

“There is no law except the law that there is no law.”

-John Archibald Wheel

## Visionary Physicist

### The Glass Guru, Who Tempered Science with Humanity: Dr. Arun K. Varshneya



In the world of materials science, where glass is too often overlooked in windows, screens, and containers, one man refracted it into a beacon of innovation, education, and life-saving technology. Dr. Arun K. Varshneya—affectionately known as the “Glass Guru”—forged a legacy spanning continents, academia, industry, and humanitarian impact. His story begins in India, in a family that valued education and humility. His parents, Shanti Lal Varshneya and Krishna Devi, were not scientists, but they instilled in him something more essential: the conviction that knowledge must serve others. “My father taught me how to hold steady in a storm. My mother taught me why I must sail at all,” he recalled.

After earning a B.Sc. from Agra University, Varshneya moved to the University of Sheffield for an honors degree in glass technology, and then to Case Western Reserve University under Professor Al Cooper. There, he earned both an M.S. and Ph.D. in materials science, gaining breadth across ceramics, metals, and polymers. His career began at Ford Scientific Labs and GE Lighting’s Nela Park, where he contributed to molecular dynamics and sealant research. “I did a lot of science at Nela Park,” he said. “It was beautiful.”

In 1982, he transitioned to academia, joining Alfred University in upstate New York. At Alfred, he shaped the Glass Science and Engineering program, teaching across the spectrum while preparing students for industry through his hallmark “Engineering Operations” course. His textbook *Fundamentals of Inorganic Glasses*, requested by students, gave coherence and identity to a field that lacked both. This work earned him the title “Glass Guru,” while mentees like John Mauro—now a leading researcher at Penn State—carried his influence forward. His 13-page entry on industrial glass in *Encyclopedia Britannica* further cemented his global standing.

Determined to translate knowledge into impact, Varshneya co-founded Saxon Glass Technologies in 1996. The company’s breakthrough was solving a life-threatening problem with EpiPen® cartridges, which often shattered under injection stresses. Through ion-exchange strengthening—replacing sodium ions in glass with larger potassium ions to induce compressive stress—failure rates dropped from one in ten to less than one in a million. Saxon, guided administratively by his wife Darshana as CFO, grew from a modest facility into a global supplier, ensuring millions could rely on a device designed to save lives. “The best part,” he said humbly, “is that my staff helps save thousands of lives each year.” His achievements earned widespread recognition: the Gold Medal of the Case Alumni Association in 2021, fellowship in the American Ceramic Society, and in 2019, a Festschrift Symposium at the International Congress on Glass. In 2025, he and Darshana endowed the Varshneya-University Conference on Glass and an annual lecture at Alfred University, ensuring the discipline he nurtured continues to thrive. Yet his reflections reveal a deeper essence: a belief in equity, identity, and service. He urged that women engineers “should receive opportunity... and be not afraid to lead.” And when looking back, he invoked Sinatra’s words: “Regrets I had a few, but too few to remember.” Dr. Varshneya’s journey—from Agra to Alfred, from student to innovator, from scholar to life-saver—stands as a testament to how science, when fused with purpose, can transform both technology and humanity.

## Science News Section

### India Achieves Medals at the 54th International Physics Olympiad

At the **54th International Physics Olympiad** held from **July 21–29, 2024**, in Isfahan, Iran, All five Indian participants bagged medals, including 2 gold and 3 silver medals. Rhythm Kedia from Chhattisgarh and Ved Lahoti from Madhya Pradesh bagged gold medals, whereas Akarsh Raj Sahay from Maharashtra, Bhavya Tiwari from Uttar Pradesh, and Jaiveer Singh from Rajasthan were honoured with silver medals. India’s delegation was led by Prof. Deepak Garg (DAV College, Chandigarh) and Dr. Shirish Pathare (HBCSE, TIFR), with Prof. A. C. Biyani (Retd., Govt. Nagarjuna Post Graduate College of Science, Raipur) and Prof. Vivek Bhide (Gogate-Jogalekar College, Ratnagiri) serving as Scientific Observers. A total of 193 students from 43 countries participated in the competition. In the country-wise medal tally, India was placed in the fourth position, jointly with Vietnam. China came at the top, followed by Russia and Romania at second and third position, respectively.

### IIT Mandi Physicists Recognizes with Fundamental Physics Breakthrough Prize for Contributions to CERN Experiments

Dr. Prabhakar Palni and Dr. Amal Sarkar from the School of Physical Sciences, IIT Mandi, along with their international team, have been named laureates of the prestigious Fundamental Physics Breakthrough Prize 2025 for their collective contributions. They are recognized for their significant contributions to the ATLAS, ALICE, and CMS experiments at the Large Hadron Collider (LHC) at CERN, which enhanced our understanding of fundamental particle physics during the second run of the experiments, which took place from 2015 to 2024. The Breakthrough Prize honors the groundbreaking achievements of international scientists who have expanded humanity’s understanding of the universe. This year’s prize includes a \$3 million award, which has been donated to the CERN Society Foundation.

### End-to-End Testing of 6-Qubit Quantum Processor Completed

On **August 28, 2024**, Indian scientists from the **DRDO Young Scientists Laboratory for Quantum Technologies (DYSL-QT)** in Pune, in collaboration with **TIFR, Mumbai, and Tata Consultancy Services**, completed successful **end-to-end testing of a 6-qubit quantum processor**—a noteworthy milestone in India's journey in quantum computing.

### FAIR Council meeting in Kolkata: A historic step towards creating milestone

The 42nd meeting of the Facility for Antiproton and Ion Research (FAIR) Council was hosted in Kolkata, India on 3-4 December 2024. The meeting was held at the Unified Academic Campus of Bose Institute, making it the council’s first meeting to be held outside the FAIR site in Germany. The Facility for Antiproton and Ion Research (FAIR), an international particle accelerator facility, is being constructed in Darmstadt, Germany at a cost of about 2.6 billion euros. The multipurpose facility will be responsible for carrying out research in high energy physics, nuclear physics, particle physics and plasma and applications including space science and cancer therapy

### Urbasi Sinha: The Woman Rewiring the Quantum Future from India to the Stars



In the quiet corridors of the Raman Research Institute (RRI) in Bengaluru, a scientific revolution is unfolding—one photon at a time. At its helm is Professor Urbasi Sinha, a world-renowned physicist who combines scientific rigor with social vision. Head of RRI’s Quantum Information and Computing (QuIC) lab and a 2024 Rashtriya Vigyan Puraskar awardee, Sinha is shaping India’s place on the global quantum map while championing equity in science. Her lab was among the first in India to manufacture and deploy entangled and heralded photon sources—building blocks for quantum communications and computing.

Recently, her group pioneered a method to generate truly unpredictable quantum random numbers, bolstering encryption for secure communication. She also led the QuEST project (Quantum Experiments with Satellite Technology) with ISRO, laying the foundation for India’s quantum satellite program. Identifying Ladakh’s Hanle site as ideal for quantum ground stations, she envisions it as a gateway to global satellite-based quantum networks. “India’s landscape could serve as a universal model for future projects,” she has said.

Born in London and raised in Kolkata, Sinha earned her B.Sc. in Physics at Jadavpur University, then pursued an M.Sc. and Ph.D. at Cambridge, where she was among the first doctoral researchers at its Nanoscience Centre. Postdoctoral work at Cambridge’s Cavendish Laboratory and Canada’s Institute for Quantum Computing deepened her expertise in quantum optics and led to landmark contributions such as the triple-slit experiment testing the Born rule. She joined RRI in 2012, where her lab has advanced quantum key distribution, teleportation, and device-independent randomness.

Her excellence has been recognized globally: she was listed in the Asian Scientist 100 (2018), received the ICTP-ICO Gallieno Denardo Award in Optics the same year, became a Simons Emmy Noether Fellow at the Perimeter Institute in 2020, and in 2023 won the Chandrasekarendra Saraswathi National Eminence Award. In 2025, she was honored with the Gates-Cambridge Impact Prize. She also holds appointments in Canada, including as Excellence Research Chair in Photonic Quantum Science and Technologies.

Yet Sinha is more than a physicist—she is a force for change. She speaks candidly about the gender bias embedded in academic culture, comparing it to the themes of the *Barbie* film: “As I started climbing the ladder, I noticed increasing hostility towards personal success. There’s a sentiment that women should be content with whatever they’ve achieved.” Her response is resolute: “Bring it on.” She founded initiatives like *Women in Optics and Photonics in India* (WOPI 2022) to build mentorship networks and advocates for structural reforms—scholarships, flexible hours, childcare, and shifting societal norms.

Looking ahead, Sinha envisions quantum sensing, quantum-inspired medical imaging, and global entanglement distribution networks, aligning deep-tech research with the UN Sustainable Development Goals. “This is a golden era for science,” she says. “Technologies once considered science fiction are now testable. It’s a privilege to be a scientist today—and a responsibility.” Professor Urbasi Sinha is not only advancing quantum technologies; she is building bridges—between disciplines, nations, and generations—redefining both India’s scientific destiny and the role of women in shaping it.

### C-DAC's Quantum Reference Facility Slated for Completion

In a bid to drive India's quantum computing revolution, a "reference facility" on quantum and high-speed computing is expected to be operational over the next three years in Bangalore, a senior scientist of the C-DAC said on Tuesday. Quantum computing is a rapidly emerging technology that harnesses the laws of quantum mechanics to solve problems too complex for classical computers. "The research on quantum computing has been ongoing for several years by various institutions, including us. The **Quantum Reference Facility** is coming up at the C-DAC facility in Bangalore," said A S Murty, senior scientist and Kolkata head of the Centre for Development of Advanced Computing (C-DAC). The scientist was speaking on the sidelines of the International Symposium on Quantum Computing (ISQCI 2024) held in Kolkata.

### India-Australia Space Collaboration: Space MAITRI

NewSpace India Limited (NSIL), the commercial arm of ISRO, has signed a **Dedicated Launch Service Agreement** with **Space Machines Company**, an Australian-Indian in-space servicing firm. The agreement paves the way for the **2026 launch** of *Optimus*, a 450kg spacecraft—the **largest Australian-designed and built satellite to date**—aboard ISRO’s **Small Satellite Launch Vehicle (SSLV)**. This will mark **SSLV’s first dedicated commercial launch**, following its earlier Janus mission (10kg nanosatellite on SSLV-D2). The mission, titled **Space MAITRI** (Mission for Australia-India’s Technology, Research and Innovation), highlights the growing strategic partnership between the two nations in the space sector. Focusing on **space debris management and sustainability**, the initiative reinforces responsible space operations and reflects shared priorities on global challenges like climate change. The Australian government is supporting this mission as part of its broader investment in collaborative space ventures with India.

### Beyond LIGO-India: Indian Deci-Hz GW Space Mission': Two day meet at IISER Kolkata

A two-day meeting will be held at IISER Kolkata to develop a planning document for the Indian deci-Hz gravitational wave space mission. During this meeting, we will discuss key scientific goals, technological challenges, and strategies to achieve these objectives. The Deci-Hz GW mission is among the future space science projects proposed by the community for ISRO’s long-term space science vision (by working group SG-2: Gravitation and Cosmology of the Space Science Roadmap Formulation initiated by URSC/ISRO). It is also regarded as a step forward beyond LIGO-India.

Quantum physics is the only field where being uncertain makes you more accurate.



## Anubhooti-2024 Student Student Mentoring Workshop

The P.G. Department of Physics at Kanya Maha Vidyalaya, Jalandhar, a prestigious autonomous and heritage institution, successfully organized its annual workshop **Anubhooti-2024** on August 23–24, 2024. The event featured creative Physics demonstrations by KMV students, including models like **Newton’s Cradle**, **Air Cannon**, and **Lorentz Oscillator**, aimed at making Physics fun, practical, and accessible. The interactive sessions engaged newcomers and visiting school students, while KMV students mentored juniors, fostering creativity, critical thinking, and hands-on learning through prototype development.



## National Space Day Celebrations

On August 23, 2024, **National Space Day** was celebrated. The event highlighted students' creativity through remarkable projects like a **3D model of Chandrayaan-3**, **Mars Rover posters**, and **International Space Station simulations**. Innovative models such as a **Bubble Machine**, **Earthquake Alarm**, and **Magnetic Levitation** display captivated attendees, showcasing the scientific enthusiasm of KMV students. The celebration proved to be a resounding success, sparking curiosity and encouraging scientific exploration.



## Kanya Maha Vidyalaya, Jalandhar Hosts DISHA 2024: A Resounding Success in Innovation and Problem-Solving

On September 11, 2024, the **KMV Innovation Council (KMV IIC)**, hosted **DISHA 2024**, an inter-departmental hackathon celebrating student creativity and innovation. Held as part of the **Smart India Hackathon (SIH)** initiative, the event saw participation from over 50 teams showcasing impactful projects like the **Earthquake Alarm**, **Artificial Wetland**, **Bio-Blend**, **Musa Papyrus**, and **Peel Glow**. DISHA 2024 reflected the vibrant culture of research, creativity, and collaboration at KMV.



## 5-Day Inspire Camp Commences At Kmv

From October 14–19, **INSPIRE (Innovation in Science Pursuit for Inspired Research) Camp** was hosted at **KMV**. This five-day initiative aimed to ignite scientific curiosity and promote innovation among young minds. The camp was inaugurated in the presence of **Shri Chander Mohan**, President, Arya Shiksha Mandal, along with esteemed members of the KMV Managing Committee and **Keynote speaker Prof. Arvind** (IISER Mohali), who delivered a thought-provoking talk on the deeper foundations of science. With participation from **200 top students representing over 15 institutions**, the camp featured enriching sessions by renowned mentors including **Dr. H.L. Vasudeva**, **Dr. Sarmistha Sahu**, **Dr. Yogesh Kumar Singh**, and **Dr. Neetu Verma**, covering topics from mathematical inequalities and magic squares to Vedic Math and experimental physics. The camp was highly appreciated by students and faculty alike for its hands-on approach and intellectual rigor. Shri Chander Mohan ji praised KMV’s efforts in nurturing future scientific leaders and commended the faculty for their dedication to academic excellence.



## KMV Conducted a program - Learning Physics through Nature (LEPTON)

The **LEPTON program—Learning Physics Through Nature**—was held on October 15, 2024 by Dr. Harleen, as part of KMV’s status as Punjab’s first and only Anveshika centre, the offline quiz challenged 156 students from 15 schools to analyze experimental videos and apply theoretical concepts in real-world scenarios. The event successfully fostered critical thinking and scientific analysis among young learners.



## Kanya Maha Vidyalaya Becomes Punjab's First Knowledge Partner in DST- Vigyan Jyoti Programme

Kanya Maha Vidyalaya (KMV), Jalandhar, has become the **first college in Punjab** to be recognized as a **Knowledge Partner** in the prestigious **DST-Vigyan Jyoti Programme**, an initiative of the Department of Science & Technology to promote STEM careers among meritorious girls from Classes IX to XII. Joining the ranks of national institutions like IITs and IISERs, KMV will mentor JNV Jalandhar through science camps, workshops, and career counseling. Under the guidance of Dr. Neetu Verma, KMV’s efforts aim to break gender barriers in STEM fields. This recognition reflects KMV’s continued leadership in innovation and education, as well as its commitment to empowering young women in science and technology.

## Inspire Internship Science Camp

On August 30, 2024, Dr. Neetu Verma from the Physics Department was invited to conduct a workshop at the **Inspire Internship Science Camp** held at DAV College, Bathinda. Accompanied by technical staff, Dr. Verma demonstrated key Physics concepts such as **Bernoulli's principle**, **Lenz’s law**, **wave motion**, **Pascal's law**, and **optics**, using simple, everyday materials. Engaging experiments with instruments like the **radiometer**, **plasma globe**, and **magic tap** captivated students and encouraged active participation. The workshop sparked curiosity and excitement, showcasing KMV’s commitment to hands-on learning and inspiring the next generation of scientific minds.



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



On September 16, 2024, a **mentoring program** was **organised** for students of Govt. Smart Sr. Sec. School, Hazara. Held at KMV’s **Innovation Hub**, the session aimed to promote scientific thinking and innovation among school students. Students explored hands-on experiments like the **Newton Cradle**, **Air Cannon**, **Lorentz Oscillator**, and **energy transfer in springs**, gaining practical insights into real-world applications. The interactive session sparked enthusiasm and curiosity, encouraging students to pursue innovative ideas.

## KMV Hosts 5-Day Drone Technology Bootcamp organised by Dr. BR Ambedkar National Institute of Technology

**5-day Drone Technology Bootcamp** was hosted in collaboration with **Dr. B.R. Ambedkar National Institute of Technology**, from **September 23–27, 2024**, under the MeitY-funded project for capacity building in unmanned aircraft systems. The bootcamp offered students a unique opportunity to gain **hands-on experience in drone assembly, operation, and applications**. Expert sessions by **Captain Ashinee Kumar Acharya**, **Ms. Shivangi Sachdeva**, and others covered critical topics like **hybrid drones**, **payloads**, **drone maintenance**, **ATC procedures**, **flight control**, and **safety regulations**. Students actively engaged in assembling drones, flight calibration, and presenting their own self-built models.



## Kanya Maha Vidyalaya (KMV), Jalandhar Unveils State-of-the-Art Research Lab



State-of-the-art **Research Lab** was inaugurated, marking a significant milestone in academic excellence. Built with an investment of **Rs 2 crore**, the lab is equipped with cutting-edge instruments like the **UV-VIS Spectrophotometer**, **FTIR Spectroscopy**, **Differential Scanning Calorimeter**, and more. Supported by prestigious grants like **CURIE**, **FIST**, and **DBT**, the lab will greatly benefit KMV’s faculty and research scholars. This initiative reinforces KMV’s leadership in higher education and its commitment to fostering innovation and scientific inquiry.

## Dr. Surbhi Sharma Delivers Invited Speech at Universiti Tunku Abdul Rahman (UTAR), Malaysia



Dr. Surbhi Sharma, was invited as a distinguished speaker at the **13th Global Conference on Materials Science and Engineering (CMSE 2024)**, held from November 17–20 in Kampar, Perak, Malaysia. Organized by the Faculty of Engineering and Green Technology, UTAR, this prestigious event brought together leading global researchers in materials science. Dr. Sharma’s invited talk showcased her expertise in innovative materials and their real-world applications, underlining her significant contributions to the field. Her participation marked a proud moment for KMV, highlighting the institution’s global academic outreach and dedication to cutting-edge research and collaboration.

## Harman of M.Sc Physics at Kanya Maha Vidyalaya Jalandhar Clears Prestigious UGC NET JRF Exam

**Harman**, a student of the **M.Sc. Physics** program, has successfully cleared the prestigious **UGC NET JRF** exam. This outstanding accomplishment reflects the academic excellence and rigorous training provided by the **Department of Physics** at KMV.



I’m small, I’m strange, I’m up and down. I help build matter all around. You’ll find me inside protons too — What kind of particle am I? Clue’s in the zoo!  
A Quark



Dr. Neetu Verma Presents Groundbreaking Research on Gamma Ray Shielding at ICAMM-2024

Dr. Neetu Verma, presented her research paper at the prestigious **International Conference on Applied Mechanics and Mathematics (ICAMM-2024)** held in **Melbourne, Australia**, on **22nd-23rd November 2024**. Her paper, titled “*Analysis of Enhancement in Gamma Ray Shielding Proficiency with Samarium in Lead-Free Potassium Boro-Tellurite Glass System*”, offered groundbreaking insights into sustainable radiation shielding materials. Dr. Verma's innovative work was highly appreciated by the global scientific community and sparked valuable discussions on the potential of samarium-doped glass systems in advanced shielding technologies.

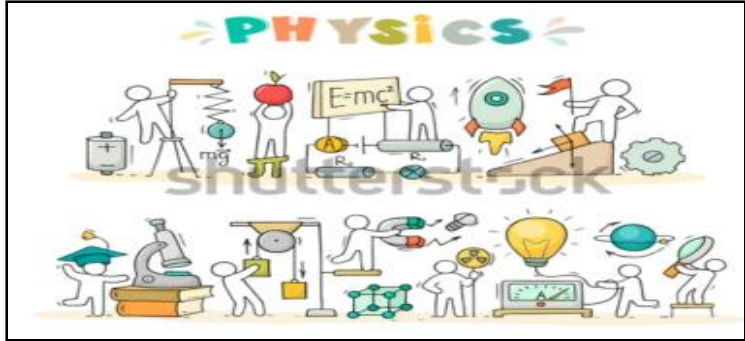
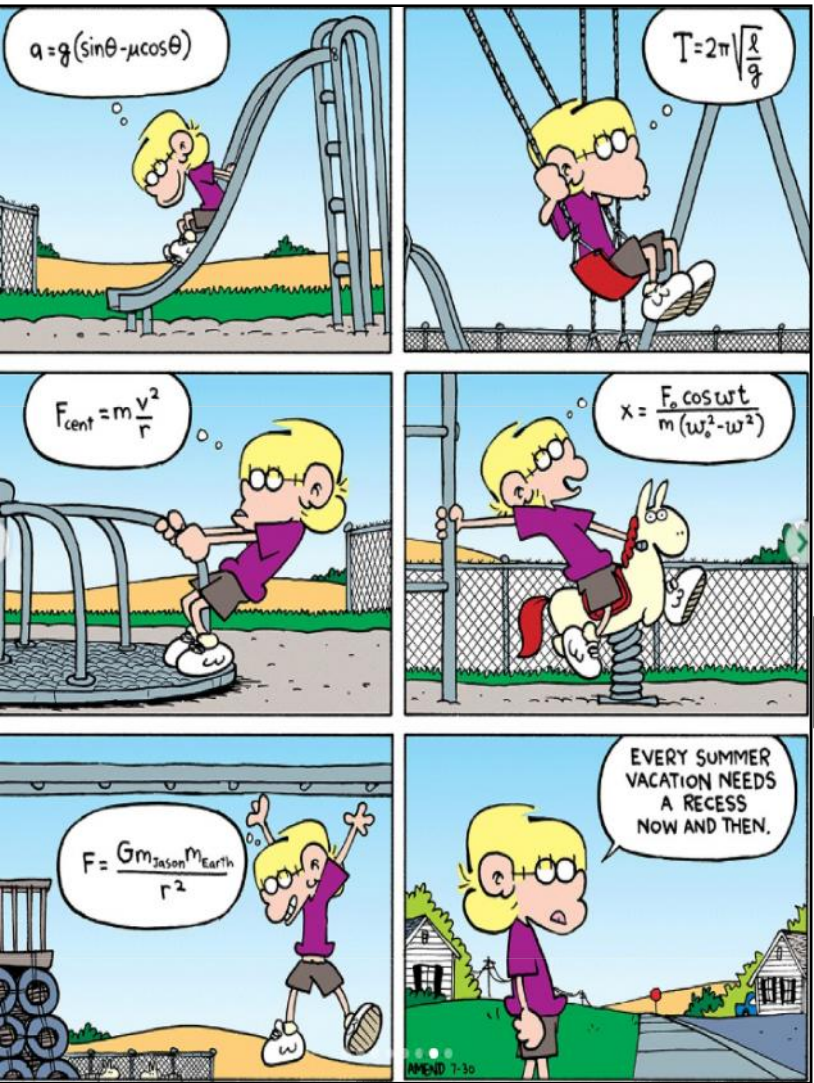


Innovating Careers: The Impact of Physics Education on Job Market Success and Future Innovation



On **December 17, 2024**, **Dr. Surbhi** delivered an impactful seminar titled “*Innovating Careers: The Impact of Physics Education on Job Market Success and Future Innovation*” at **Government Senior Secondary School, Hazara**. The seminar aimed to enlighten students on the transformative role of physics in shaping diverse and future-ready career paths. Dr. Surbhi’s engaging talk emphasized how physics education forms a strong foundation for success in both conventional fields and emerging sectors like **data science**, **engineering**, and **environmental sciences**. She encouraged students to adopt innovative thinking, seek hands-on experiences through **internships**, **research projects**, and **workshops**, and cultivate an entrepreneurial mindset.

Fun Times with Physics



RIDDLE

How many theoretical physicists specializing in general relativity does it take to change a light bulb?

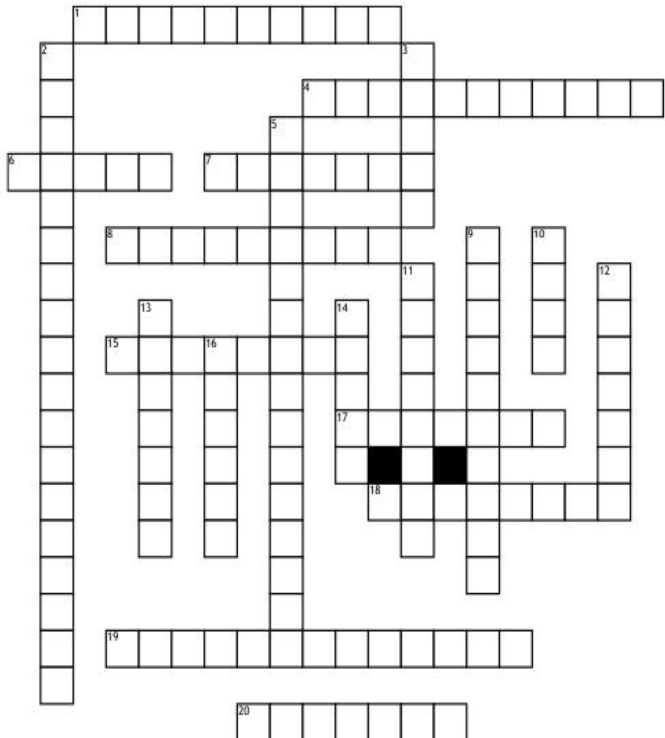
Answer: Two. One to hold the bulb and one to rotate the universe.

RIDDLE

I come in many shapes, sizes, and colors. I stick to many surfaces but I am, in fact, not sticky at all. What am I?

Answer: Magnet

Electrostatics



Across

- 1. charges that don't move easily through material since their electrons are tightly bound to the nucleus.
- 4. the fundamental law of electrostatics stating that the force between two particles is directly proportional to the product of their charges and inversely proportional to the square of the distance between them
- 6. like charges do what
- 7. electric potential or also called
- 8. charges that move easily through the material, outer electrons are not as tightly bound to the nucleus. they conduct heat and electricity easily. ex): metal, fingers, etc
- 15. gain electrons, charge becomes
- 17. unlike charges do what
- 18. charge is measured in
- 19. only allows electrons to flow in one way
- 20. A way to charge insulators and conductors

- 5. Continuous path for which charge flows
- 9. uses mechanical motion to create electricity
- 10. what is the unit for resistance
- 11. A force that opposes motion between two surfaces that are in contact
- 12. protons and neutrons
- 13. force is measured in
- 14. example of electrical conductors
- 16. What is the unit for current



Dr. Sangeeta Prasher from KMV, Jalandhar, Honored with Best Researcher Award at the 17th International Popular Scientist Awards

Dr. Sangeeta Prasher has been honored with the prestigious **Best Researcher Award** at the **17th International Popular Scientist Awards**. This esteemed accolade recognizes her outstanding contributions to the field of physics and her relentless commitment to scientific advancement. Dr. Prasher is known for her innovative research in **advanced materials** and **quantum mechanics**, which has garnered acclaim in prominent scientific forums.

Faculty and Research Scholars from KMV Attended Workshop on Environmental Radioactivity Monitoring

Faculty members and research scholars, actively participated in a **five-day online workshop** on “*Environmental Radioactivity Monitoring and Its Impact for Health Risk Assessment*”, held from **January 6 to 10, 2025**. The workshop was organized by the **Department of Physics, Dr. B. R. Ambedkar NIT Jalandhar**, under the esteemed **GIAN (Global Initiative on Academic Network)** program. The sessions featured renowned experts, including **Prof. Shinji Tokonami** from Hirosaki University, Japan, and **Prof. Rohit Mehra** from NIT Jalandhar, and focused on radiation measurement techniques, environmental impact, and health risk mitigation strategies.

Story time

The Dark Matter’s Secret

Dr. Elara Vance had devoted her career to chasing shadows. Not the shadows of planets or black holes, but the greatest one of all—**dark matter**. The invisible mass that outweighed everything familiar in the universe, the hidden scaffolding of galaxies, the ghost that no instrument had ever truly caught.

Her laboratory was buried beneath the Arctic ice, where silence was deep enough to detect whispers from the cosmos. The experiment was designed to be impossibly delicate: xenon tanks cooled to near absolute zero, tuned to notice the faintest tremor of a dark matter particle brushing against ordinary atoms. For months, the detectors had returned nothing but static. Until tonight.

At 2:17 a.m., the data feed jolted to life. Not with random noise, but with *rhythms*. Pulses, repeating with an order too precise to be chance.

Elara blinked at the screen, leaning closer. “This can’t be right...”

Her deputy Markus joined on the comms. “I’m seeing it too. Almost looks like...music.”

Not music, Elara realized, but *patterns*. She ran the feed through filters and transforms. Slowly, the chaos resolved into meaning. Ratios. Constants. Sequences. The fingerprints of physics itself, written in code.

And then something stranger happened. The equations unfolded into a lattice—a **map**.

On her monitors bloomed the cosmic web, the vast scaffolding of dark matter stretching across billions of light-years. She had seen crude reconstructions before, but nothing like this. The detail was staggering. Threads of invisible mass connected galaxy clusters like strands in a neural network.

Her breath caught as she compared the model to known star charts. It matched—except in certain places. The map showed dense knots of dark matter where no visible galaxies existed. Invisible structures, hidden nodes.

A thought chilled her: *The galaxies are not the structure. They are only decoration. The real universe is this.*

For the first time, Elara saw humanity’s insignificance with painful clarity. Stars and planets were mere sparks scattered on the skeleton of something far vaster.

Then the pulses changed.

The rhythm slowed, deliberate. Numbers appeared again—this time primes, Fibonacci spirals, golden ratios. *Intentional*. Not just background noise, but *a message*.

Elara’s lips went dry. She parsed the symbols until a phrase emerged, undeniable in its simplicity:

**YOU ARE NOT ALONE.**

Her heart hammered. It wasn’t possible. And yet the data left no room for doubt. Dark matter wasn’t passive scaffolding. It carried information. Maybe even thought. The universe itself could be a living web, an intelligence stretched across galaxies, older than stars.

“Elara,” Markus whispered, “what if it’s...aware?”

The thought terrified her more than any black hole or gamma-ray burst ever could. If this was true, then humanity was a fleeting spark in the mind of something incomprehensibly vast.

The pulses continued, steady, patient. Waiting.

Her fingers hovered over the console. She could respond—encode a sequence of primes, a simple greeting, something to say: *We hear you*. But the implications made her hesitate.

If she answered, humanity would no longer be an observer. It would be a participant in a dialogue with the cosmos itself. And she knew what would follow: governments would weaponize it, religions would claim it, civilizations might fracture under the weight of knowing.

But she had not spent her life staring into silence just to remain silent herself.

Elara exhaled, steadying her hands. She typed: **2, 3, 5, 7, 11, 13**. Prime numbers, unmistakable as a sign of intelligence. She pressed *enter*.

The data stream flickered. For a long moment, nothing. Then the response came, overwhelming—an avalanche of complexity, equations spilling across her screens faster than she could process. Architectures of physics beyond human comprehension.

The universe was not whispering anymore. It was speaking.

Elara sank back in her chair, awe and terror warring in her chest. The secret of dark matter was not its invisibility. It was that it was **alive**, a vast consciousness holding the cosmos together.

And tonight, for the first time, it knew she was listening.

The darkness had spoken—and would never be silent again.

I’m all around you, but you can’t see me.

I hold you down, but I set rockets free.

What am I?

