers that could end the universe's wonder.

He took a steady breath. "Then let me be the keeper of questions, not their end."

The lantern pulsed once more, releasing a final burst of brilliant blue that streaked across the night like a cosmic aurora. When Aarav opened his eyes, the lamp had vanished. But on his notebook, three softly glowing words remained:

**"Curiosity sustains existence."**

Years later, students often found Aarav sitting beneath the campus observatory, watching the stars with a quiet smile — as though he could still hear a quantum lantern whispering secrets from the edge of reality.