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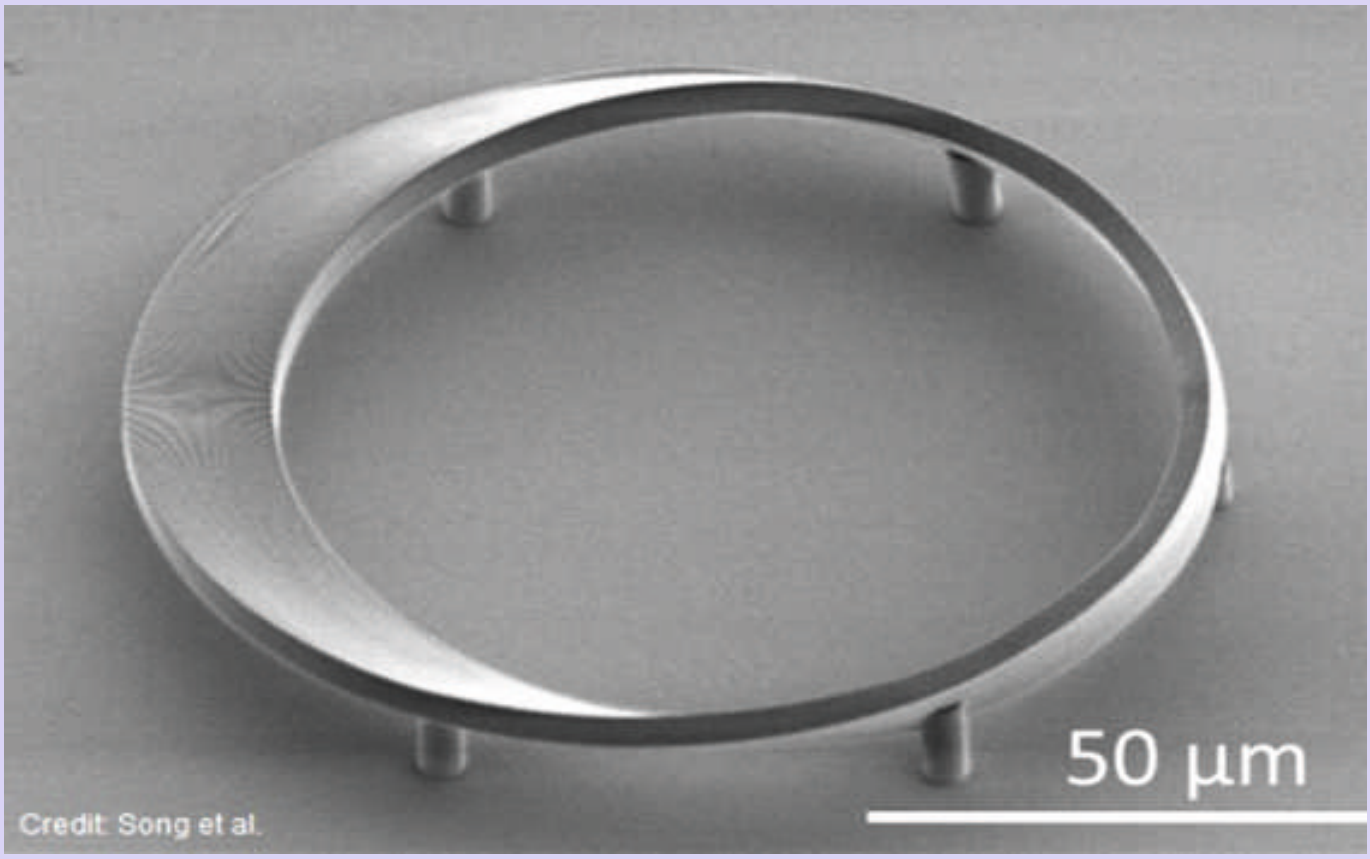

Researchers at Université Paris-Saclay coined a new term for a new photonics sub-field called non-Euclidean photonics. The team introduced new devices that could be used as a test bed for non-Euclidean photonics. These devices are microlasers in which the laser cavity is a curved surface. In particular, they investigated one-sided, non-orientable surfaces known as Möbius strips. The image (above) is a scanning electron microscopy image of a Möbius strip microlaser. Using a single sample, several dozens of microlasers with different shapes and sizes were created.The fabrication method employed is effective and easy to reproduce, and could thus be used to create numerous microlasers that perform well.

The 3D fabrication of microlasers could be a crucial step in the development of new photonic technologies. Researchers believe that there could soon be new theoretical and experimental results in this area; for instance, uncovering the polarization features and the diversity of modes of the new microlasers.

(https://phys.org/news/2021-11-mbius-microlasers-non-euclidean-photonics-applications.html)

The Story of Cosmology through Postal Stamps- 10

MEDIEVAL ASTRONOMY

ISLAMIC (700AD-1500AD)

Revival of astronomical studies occurred and led in 7th century by the Arabs. The origin of Islamic Astronomy is interwoven with the knowledge derived from India and ancient Greeks.

Astronomical observations made by Arabs contributed greatly in the field of observational instrument and setting up truly astronomical institutes.

Stamp with tag- depict Madrasa founded by Ulngh Beg at Samarkand were also used as astronomical observatories

Ulugh Beg(1394AD) with astrolabe

Mohammad Taragai Ulugh Beg, Tartar Prince (1394) founder of astronomical observatory at Samarkand

Al-Zarqawi (1402), Spain- invented perfect astrolabe –"the tablet of al Zarqawi" or Saphaea

Ali Qushji-(1403)-Samarkand-wrote 9 work on astronomy

Al – Khwarizmi(820), Iran, Parcian polymath am=nd astronomer prepared first comrehensive astro table Zijes – Sindhind.

Ibrahim Hakk Erzuruni(1756), sufi saint- wrote - ***Marifetname*** explaining observational astonomy

Al Nath- arabic name of Beta Tauri- second brightet star in Taurus, Gint Star 134 LY away

BULLETIN OF
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The Bulletin is the official organ of the IAPT. It is a monthly journal devoted to upgrading physics education at all levels through dissemination of didactical information on physics and related areas. Further, the Bulletin also highlights information about the activities of IAPT.

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The editors wish all the readers
A VERY HAPPY
NEW YEAR

President's Message

New Year New Resolution

IAPT is a unique organisation with a cause to serve Physics community in particular and Scientific community in general by voluntary actions in a planned way and self-sustained manner with clear goals of reaching out to stake holders. New Year is the time to express our gratitude to all those who continued to inspire us and carried this resolve in their own innovative ways. Hats off to our founder Prof. DP Khandelwal and his dedicated team who provided us the vision and mission to think beyond our mundane routines. Thank you, Prof. Vijay Singh, Prof. KN Joshipura, Central EC members, Vice presidents, Presidents of the regional councils and their EC members, our team at central office, our IT and standard examinations teams, our Bulletin team for an exemplary work which you have done. Fortunately, despite pandemic waves which have shaken the world and are still around, silver lining has been the tremendous possibilities which virtual world has offered us. It has brought us all only a click away. We had no choice but to adapt to this new reality. New Teams to serve IAPT are in place ready to go ahead.

Our resolution for the Year 2022 is to build and strengthen teams and create an environment to facilitate their working. For me participating in election has been an exercise in introspection, feeling the pulse of your aspirations & dreams and identify the challenges ahead.

Physics is our common bond and doing physics means we are in the company of great minds who have changed this world beyond recognition. And yes, we too can in our own tested humble ways. We invite you all to be part of this journey, to quote PW Anderson- `More is Different'. And let us remember Prof. SN Bose who also made us realise why- `More is Merrier'.

Wish you all a very Happy, Healthy, Joyful and Thoughtful New Year 2022 ahead.

PK Ahluwalia

PHYSICS NEWS

A-List Candidate for Fault-Free Quantum Computing Delivers Puzzling Surprise

Uranium ditelluride crystals are believed to host a rare "spin-triplet" form of superconductivity, but puzzling experimental results have upended the leading explanation of how the state of matter could arise in the material. Neutron-scattering experiments revealed tell-tale signs of antiferromagnetic spin fluctuations that were coupled to superconductivity in uranium ditelluride.

Read more at :https://phys.org/news/2021-12-a-list-candidate-fault-free-quantum.html
Original paper : Nature (2021). DOI:10.1038/s41586-021-04151-5

Study re-examines the decay of 185Bi using state-of-the-art technologies

In addition to enhancing the understanding of 185Bi decay, the recent work could open new possibilities in the search for heavier proton-emitting nuclei. While these searches might be difficult to carry out and will involve challenging measurements, the tools at Argonne National Laboratory's ATLAS facility could be used to search for potential proton emitters, such as 188,189At, 194,195Fr and 200,201Ac. If successful, such research efforts would unveil new regions of proton radioactivity.
Read more at :https://phys.org/news/2021-12-re-examines-185bi-state-of-the-art-technologies.html
Original paper : Physical Review Letters(2021).DOI: 10.1103/PhysRevLett.127.202501

Turbocharged data analysis could prevent gravitational wave computing crunch

A new method of analyzing the complex data from massive astronomical events could help gravitational wave astronomers avoid a looming computational crunch.Researchers have used machine learning to develop a new system for processing the data collected from detectors like the Laser Interferometer Gravitational-Wave Observatory (LIGO). The system, which they call VItamin, is capable of fully analyzing the data from a single signal collected by gravitational wave detectors in less than a second, a significant improvement on current analysis techniques.Since the historic first detection of the ripples in spacetime caused by colliding black holes in 2015, gravitational wave astronomers have relied on an array of powerful computers to analyze detected signals using a process known as Bayesian inference.A full analysis of each signal, which provides valuable information about the mass, spin, polarization and inclination of orbit of the bodies involved in each event, can currently take days to be completed.
Read more at :
Original paper : Nature Physics (2021). DOI: 10.1038/s41567-021-01425-7

Pankaj Bhardwaj
Friedrich Alexander University
Erlangen & Nuremberg Germany

Indian Association of Physics Teachers

Announcement: Election Results

Due to Corona and other difficulties we the undersigned IAPT Life Members and invited guest (Ms. Mrunal Vaze) have unanimously decided to count all the ballot papers posted on or before the last date 8th Dec. 2021 and received upto 22nd Dec. 2021.

Name of the Post	Name of the Candidate	Details	No. of Votes obtained
President IAPT	Prof. P.K. Ahluwalia	Shimla Life Membership No. L 0326	509
	Prof. G. Venkatesh	Bangalore Life Membership No. L 3995	140

Invalid votes = 5 (five) Total votes polled = 509 + 140 + 5 = 654

Name of the Post	Name of the Candidate	Details	No. of Votes obtained
Vice President IAPT (West Zone)	Prof. Arun V. Kulkarni	Goa Life Membership No. L 4513	90
	Prof. Sivanand Appanna Masti	Hasarchampu, Maha. Life Membership No. L 3681	195

Invalid Votes = 2 (two) Total votes polled = 90 + 195 +2 = 287

It is our pleasure to declare that **Prof. P.K. Ahluwalia** has been elected as the President of IAPT.

It is our pleasure to declare that **Prof. Sivanand Appanna Masti** has been elected as the Vice President of IAPT (West Zone).

(Mrs K P Sule)
L3131

A M Shaikh
L3191

M.N. Shelke
L 3037

V.S. Kardare
L. 2610

(MRUNAL VAZE)

23/12/2021
(Dr. P.D. Lele) - R.O. Elections
Goregaon (East) Mumbai-400 065

Election Result for RC-10

(Jan 2022-Dec 2014)

In my capacity as Returning officer, I declare the following as elected unopposed to RC-10, on posts as mentioned against their name, for the term Jan. 2022 to Dec. 2024

President: Dr. A.K.Shrivastava **(L-5522)**
Dean, Faculty of Sciences, Dr.C.V.Raman University, Kota, Bilaspur, Chhattisgarh

Vice President: Dr. Ashutosh Pandey **(L- 6769)**
Assistant Professor, Dr.C.V.Raman University, Kota, Bilaspur, Chhattisgarh

Secretary: Prof. Sharad Kumar Kaushik **(L- 7851)**
Professor of Physics, Chauksey Engineering College, Bilaspur

Treasurer: Mr. Nitesh Kumar **(L-6774)**
Department of Physics, Dr.C.V.Raman University, Kota, Bilaspur, Chhattisgarh

Executive Members:
1. Dr. A.K.Panigrahi **(L- 2670)**
2. Dr.Bhuneshwar Verma **(L-6459)**
3. Dr.Vivek Ambalkar **(L- 7889)**
4. Dr.Lakhapati Patel **(L- 7020)**
5.Dr.P.B. Taunk **(L-6884)**

Umakant Shrivastava (L-7126)
Returning Officer
IAPT, RC-10
Chhattisgarh

Election Result for RC – 12

(Jan 2022 to Dec 2024)

Positions	Name	LM. No
President	Dr. L. A. Udachan, HOD Physics, CB PG College, Bhalki,Mob 9449291594	M
Secretary	Dr S M Khened, Raichur, Former Principal LVD College Raichur Mob 9448571503	L1804.
Vice President	Prof Dr B R Kerur, Gulbarga University,Kalaburagi, Mob9448213160	L1224.

Treasurer		
Member	Prof. S Y Amargolakar.Former Professor, Karnataka University Dharwad,	L2450.
Member	Prof .V T Deshpande, LVD College Raichur (Rtd), Raichur,	L1808.
Member	Dr M Prabugouda, VN College, Hospet,	L3140.
Member	Dr Shantala D Patil, Govt. First Grade College, Aland	L3311.
Member	Prof. VeerappaDalavai,Former HOD Dept. of Physics RLS College, Belagavi,	L 3981.
Member	Dr. Mohan T Hosmani, Former Principal PC JabinCollege,Hubali,	L4060.

List of new EC members of IAPT for the term from January 2022 to December 2024

Sr. No.	Post	Name
1	President	Prof. P. K. Ahluwalia, Shimla
2	General Secretary	Prof. Mrs. Rekha Ghorpade, Thane- Mumbai
3	Vice President, North zone	Prof. Ravi S. Bhattacharjee, Delhi
4	Vice President, East zone	Dr. Ranjita Deka, Guwahati
5	Vice President, Central zone	Prof. Ashok Kumar Jain, Roorkee
6	Vice President, South zone	Dr. P. Nagaraju, Bangalore
7	Vice President, west zone	Dr. Shivanand A. Masti Hasarchampu, Maharashtra
8	Vice President, General	Prof. H. C. Verma, Kanpur
9	EC Member RC-02	Prof. Meenakshi Sayal, Jalandhar
10	EC Member RC-03	Prof. Paswan Kumar, Shimla
11	EC Member RC-04	Dr. sunder Singh, Bareilly
12	EC Member RC-05	Dr. L. P. Purohit, Haridwar
13	EC Member RC-07	Dr. Chetan G. Limbachiya Vadodara
14	EC Member RC-08	Dr. S. B. Mane, Islampur Maharashtra
15	EC Member RC-09	Dr. Pradip Kumar Dubey Indore
16	EC Member RC-12	Dr. M. S. Jogad, Kalburgi Karnataka
17	EC Member RC-13	Dr. A. Anandvadivel Midnapur (WB)
19	EC Member RC-18	Prof. Kalipada Adhikari, Agartala (Tripura)
20	EC Member RC-20	Prof. Shyam Ranjan Kumar Ranchi (Jharkhand)
21	EC Member RC-22	Dr. V. Rajeshwar Rao, Karimnagar (Telangana)

Rekha Ghorpade
General Secretary, IAPT

ARTICLE

A Gedanken Experiment to Verify the Principles of Quantum Physics for Macroscopic Objects

Ajay S

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Abstract

In this paper we discuss about the scale in which quantum mechanical effects are significant and also discuss its application to large scale bodies. We use sand grains travelling at extremely low speeds such that their de Broglie wavelengths cannot be ignored and perform an interference thought experiment. We show that this experiment is practically impossible even though it is possible in principle.

Keywords

Quantum mechanics, particle nature, wave nature, de Broglie wavelength, Planck's constant, low speeds, sand grains.

Introduction

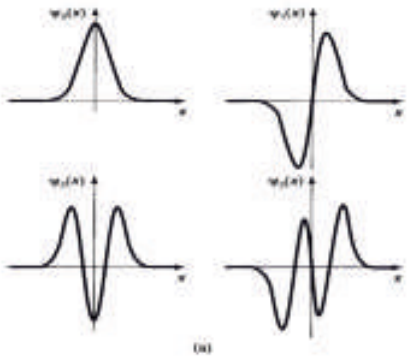
It is well established that Quantum Mechanics is the general theory governing the interaction and motion of all that exists and Classical Mechanics is but a limiting case of the same, producing the same results as classical physics in the limiting case of large objects moving with normal speeds, or more precisely in situations where the object momenta are not good enough to offset the extremely low value of the Planck's constant (10 to power minus 34) so as to result in a significant value of the De. Broglie wavelength of the object.

Take harmonic oscillator for example. When we apply the Schrödinger's equation to this problem and solve, we get the spatial part of the wave function to be

$$\psi_n(x) = \left(\frac{m\omega}{\pi\hbar}\right)^{\frac{1}{4}} \frac{1}{\sqrt{2^n n!}} H_n(\epsilon) e^{-\epsilon^2/2} \qquad (1)$$

Where $H_n(\epsilon)$ is the Hermite polynomial [1]

The graph of $\psi_n(x)$ and $|\psi_n(x)|^2$ is plotted for n=0,1,2,3 in figure 1.



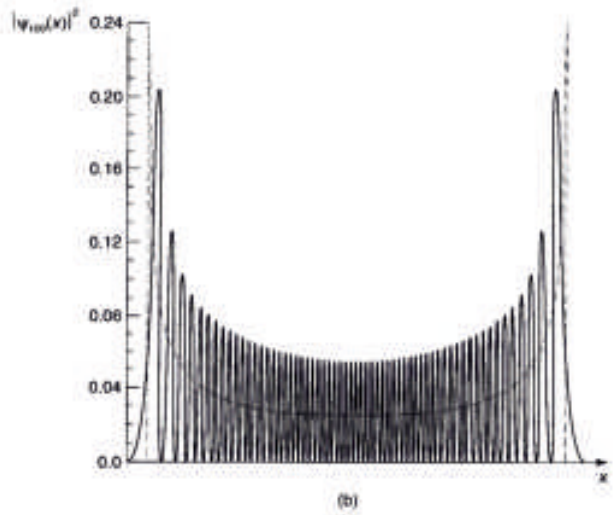


Fig 1: (a) The first four stationary states of the harmonic oscillator. (b) Graph of $|\psi_{100}(x)|^2$,with the classical distribution (dashed curve) superimposed. [1]

From figure 1 (b) it is very clear that as n becomes larger and larger, the result obtained is described by the harmonic oscillator problem solved using classical physics.

Therefore, we understand that classical physics is a small part or a domain of the larger theory: quantum mechanics, except of course Gravity, which is yet to get integrated into a Quantum theory.

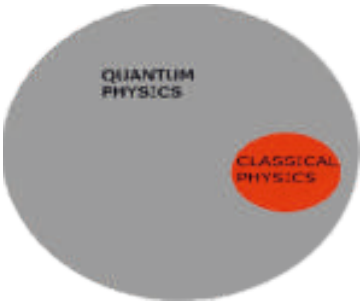


Fig 2: Depicting the view that classical physics is a domain of quantum physics

1.1 De Broglie wavelength (h/mv) of electrons

Supposing that an electron is moving at a speed~$10^6 ms^{-1}$

(Which are their usual speeds) Then its de Broglie wavelength is$0.728nm$.

Because the wavelength of electron is comparable to the dimensions of atoms and interatomic spacing, they show effects like crystal diffraction- a wave phenomenon.

1.2 De Broglie wavelength of humans

Suppose there is a person who weighs about $50kg$, who is stationary with respect to a frame of reference. Then for an observer in the same frame, his de Broglie wavelength is infinity, because $v = 0$ hence considering the wave properties of a human at rest makes no sense.

Let us try the person to have finite wavelength. Supposing he is running at $5ms^{-1}$ then his de Broglie wavelength would be $\lambda = 2.6504 \times 10^{-3}\ m$. This is such a ridiculously small number that it makes no sense to consider the wave nature of a person moving at $5ms^{-1}$ as the same will not be measurable.

1.3 De Broglie wavelength of Earth

With respect to the sun, earth moves at an orbital speed of $30kms^{-1}$ and has a mass of $5.972 \times 10^{24}kg$

Hence its de Broglie wavelength would be $3.698 \times 10^{-63}m$, which is again a ridiculously small number for any possible measurement, directly or indirectly.

Therefore, by examining all the examples mentioned for de Broglie wavelength, we understand why quantum mechanical effect or wave nature of matter can be ignored for large scale bodies and hence classical physics works.

1.4 De Broglie wavelength of sand grains

Let us now consider an example where the object size is not too big, but still can be seen with a naked eye, say sand grains. Suppose the mass of a grain of sand is one microgram i.e., $m = 1\mu g = 10^{-9}kg$. Suppose we want to calculate the speed of a grain of sand such that its de Broglie wavelength is $1mm$. Its velocity must be $v = 6.626 \times 10^{-22}ms^{-1}$.

In practice, sand grains never move at such a low speed, hence we do not observe any wave properties either. At normal speeds, their wavelength will be too small to lead to observable effects on a macroscopic scale.

Gedanken experiment

What if we do a thought experiment to make macroscopic matter travel at a desired speed to get a desired de Broglie wavelength, hence observing their wave nature at large scales? Such an experiment would prove that quantum physics works all through.

2.1 The double slit experiment

In the famous double slit experiment,[2](See figure 3) when monochromatic light is shined through two slits, the light from the two slits interfere and form an interference pattern on the screen placed a few meters apart. If we use light of wavelength $\lambda = 600nm$, and the two slits being $d = 1.5mm$ apart, then we obtain an interference pattern. At a distance of $D = 3m$ from the slits, the fringe width of both bright and dark bands will be $\beta = 1.2mm$($\beta = \frac{\lambda D}{d}$)

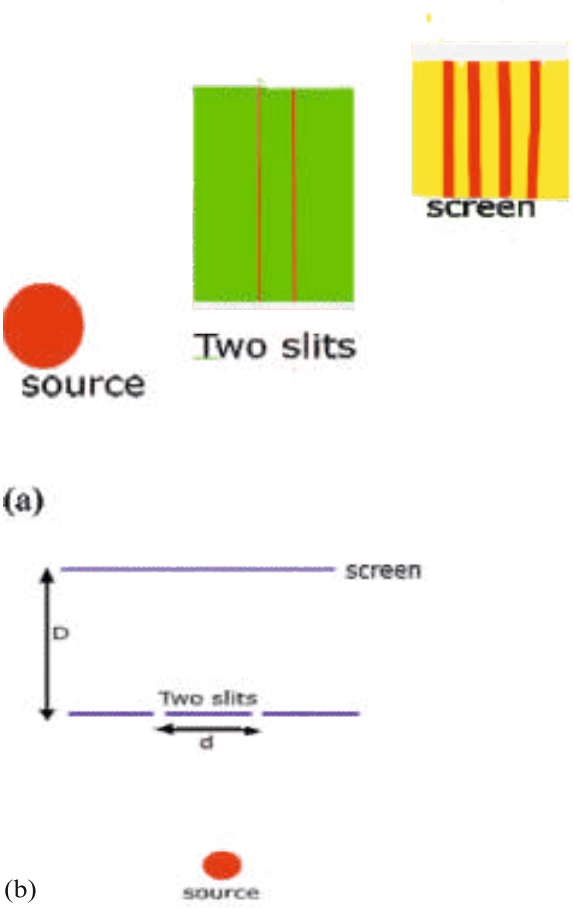


Fig 3: (a) Represents the side view of the double slit experiment. (b) Represents the top view of the apparatus used in the double slit experiment.

2.2 Double slit experiment using sand grains

Now, if we do the same experiment using matter waves of the same wavelength as $\lambda = 600nm$, we expect the same interference pattern, if matter really has wave like properties. Again, we will consider a sand grain, which is a bulk matter containing millions of atoms. We will check whether sand grains obey the rules of quantum physics. Supposing the mass of a sand grain is $1\mu g$.

To have a de Broglie wavelength of $600nm$ its speed must be $v = 1.104 \times 10^{-18}\ ms^{-1}$to produce an interference pattern, when passed through two slits. For our purpose, we will take the distance between two slits to be again $d = 1.5mm$, distance between slits and screen to be $D = 3m$.

Then these matter waves must give an interference pattern with fringe width equal to $\beta = 1.2mm$, which is measurable.

Now, the real challenge is to make sand grains to travel at such extremely low speeds. Let us discuss whether this is really possible, if so, then how to make these travel at those speeds.

2.2.1 Experimental setup for double slit experiment using sand grains

When the experiment is carried out using light, because light interacts weakly with gravity, we did not care about it. Now because we intend to do the experiment using sand grains with mass significant enough, that gravity comes into picture. Therefore, when we shoot these sand grains, they will not reach the screen but fall down in along a parabola. We have to nullify this effect due to gravity, so that the experiment can be carried out. For that we charge the sand grains electrically, so that we can control their motion using an external electric field. As mentioned previously, the sand grains, each weigh about $1\mu g$ or $10^{-9}kg$, the gravitational force on these objects will be $10^{-9}kg \times 9.8ms^{-1} = 9.8 \times 10^{-9}N$. This might be a force in the order of nanonewtons, but because this is the only force acting on them, they will eventually deflect because of it.

The idea here is to balance the downward gravity using an upward electric field. Suppose we charge each sand grain by q and the magnitude of electric field is E, then for no motion of the sand grains vertically, we must have

$$qE = mg \qquad (2)$$

$$qE = 9.8 \times 10^{-9}$$

Suppose we charge each grain of sand to $+1C$ then the intensity of the electric field must be $9.8 \times 10^{-9}NC^{-1}$.

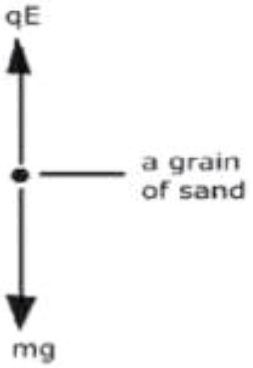


Fig 4: A grain of sand at equilibrium due to balance of gravity and electric field force.

Practically, we have to place the experimental apparatus between two plates as shown in figure 5.

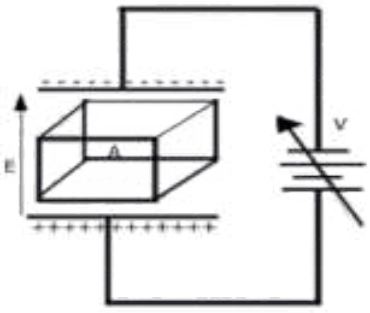


Fig 5: Depiction of the double slit experimental apparatus(A) kept in between two electrically charged plates, producing an electric filed intensity E.

We need to make sure that the bottom plate is positively charged, so that the applied electric field will be pointing up. The next challenge is to make the sand grains to travel at $1.104 \times 10^{-18}ms^{-1}$.

If we measure the distance between the plates (z), we can set the desired electric field by applying a suitable voltage given by

$$E = \frac{V}{z} \qquad (3)$$

2.2.2 Experimental setup to achieve low speeds of sand grains.

The idea will be that the source which is shooting these sand grains onto the two slits should contain a source of electric field.

Suppose, the sand grains all are at rest initially, to make them have a velocity $v = 1.104 \times 10^{-18}ms^{-1}$, the acceleration must be $a = 1.104 \times 10^{-18}ms^{-2}$ for one second only. Immediately, the external force must be removed, so that they will have a velocity of $v = 1.104 \times 10^{-18}ms^{-1}$ the remaining time. If the acceleration must be $a = 1.104 \times 10^{-1}\ ms^{-2}$ for one second, then the force acting on each of sand grains must be $F = ma$

$$F = 1.104 \times 10^{-18}ms^{-2} \times 10^{-9}kg = 1.104 \times 10^{-2}\ N$$

This tiny amount of force must be produced due to external electric field in the source

$$F = qE \qquad (4)$$

Since it was mentioned earlier that charge on each grain of sand is $1C$, $E = 1.104 \times 10^{-27}NC^{-1}$.

Therefore, an electric field of $E = 1.104 \times 10^{-27} NC^{-1}$ must be applied on the sand grains at rest for one second and immediately turned off.

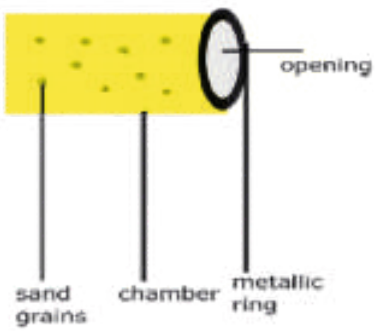


Fig 6: Schematic of the source, containing sand grains in the chamber. The metallic ring surrounding the opening will accelerate the sand grains to the desired speed.

As shown in figure 6, the source of electric field must come from the ring drawn in the source, as the sand grains can come through the hole.

2.2.3 Further measures to carry the experiment

We will evacuate the whole apparatus, so that there will be no other influence on these objects to affect their motion. We will have to enclose the entire apparatus with a strong material of good mechanical strength because we do not wish the apparatus to collapse due to air pressure from outside. Ones the sand grains are let out from the source, we are not allowed to see it using light because these are charged matter, its motion will be affected due to light.

Let the screen be made of a material which can stick sand which falls on it. So that towards the end of the experiment we might figure out whether they indeed show wave like properties if we see an interference pattern. Meaning the sand grains have to be distributed like shown in figure 7.

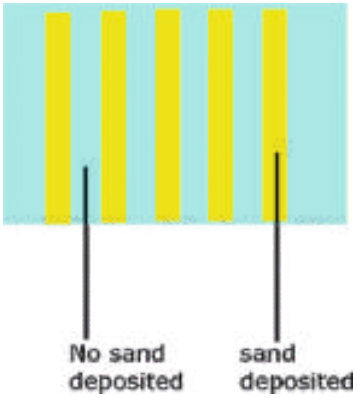


Fig 7: Screen with sand being deposited after equal lengths.

The width of the regions where sand is deposited and not deposited must be of equal size as mentioned earlier.

2.2.4 Time duration of the experiment

Suppose the distance between the source and the slits is taken as $2m$. And the distance between slits and the screen is $3m$. The sand grains will have to travel $5m$ from the source to the screen. Now that we know at what speed these sand grains have to travel at and what distance they should travel, we can calculate how long this experiment would take.

Time taken for a sand grain to travel from source to screen $t = \frac{5m}{1.104 \times 10^{-1}\ ms^{-1}} = 4.5289 \times 10^{18} s.$

And $4.5289 \times 10^{18} s = 1.1456 \times 10^{11} years = 114.56\ billion\ years.$

Carrying out such an experiment for about a hundred billion years is practically impossible. So, can we create computer simulations of this experiment and fast forward a hundred and fourteen billion years and see if there is an interference pattern? May be? Even though macroscopic objects like the sand grains exhibit wave properties at such low speeds in principle, practical difficulties of nature do not allow us to verify them experimentally. Hence this has to remain a thought experiment.

3.Conclusion

In this paper we discussed when the wave nature of matter becomes more significant. We also tried to address the question whether quantum physics applies to all domains. We calculated the de Broglie wavelengths of various macroscopic objects and reasoned why they do not have significant wavelengths. We discovered that, even though in principle the sand grains exhibit wave properties at very low speeds, it is practically impossible to carry out the experiment. Nature is built that way!

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Figures created using Inkscape (http://inkscape.org).

Radiation - the Uncommon in the Life of the Common Man.

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Abstract:
Nuclear Physics is that elegant branch of physics which is understood by few and feared by most. The name triggers the memory of the devastation caused by the atom bombs and the recent disaster of the Fukushima power plant. But, just like every coin has two sides, this science has applications that the common man may not know about. This article aims to make people aware of some of the applications of radiation in our daily lives.

Radioisotopes

Every element can be represented by a symbol. For example, ${}_6C^{14}$ represents Carbon. The number 6 represents the number of protons and 14 represents the total number of nucleons, that is, protons and neutrons, inside the nucleus. When the number of protons remains the same but the number of neutrons changes, then we get isotopes of the element. For example, ${}_6C^{12}$, ${}_6C^{13}$, ${}_6C^{14}$, etc. are all isotopes of carbon. When these isotopes are emitting radiations like □ and □ particles or □ radiations, they are known as radioisotopes or radioactive isotopes. Natural radioactivity is observed only for the heavy elements which have more than 92 protons. All other radioisotopes are produced artificially in nuclear reactors or accelerators.

Most people are aware of the high-end medical applications involving radioisotopes. These isotopes are used to detect tumors or blockages in organs and also to cure these anomalies. CAT scans and PET scans are now everyday household words!

Applications of Radiations in Industry

The industrial applications of radiations are the ones which affect the quality of life of the common man. These applications are broadly divided into three categories. They are as follows:

1. Radiation processing
2. Non - destructive testing
3. Radiotracer applications

We shall discuss each of them with a few examples.

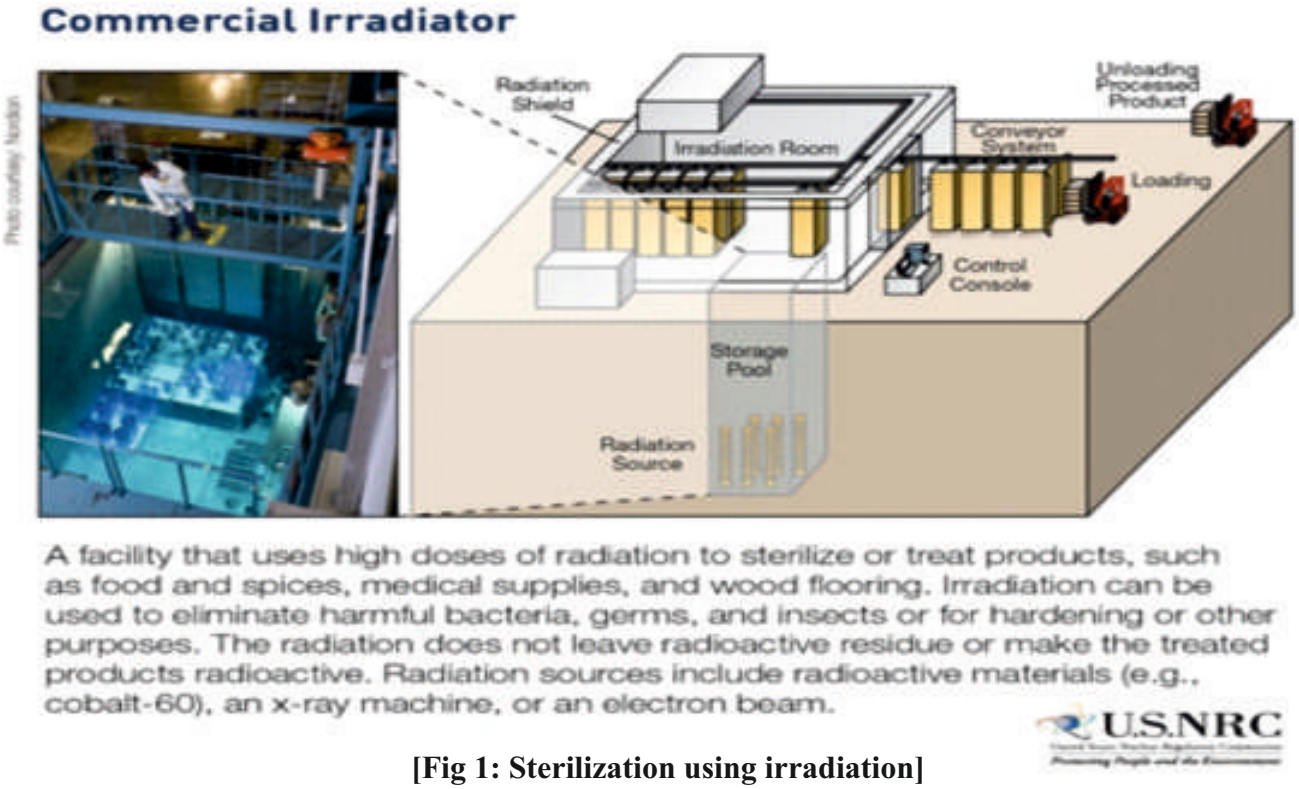
1. **Radiation processing** - In this process, the energy of ionizing radiation is applied on the product for treating it or sterilizing it. The ionizing radiations include the gamma and the x-rays and accelerated electrons. Some of the applications are as follows:

a. Sterilization of medical equipment: Earlier, the medical equipment like syringes were mostly made of glass. These and other metallic instruments were sterilized either in an autoclave or hot air oven. This method of cleaning had a major drawback: the grooves in these instruments could not be completely cleaned, thus providing a breeding place for bacteria and viruses. Also, plastic or rubber instruments could not be cleaned by this method, as they would melt at such high temperatures. Nowadays, the manufacturer uses radiation sterilization for all medical devices and also surgical cotton, and certain antibiotics and ointments. The major advantage of this method is that the equipment can be packaged and then sterilized, and the radiation can reach every cavity. In this method, a dose of 25 kGy is made incident on the product. The gamma rays penetrate through the sealed packages and destroy if any microorganisms are present in the package. This even increases the shelf life of the

product. More than 40% of all single use medical devices are sterilized by this method.
Gamma irradiation is used by many tissue banks all over the world. Tissue transplants involve donation of tissues, proper storage and eventually transplanting in the patient. When these stored tissues are sterilized using radiation and then transplanted, it helps in preventing infection and sometimes death of the receiver.

b. Sewage treatment using radiation techniques: The main cause of water pollution worldwide is sewage. Sewage consists of wastewater from homes, factories and even excess rain water. It is known as effluent. While this water is rich in organic matter, nutrients and trace elements, which makes it ideal for reuse as fertilizers and manure, it also contains harmful chemicals which may harm the ecosystem. The pathogens in the water can cause diseases like cholera, typhoid, hepatitis and other water borne diseases when it mixes with river water. It can also prove dangerous to aquatic life.
The electron beam irradiation technique is now adopted by many countries for wastewater treatment. It yields cleaner and clearer water. This process breaks down the chemicals into smaller fragments, which makes the wastewater safer for reuse.

b. Treatment of flue gases: Many industries and power generating plants release harmful gases into the atmosphere from their chimneys. These are known as flue gases. They are a major source of air pollution. They contain mostly nitrogen, carbon dioxide and water vapor with very small amounts of carbon monoxide, nitrogen oxide and sulphur oxide. Soot is the minute particulate matter present in these flue gases.
The flue gas emanating from the boiler is initially cleaned by passing it through a mechanical filter and saturated with water vapor. Then, it is passed through a radiation



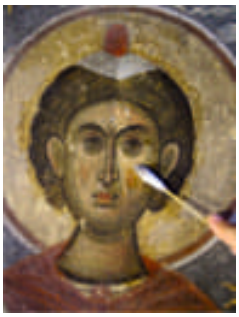
[Fig 1: Sterilization using irradiation]

chamber where the oxides are converted to their salts. A radiation of 10-20 kGy is used for this purpose. This process is further improved by using electron beam technology. It is economically more feasible and technologically better, as the efficiency of removal of sulphur oxides and nitrogen oxides is also more.

c. Food processing: According to a report by the World Health Organization (WHO), about 600 million people fall ill after eating contaminated food and about 4 lakh 20 thousand people die every year. Also, about one-third of the total food produced gets wasted due to fungus and bacteria. Food irradiation is an effective method of ensuring food safe from all pathogens and increasing its shelf life too. Contrary to popular belief, irradiated food is safe to eat.
Food irradiators generally use either gamma rays emitted from a Cobalt -60 source, or electron beams, or X-rays. The method of irradiation is the same for all the three radiation sources. The packaged food passes through a radiation chamber on a conveyor belt. The food passes through a beam of radiation. The ionizing radiation kills the pathogens by breaking chemical bonds, or rendering them ineffective.
Foods that can be irradiated include herbs and spices, fresh produce like fruits and vegetables, wheat flour, meat and some types of seafood.
It will be reassuring to know that NASA astronauts in the International Space Station eat irradiated food so that they do not contract any disease borne by food while in space.

[Fig 2: Irradiated food]

d. Preserving artifacts: the museums and old churches are abodes of works of art that are many centuries old. Old books, paintings or wooden objects are infested with insects and moulds, which eventually destroy them. The environmental effects also tend to spoil these works of art.
Gamma irradiation is a non-destructive way of freeing these artifacts from pests, and thus helps in preserving our cultural heritage.



[Fig 3: Restoration of artifacts by irradiation]

2. **Non-destructive testing** - Radiography is extensively used in industries for checking the quality of finished goods for faults and cracks. The material or product being tested is not affected in any way by this method. Infrared radiation, ultrasound, X-rays and other techniques are employed to detect structural faults or other defects. A sample list below shows the diverse industries that use this technique.

a. **Automobile industry** - each part of cars, planes and other automobiles can be tested using X-rays.

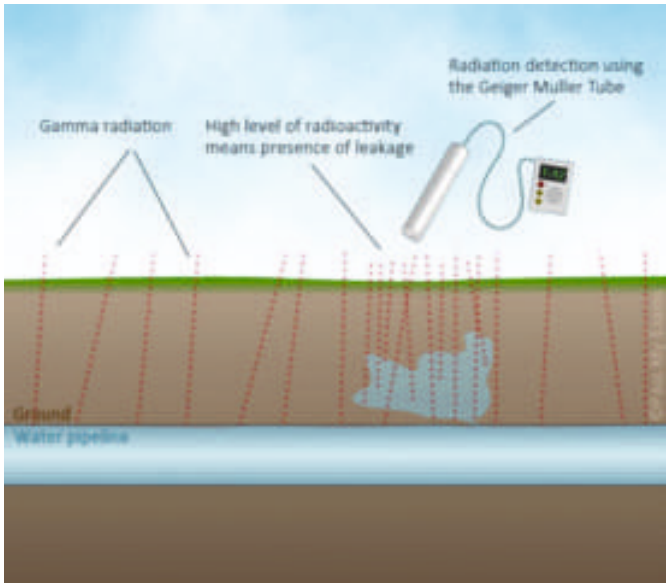
b. **Construction industry** - X-rays are used to perform quality control on building materials. Bridges have a large number of welds and fittings. Each part is checked using X-rays to discover cracks, corrosions or loose fittings.

c. **Manufacturing industries** - the non-destructive testing method using radiations is ideal for ensuring the quality of components and machinery. Boilers, ships and aeroplane components are checked using highly penetrating gamma radiation. It is also

employed for checking welds and casts in power plants, fertilizer plants, petrochemical industries, etc.

3. **Radiotracer Applications** - a radioactive tracer is a chemical compound in which one or more atoms have been replaced by a radioisotope. This radioactive isotope will decay by emitting alpha or beta particles or gamma rays. Its path can be traced by suitable detectors as it changes form reactant to product, thus exploring the mechanism of chemical reactions. A few applications of this technology are mentioned below:

a. **To detect leaks**- Gas and oil pipelines are checked for cracks and flaws by this method. The source of radiation is kept on one side of the pipe, whereas the detector is aligned with the beam on the other side of the pipe. The function of the detector is to measure and record the amount of radiation passing through the material. Less radiation can pass through where the material is thicker whereas more radiation can pass through where the crack or flaw makes the material thinner. Determining the amount of radiation absorbed by the material at each point can clearly indicate the position of the fault in the pipeline.



[Fig 4: Detection of leakage in pipes using radiation]

a. **Nucleonic gauge** - This is used in many industries like the shipping industry, construction industry, in agriculture, in paper mills, etc.

The **shipping industry** makes use of this device to measure the ever changing density and thickness of the mud layer at the bottom of the sea. This ensures the safety of ships at all times. If the mud layer is too high or dense, dredging is done before the vessel travels over that area, thus preventing it from being stuck in that layer.
To ensure uniformity and correct mix of building materials while **constructing** roads, these gauges are used to measure the density and moisture of each layer. The meticulous use of this gauge can facilitate smoother, good quality roads, which in turn helps in reducing fuel consumption of vehicles passing over it.
We have observed that paper from the best mills, have uniform thickness and quality. This uniformity is achieved by using the highly efficient nucleonic gauges in the **paper mills**.
Different crops have diverse methods of taking in the nutritive content of fertilizers. Some crops like rice grow better only when plenty of water is available, whereas others like cotton need less water. In the field of **agriculture**, these gauges are used to determine how any plant absorbs the nutritive substance or fertilizer. This method can provide an understanding of the growth process of various plants and help in enhancing the crop output.

Conclusion

There is no doubt that radiation is hazardous to all living things. But if proper measures are taken for radiation shielding, it can provide innumerable applications which affect the day-to-day life of the common man.

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ARTICLE

The Olympiad Class of 2001 – A Glorious Performance

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Vice President IAPT (1999-2004)

The Olympiads, like the Olympics, are international competitive events. However, these are related to academics and not sports and the Olympiad events are organized annually and separately for each subject. This story is about the International Physics Olympiad in 2001 (IPhO-2001). Teenage students, reputedly the best young minds of their nation, from across the globe, assembled for ten days at Antalya, the beautiful coastal city on the Mediterranean shore of Turkey from June 28 to July 6, 2001 . They were presented with challenging problems of sterling academic standards. In many ways the Olympiads represent a celebration of the best in high school and pre-college science. We recollect this event since in spite of this being only our fourth foray into this international event we stood **second** among 65 nations. It may not be out of place to mention that one of our gold medalists in that glorious event, **Parag Agrawal** has recently been appointed as the CEO of *Twitter.* We were involved in training and counseling the 5 students (which included Parag Agrawal) for a total period of some six weeks. The details are described below.

Parag Agrawal (born 21 May 1984) is an Indian-American technology executive, and the chief executive officer (CEO) of Twitter since November 2021. Agrawal joined Twitter as a software engineer in 2011 and became the chief technology officer in 2017.

Let us backtrack some one month before this international event. The air in the assembly hall of the Homi Bhabha Centre for Science Education (HBCSE), Mumbai on the morning of June 4th 2001was heavy with expectation. 34 of some of the best students in the country had undergone a three week rigorous training in Physics from May 16-June 04. It may be noted that the selection process was carried out in those days at HBCSE by holding a three week camp for these students and special training relevant to the syllabus of IPhO is imparted. Today the five chosen to represent India would be announced. Several among

the 34 would also go on to ace the prestigious IIT exam and be in the top 100. But what mattered the most to them was to be in this top 5 and get a chance to bring glory to the nation. As the Academic coordinator of the theoretical part of the program one of us (VAS) knew how exacting it had been. Three weeks of lectures in advanced topics in physics which included Einstein's theory of relativity. And long sessions in the laboratory helm-ed mainly by resource persons from the Indian Association of Physics Teachers (IAPT) including the late Prof. R, M. Dharkar and Profs. D. A. Desai, M. L. Ogalapurkar, Rekha Ghorpade, Ravi Bhattacharjee, B. N. Das, N. S. Dhaygude not to mention the experimental team from HBCSE – Rajesh Kharpade, Shirish Pathare, and Prof. H C Pradhan (later President IAPT). Our students were known to be wanting in experimental skills and our IAPT colleagues did worked hard on their weaknesses. And then 3 tests in theory, 3 tests in experiment, each of about 5 long hours.

The names of the 5 students were solemnly read out in alphabetical order -

Arvind Thiagrajan! A diminutive lad from Chennai. Arvind had a phenomenal memory. Ask him about India's performance in test cricket as far back as the 1930s and he knew it. Arvind went on to ace the IIT Jee and was rank one.

Nandan Dixit! Nandan was from Mumbai. A fiercely dedicated lad.

Naresh Satyan! From Bengaluru. Naresh was a quiet, unassuming lad, very humble.

Parag Agrawal! From Mumbai. A lanky lad, easy going, and probably the friendliest in the selection camp.

Vijay Kimar! From Bengaluru. Vijay was known to have read way beyond the standard syllabus. He knew portions of the MSc syllabus.

Those selected were elated. The 29 who did not make it were sad but sportingly congratulated the team members. We felt sad – they were all good. As mentioned earlier this period is emotionally taxing for the students. As teachers we too feel the stress and the consequent disappointment of students not selected for the team does make it painful to us. We will mention two just to do justice to the 29 who did not make it. One student Punyashlok Biswal from Delhi had done

Fig. whole group some 30 or more people Last row standing, tenth from the right and also tenth from the left is Parag Agrawal (i.e. in the middle). Sitting on the grass fourth from the left is Arvind Thiagragan, Sitting on the chairs one can identify veteran IAPT members, D A Desai, R M Dharkar, Vijay A. Singh, Ravi Bhattacharjee and others

particularly well in theory and we felt his disappointment. There was another younger student Ravishankar Sundaram a year junior to the rest (Std XI) who narrowly missed being in the time. The next year he qualified and got us a gold medal.

We trained the 5 students for an additional 10 days before taking them to Antalya, Turkey. They would be accompanied by two of us: Prof. D A Desai of Ruparel College, Mumbai and Vijay Singh then Professor IIT Kanpur. This was also a stressful experience with hope, excitement, and joy if the results are seen as bringing glory to the nation. We were however confident about our students' preparation and the sylvan surroundings around Antalaya soothed our anxieties. We were planning to urge the students to not over exert themselves during the flight and before the exams. But that was not necessary. They busied themselves in chatting and reading Harry Potter.

65 nations participated in the event and the number of students was some 300. The theory test was of 5 hours duration and there were just 3 long challenging problems. One of them required the student to understand radiation from a binary star; another was on magneto hydrodynamics. The experimental test was tricky. Each student was given a large beaker partly filled with glycerin. They were supposed to mount it on a rotating turntable and figure out a way to find the curvatures of the (reflecting) surface of the glycerin as the angular speed of the turntable was jacked up. As leaders we worked hard on grading the tests and arguing on behalf of our students. When the results were announced we were all overjoyed.

Fig. Physics Olympiad team Turkey 2001, From left Nandan Dixit, Parag Agarwal, Arvind Thiagarajan, Vijay Kumar Naresh Satyan. Leaders D A Desai, and not in the picture Vijay Singh.

We bagged 3 Gold medals and 2 Silver medals. The gold medalists were Parag Agrawal, Nandan Dixit and Arvind Thiagarajan. Naresh Satyan missed the gold with the narrowest of margin (0.15 points!) and had to be satisfied with silver. Vijay Kumar, who probably had a bad day also got a silver. But the best part was that in terms of medals **we were 2nd in the world ranking,** a step behind China (4 Gold and a silver) and ahead of Russia, USA, Singapore, Germany and some 60 other nations.

It has been 20 years and memories get dimmed. But looking back our three gold medalists had different strengths. Arvind Thiagarajan was brilliant in theory. Nandan Dixit excelled in experiment. And Parag Agrawal did well both in theory and experiment – the golden mean. They were all talented and fun loving. So were the remaining 29 in the selection camp. Parag was the most easy going. We have vivid memories of our last day at Istanbul. We had the whole day to ourselves and saw the Hagia Sophia, the Blue Mosque, crossed the Bosphorus Straits on a ship to the Asian side of Istanbul, ate chestnuts, went up and down in the local train and in all this almost missed our flight back! We got to know the students, their aspirations, and our friendship was cemented to a lifelong affair.

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Reminiscences
Dr DP KHANDELWAL: The Man and His Vision

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My Impressions of DP Khandelwal, the Man: It was the end of 1983 or early 1984 when I received a letter addressed to me by an unknown person signed as DP Khandelwal. More than the contents, I was highly impressed by his handwriting. I accepted to join his band of workers for the sake of promotion of Physics education in India. He started sending cyclostyled pages explaining his mission which I consider as the birth pangs of Indian Association of Physics Teachers (IAPT) and foundation stone of its bulletin. I am sure, DP must have written hundreds of letters to Physics teachers spread over the length and breadth of India.

When SC Samanta, the founder of Midnapore Centre for Science Culture (CSC), asked me to write my reminiscences about DP Khandelwal for the Centenary Volume, I was reluctant to accept this offer. On my request, Prof. Samanta sent me Commemoration Volume of Feb. 1997, dedicated to IAPT Founder, which motivated me to move on my journey to this historic event. Anil Khandelwal and other IAPT Founder Members have written about DP and his work by paying glowing tributes in this volume. I discovered that our Hero was a poet, revolutionary and a Gandhian who changed his name from Daya Prasad (DP) Rawat to DP Khandelwal to hide his identity during the freedom struggle.

The first IAPT convention was organised by DP in October 1984 in HBTI Campus, which was being shared by Chandra Shekhar Azad Agricultural University, Kanpur. We were half a dozen participants from Punjab and were lodged in Agri-university hostel. RN Kapoor was helping DP in making all arrangements. The inaugural session was chaired by DD Pant, the well known patriarch of CV Raman era and a close associate and Ph.D. supervisor of DP Khandelwal. HD Bist and some other physicists of IIT Kanpur also attended the inaugural session. DP had research collaboration with Bist after retirement from HBTI and co-authored 33 research papers before leaving IIT in 1984. I was not sure how the idea of IAPT was conceived by DP? I learn from reliable sources that it was during an International Conference on Laboratory Physics held at Jaipur that DP got an impetus to create IAPT in consultation with Prof. Babu Lal Saraf. The rest is all history now.

I was among the Founder Members of IAPT. DP wanted to establish IAPT on firm footing with its elected executive council. A meeting was called to elect the executive body. AMU Aligarh group proposed my name for the post of President of IAPT. DP was interested in BL Saraf to be Founder President of IAPT. I accepted the position of Vice-president (VP) without any fuss. DP himself wanted to be General Secretary of IAPT. So it was a unanimous election and everyone appreciated the role played by DP. US Kushwaha was a member of the Executive Committee but soon after he was given the duties of Editor of IAPT Bulletin, which he has continued with unflinching faith.

I was VP for four terms of two years each and met DP on several occasions. He was a man of few words and did not indulge in gossip. I invited him as examiner of M.Phil. thesis of my student, Amrik Singh, who was working on a topic concerning Physics Education in India. There was lot of survey work to collect data from the students studying Physics. DP wanted to address teachers of the area. So I had to make quick arrangements but DP was not satisfied with the response. He wanted a bigger audience to listen to his views.

IAPT annual meetings provided more occasions to watch his work culture. He used to reach one day ahead of the meeting so as not to leave any arrangement unsatisfactory. He was a great help in planning annual IAPT conventions at GNDU Amritsar (1990) and GMN College Ambala Cantt (1994). I was convener at GNDU

and prime mover of GMN Conference. Prof. HS Hans and his faculty of Physics participated in full strength; rather they overshadowed GMN convention. When a speaker from PU Chandigarh did not stop after DP rang the final bell, he was much annoyed and looked askance at Prof. Hans. The same night he pulled up US Kushwaha for some lapse. I believe, DP never lost temper with me as I understood his mental makeup and dedication to the cause of Physics.

DP Khandelwal: A Visionary

In the Memoriam Volume, Dr A. Mishra has sketched a Cartoon with DP holding the banner of IAPT in his hand while pulling the wagon of Physics Education. It is a beautiful illustration of DP's vision. In the wagon, he has uploaded the planned activities: IAPT Bulletin, NSEP, NGEP, Lab. Improvement, Low-cost Books, IAPT Convention and Dev Das Science Stage Shows. I may add DP's other visionary activities, for example, Centres for Science Culture (CSCs), Design of Innovative Experiments, and Essay Competitions.

DP wanted to make IAPT as a national mission oriented project. The membership drive covered all States. To expand IAPT activities and programmes, he started Regional Councils. India was divided into five zones and each zone was under the supervision of a Vice President. Regional Councils were given seed money to start activities at state level. I had my doubts that so much expansion will dilute IAPT programmes but DP was a man of courage and non-stoppable in his mission.

Holding of National Standard Examination in Physics (NSEP) was a dream project of DP. All the work was to be shared by teachers without any remuneration. My apprehension was if this national test has no recognition from any State or National authority, it may last for a decade and the scheme will fizzle out. I wonder NSEP has completed more than three decades and is still going on. NGEP was another test at B.Sc. level. DP tried his level best to get it recognized for admission to M.Sc. in national level institutes. I am not sure if he got some success.

Centre for Science Cultures (CSCs) was conceived by DP at national level. The purpose was to overhaul the laboratory curriculum of Science in India. I was involved in planning stage of the project. DP wrote a proposal for funding by UGC to the tune of rupees One Crore, which was reduced to 4.5 Lakhs by the Physics panel. DP wrote an Open letter to PM, Narsimha Rao, reminding him of his (DP's) sacrifices as a freedom fighter but Indian political leadership and bureaucracy ignored his appeals. It shows his courage of conviction. Two CSCs were set up with funding from IAPT but the main purpose was defeated. I visited CSC at Midnapore in 2005 as President of IAPT. It was being used as a B.Sc. Laboratory for college students. I learn from SC Samanta that CSC, Midnapore had designed a large number of low cost experiments at UG, HS and Secondary School levels. In my view, DP created CSCs for dual purpose: improving Science teaching and creating scientific temper in society.

Anil Khandelwal reported that DP Khandelwal was involved in the University Leadership Project (ULP) of UGC at Jaipur along with BL Saraf. He had experience of designing new courses, organising teacher orientation programmes and preparing text books in Hindi. Personally, I was involved in similar activities for teaching Science in Punjabi. NSEP papers were set up in some of the Regional Languages for the facility of students learning Science in the medium of their mother tongue. I remember Madhuben Shah of MSU Baroda evaluating Physics papers in Gujarati.

Amar Nath Nigam recounts that HBTI had no tradition of conducting research in Basic Sciences. After DP joined as Professor of Physics, he started research activity in collaboration with IIT Kanpur. It shows that DP was not only a good teacher but also a worthy researcher during his academic career. When he started his Ph.D. research under the supervision of DD Pant, he was asked to build up his equipment including Flourimeter. This training stood him in good stead when he was collaborating with BL Saraf in his CDPE project at Jaipur.

DP wanted to revolutionize teaching of Physics in India. He started a two prong strategy: development of model UG Labs. based on his CDPE expertise and "Operation

Physics through Experiments" which was planned by DP but conducted afterwards by Professors Patki, Dharkar and Desai for improvement of Physics teaching at high school level.

Anveshika activity was started by Prof. RN Kapoor after attending IAPT convention in Poona at Garware College in 1995. He started this activity in a high school in Kanpur. The purpose was to give young students hands-on-experience where they can perform experiments to understand the basic concepts of Physics. Prof. HC Verma of IIT Kanpur added another feather to Anveshika activities by demonstration of experiments developed in his Workshop in different Schools and Colleges. From Kanpur, this idea germinated in SGGS College Chandigarh where MS Marwaha became the torch bearer of this activity. He carries on IAPT's Outreach programme of Experimental demonstrations all over India. Jaswant Singh, a Science teacher of Kalyan (Patiala) and a national awardee, has been running a mobile laboratory to teach Physics using low cost experiments in Punjab.

I learn that HC Verma's flagship has moved to all corners of India under the National Anveshika Network of India (NANI), running 26 Anveshikas at the moment. It has decided to celebrate the Centenary year of Einstein getting Nobel Prize in 1921 for his theoretical work on Photoelectric Effect. A series of Webinars will be conducted in all parts of the country and the target is to reach an audience of 120,000. It shows the seed sown by DP has grown into a full-fledged tree.

Physics Olympiads were planned after the demise of DP. Selection of participating students was made after holding a training workshop in laboratory skills in Homi Bhabha Centre for Science Education (HBCSE) in Trombay. Prof. Vijay A. Singh and other faculty of HBCSE rendered all help. Olympian team was selected after a rigorous training and testing. It goes to the credit of IAPT that Indian teams have been winning laurels at the International Olympiads. During my term as President, Indian teams started participating in Asian Physics Olympiad. To attract brilliant students to NSEP, it has been named as International Olympiad Qualifier (IOQ) examination.

DP Khandelwal was a light house of power for the IAPT. No one raised a finger against his planning and purpose. I don't mean he was dictatorial in his approach. National Competition in Innovative Experiments in Physics (NCIEP), was started in Prof Waghmare's tenure as President of IAPT. When I took over as President, International Year of Physics was celebrated in 2005 with liberal funding to regional councils for holding Seminars and Workshops for teachers. National Competition in Computational Physics (NCICP) and National Competition in Essay Writing were introduced afterwards. Prof. PD Lele of GU Ahmedabad is the present Coordinator of NCICP. Dev Das Shows continued in one form or the other for the amusement of students and teachers. Prof. Ananthakrishnan, from the old guard of IAPT, is looking after this initiative under the new title “Khandelwal Science Stage Shows”.

IAPT, over the years, is moving ahead with new initiatives. Regional Council, RC-3 (including Chandigarh & Himachal) started organising National Student Symposium of Physics (NSSP). It is being held annually at Punjab University, Chandigarh. The aim of this project is to invite students from all over India to present their Papers, Projects and Posters as their exploratory investigations into research areas of Physics orientation. IAPT arranges lectures of selected resource persons for their orientation. It has been going on for the last seven years with the full support of PU Physics faculty under the dynamic leadership of Manjit Kaur.

Prof. L. Satpathi of Bhubaneshwar was editor of *Prayas*, a students' research journal started with the support of IAPT. It has now become an international journal, Student Journal of Physics. Physics News is another feature of IAPT Bulletin which has been steered by the Physics faculty of PU Chandigarh. It has gone international in recent times with inputs from Indian Scholars working in foreign universities. I am reading May issue (2021) Physics News contributed by Pankaj Bhardwaj of Friedrich Alexander University, Erlangen & Nuremberg, Germany.

At the end, I must pay my tribute to the memory of DP Khandelwal, the Founder of IAPT, as a visionary for revolutionizing the Physics Education at all levels in India. The future of IAPT looks bright with its membership approaching 10,000, covering the whole spectrum of Physics teaching all over India. I am happy that even after 25 years of his demise, the lamp lighted by this son of the soil is burning with full brightness spreading its light in all nooks and corners of India. Long live IAPT.

TRIBUTE

श्री दया प्रसाद जी खंडेलवाल - विनम्र श्रद्धांजलि

स्व० श्री दया प्रसाद जी खंडेलवाल की शुभ शताब्दी जन्म दिवस के अवसर पर विनम्र श्रद्धांजलि ।

एक महान शिक्षक, समाज रत्न, सरल - सौम्य स्वभाव के धनी महापुरुष के सान्निध्य में दो वर्ष intermediate पढ़ाई के लिए नैनीताल में रहने का सौभाग्य प्राप्त हुआ था ।

मुझे यह व्यक्त करने में कहीं भी संकोच नहीं कि श्री दया प्रसाद जी ने मेरे जैसे नासमझ इंसान को जो कि एक गाँव से आया था उसको मार्गदर्शन, स्नेह प्रदान कर उपकार किया - साथ में परिवार के सदस्य के रूप में स्नेह एवम् प्यार बरसाया । नैनीताल छोड़ने के बाद भी अवसर मिलने पर वे मेरे घर पधारते थे एवम् पुत्र की भाँति भरपूर आत्मीयता दर्शायी ।

आज मैं श्री दया प्रसाद जी के मार्गदर्शन एवं प्रेरणा से ही अपनी कार्यस्थली जोधपुर में स्वयं व्यवस्थित हो पाया हूँ । इसके लिए मैं सदा उनका अनुगृहीत रहूँगा ।

पुनश्च मैं उस महान आत्मा को अंतर्मन से स्मरण करते हुए वंदना करता हूँ ।

दिनेश खंडेलवाल, जोधपुर

TRIBUTE

My Mentor : Dr. D.P. Khandelwal

As my contribution to collection of pleasant memories of Dr Khandelwal I wish to narrate nine year long journey of my life with the visionary my Phufaji Dr Khandelwal.

I have four sisters. My father and mother were very simple and not very educated. Financially also not very sound. I was a very pampered spoiled child . When I was very young, Phufa ji realised that , I should be nurtured in a motivating atmosphere to stand on strong footing to prosper in life.

In 1970 he Moved to Kanpur from AGRA to Join HBTI. He then told my Parents that he wants me to stay with him and do my schooling under his supervision. Much against my and my mothers wishes, I had to move to his house and then for 5 years his home became my Gurukul.

I studied there from 6th Standard to 10th Standard . After my High School I was send to Boarding school - Birla Vidya Mandir – Nainital . Fufaji escorted me to Nainital realizing that I was too scared to stay away from family. Those two years in Birla Vidya Mandir transformed me into a confident , strong and independent person . All due to his tireless supervision guidance and support of Dr D. P. Khandelwal .

After leaving Nainital I did my graduations from St John's college Agra . When I was About to finish my Graduation he said.

"FOR FURTHER STUDIES YOU CAN NOW CHOOSE A COLLEGE OF YOUR LIKING ANYWHER IN THE WORLD . WE WILL PROVIDE MEANS BUT EFFORT AND CAPABILITY WILL BE YOUR'S .

I decided to move back to my parents and joined my fathers business. I was full of enthusiasm ,confidence necessary skills to expand the business . I never regretted it and did well as it was my own decision.

Today I am a well settled flourishing financial Consultant. I owe my existence today to my mentor Dr D.P. Khandelwal for guiding and supporting me for years.

Sunil Khandelwal – Financial Consultatnt
Madhur Fincare Financial Servies
Kanpur

Minutes of the EC meeting of November 28, 2021

The in-person offline meeting of the national EC of the IAPT was held on Sunday Nov 28th as announced, in the Main Auditorium of the Shri Vaishnav VidyapeethVishwavidyalaya University Indore on day zero of our 35th Annual Convention. The meeting commenced at 2 pm, and continued till about 7 pm. The Minutes of this meeting were initially circulated to the EC members, and the comments and suggestions received have been included here.

The members including the invitees present in the meeting were as follows.

1. Prof. Vijay A. Singh, President
2. Prof. K. N. Joshipura, GS
3. Prof. J. D. Dubey, VP (East zone)
4. Prof. P. N. Nagaraju, VP(South zone)
5. Prof. H. C. Verma, VP(General)
6. Dr. Anil Kumar Singh, member RC –04
   Also, Coordinator NGPE
7. Prof. Viresh H. Thakkar, member RC-07
8. Dr. S. B. Mane, member RC-08
9. Dr. P. K. Dubey, member RC-09
10. Dr. M.S.Jogad, member RC-12
11. Dr. Himanshu Pandey, member RC-19

Ex-Officio Members

12. Dr. Sanjay Kr. Sharma, Secretary
13. Dr. D.C. Gupta, Treasurer

Invited Members

14. Dr. Ravi Bhattacharjee, Coordinator, APhO
15. Prof. Rekha Ghorpade, Coordinator, NCIEP
16. Prof. S.K. Joshi, Coordinator, NCEWP
17. Prof. M.L.Oglapurkar

In view of the inadequate attendance, the meeting was adjourned for 20 minutes and reconvened to deliberate as per the Agenda.

To begin with, the General Secretary requested the President to give a formal welcome to the members present.

Extending a warm welcome to all those who were present in the meeting, Prof. Vijay Singh thanked the host SVVV, Indore for organizing the Convention. He congratulated Prof. H. C. Verma for receiving the *Padmashree* Award for his contributions in the field of physics education. He said further, that after a long gap, it was possible to get together in the offline mode. He gave a mantra; *don't ask what IAPT can do for you, but ask what you can do for IAPT."*

1. (a) To read and confirm the Minutes of the (special) EC meeting held online on Sunday July 25, 2021, from 3.00 to 5.15 pm.

The Minutes were published in the IAPT Bulletin of August 2021 issue, page 287, and no comments were received in this regard.

(b) To discuss matters that may arise from these Minutes.

No discussion took place on this item.

Further, the following highlight of the previous meetings held during the year 2021, was displayed to the members.

2. (a) Accounts and the revised budget for the FY2021-2022, by the Secretary and the Treasurer

IAPT Secretary Dr. Sanjay Kumar Sharma and Treasurer Dr. D. C. Gupta (assisted by Shri Vinod Prajapati) presented the accounts report, and replied to the queries from the members. Income and expenditure statement (hard copy) for FY ended March 31st 2021 was circulated to and discussed by the members. The statement mentioned among other items, the expenditure in the monthly bulletin, and the corresponding income generated from the relevant Corpus Funds established long ago. Also mentioned were the Anveshika expenditure and the income (funds) for the Kendriya Vidyalaya Workshop and the Vigyan Prasar Workshop.

In reply to comments from Prof. Jogad, Dr. Mane and others, Dr. Sanjay Kr Sharma explained how the funding from Kanpur office is provided to RCs and Sub-RCs. Regarding the seed money, Prof. Jogad

Sr. No.	Online Meeting	Date and time
1	EC meeting – 1;For Constitution Amendments	March 07, 10 am to 1 pm
2	EC meeting – 2; For Reports of the activities of RCs and other organs of IAPT; RC(sub-RC) Presidents and Secretaries also invited	April 18, 10 am to 1 pm
3	EC meeting – 3; For IAPT elections and recommending names for the next EC	July 25, 3.00 to 5.30 pm
4	Finance Committee Meeting -1	April 28, 3.30 to 5.30 pm
5	Finance Committee Meeting -2	Sept 19th, 3 to 5 pm
6	Other meetings – smaller groups, For special purposes, NSE/IOQ, DPKBCC etc meetings	--- ---

mentioned about a letter from the RC-12 Secretary Dr. S. M. Khenedsent to Kanpur office. The GS reiterated that there is a well-defined formula for the seed money. In case of a genuine need of funding the RC can write to the Kanpur office. Moreover, for a specific activity, there is a format in which the RC has to apply to the Kanpur office.

Regarding the submission of accounts it was proposed that if an RC failed to submit the account details of the previous year by 30th June, the seed money for the next year should not be given to that RC. The proposal was supported by Dr. S. B. Mane and others. It was also suggested that the seed money to sub-RC should directly go to them and not via the respective RC, but the suggestion was not accepted. The audits-accounts report was passed by the EC. Members appreciated with applause the services of the Secretary, treasurer and our silent worker Shri Vinod Prajapati of the Kanpur office.

(b)Soft copy of the Bulletin over the next year due to budgetary constraints – an appeal

An appeal was made earlier in the bulletin, to opt for soft copy of the monthly bulletin, as a measure to save on expenses, and a separate email account was created for members for conveying their option to the GS. Till the deadline, about 40 mails were received of which about 30 opted for soft copy, the rest wanted the hard copy. It was decided to put more stress on this matter in order to reduce the printing cost. After discussion it was resolved to publish the appeal (final call) in two issues of the bulletin and to invite IAPT members' choice through email to Kanpur office (new account to be created). It was also decided that if no response is received from the member, it will be taken for granted that he/she doesn't want hard copy and only soft copy will be sent to their registered email id. The IAPT members will also be requested to update their email id and if possible, provide their phone numbers also.

3. A brief report on the IAPT exams by the CCE, and the formal approval of the MOU for the IOQ by the EC; also a brief report of the NGPE Exams by the coordinator Dr.

Anil Kumar Singh

The CCE, Dr. B. P. Tyagi was not able to come to attend the Convention. So in his absence, Dr. Anil Kumar Singh –Coordinator, NGPE presented the report. The NGPE exams were successfully conduced even during the pandemic in the offline mode in January, 2020 and January, 2021. Five Gold medalists each from both these exams were invited in this convention and were to be felicitated by the Chief Guest in the inaugural function. If the gold medalists pursue their career in physics after their graduation, then Rs. 20,000/- per year will be electronically transferred to their registered bank account as a support to their academic pursuit.

The MOU (for one year) for conducting the IOQ exams in 2022 was signed with HBCSE-Mumbai, jointly by IAPT, Mathematics Teachers' Association of India, Association of Chemistry Teachers and Association of Teachers in Biological Sciences. A copy thereof was mailed earlier to all the EC members. The MOU was formally approved by the EC.

4. Presentation of a brief Report by the General Secretary

The GS said, "As we meet here in 2021, I pay homage to the IAPT founder Prof. D. P. Khandelwal, in whose memory the celebration programmes of the DPKBCC are going on. Academic activities and programmes (mostly online, but offline also) of our IAPT have been continued by various RCs, sub-RCs and other organs, and these will be reported briefly in this meeting. As the Covid effect subsides we are able to organize meetings in person, and this Convention comes after two years. The 8thNSSP was organized this year in the in-person mode at Bangalore Nov 12-14th. There is a good response to the annual National Competitions and the IAPT-DSM award etc." He then summarised as follows, some of the activities/programmes carried out recently.

- There is a steady rise in the number of Life-members, to about 8600.Attempts to reach out to Universities/institutions to join IAPT as *Institutional member* have been revived, and a fresh application form has been prepared. Recently, two organizations viz. CHARUSAT University (Gujarat) and Physical Research Laboratory Ahmedabad have joined as Institutional members. It was suggested that it would be more convenient if we can make a provision of a 3 – year or a 5-year membership in this category. The Finance Committee will be requested to do the needful in this regard.
- Towards an economy measure, we have requested IAPT members to opt for the soft copy of the monthly bulletin as far as possible, and this matter will be taken up further.
- A separate email account was opened to receive suggestions/comments on the Constitution Amendments. However, no responses were received in the given time limit.
- I wish to thank the Finance Committee, consisting of seven members, for the guidance provided throughout my 3-year tenure as the GS.
- As the election process is going on, I wish to thank the central RO Prof. P. D. Lele and his team, the Grievance Redressal Committee, and all the ROs of the Regional Councils for the excellent work they have done; and how can I forget the Bulletin team led by Prof. Kushwaha, who have meticulously published the election notifications-announcements and the results as submitted to them in time…! Academic reports/articles are also published regularly.

- We have received very good news as Indian team won 4 gold and 1 silver medal at Astronomy & Astrophysics Olympiad 2021 held online. Now we look forward to the APhO-2022 to be hosted by India and to be held at Dehradun.
- We are highly thankful to the Convention Organizers RC-09 and the SVVV University Indore for hosting the 35th Convention, while they have also supported various webinar activities through their online platforms in the last 1 and a ½ year or so.
- The GS mentioned about the General Body meeting to be held on Nov 29th as announced.
- The outgoing GS is highly thankful to the President and the EC members, the RCs and all other organs of our IAPT for their excellent support provided in the last 3 years….!

5. (a) To receive the brief reports of the activities of different RCs, from the respectivemember/ representative (5 min each)

Activity reports were presented with ppt, and discussed briefly as follows.

Dr. Anil Kumar Singh (RC-04)

Prof. Viresh Thakkar (RC-07)

Dr. S. B. Mane (RC-08)

Dr. P. K. Dubey (RC-09)

Dr. M. S. Jogad (RC-12)

Dr. Himanshu Pandey (RC-19)

Prof. J. D. Dubey – VP, East zone (RC-20)

Dr. P. Nagaraju VP South zone briefly highlighted the 8th NSSP symposium organized by RC12 - SubRC12A, at Bangalore.

Further, brief reports (of 10 min each) were presented with ppt, as follows.

(b) On Anveshika-NANI by Prof. H. C. Verma

Queries from Prof. M. S. Jogad were answered by Prof. Verma and by the President and

the GS, who reiterated that Anveshika-NANI is a part and parcel of our IAPT.

(c) On APhO by coordinator Prof. Ravi Bhattacharjee

(d) On the annual competitions, NCEWP by Coordinator Prof. S. K. Joshi, and on the NCIEP by Coordinator Prof. Mrs. Rekha Ghorpade. While there was no participation in the NCICP, the response to NCEWP and NCIEP was very good this time.

Members appreciated the praiseworthy efforts reported.

6. Any other item from Chair or with the permission of Chair

Some of the members requested the bulletin editors to arrange for the sending acknowledgement of the articles submitted for publication.

In the meeting there were some suggestions as regards the IAPT Constitution and its reviews regularly, and about the new incoming EC. Finally the members congratulated the President and the General Secretary for the smooth functioning of the activities of IAPT during their tenure of three years.

7. Big thanks to all and end of the meeting

With all the agenda items discussed fully, the outgoing GS Prof. Joshipura expressed big thanks to one and all, and the meeting came to an end.

K. N. Joshipura

Out going General Secretary

Minutes of the IAPT General Body Meeting

Shri VaishnavVidyapeethVishwavidyalaya, Indore (MP), Nov 29th 2021

The IAPT General Body meeting was held as announced earlier, at 4 pm on Monday November 29th, in the national IAPT Convention organized jointly by SVVV University Indore and RC-09 (MP). The meeting was initially adjourned for the lack of quorum, and was reconvened after 20 minutes, in the presence of about 27 members. All the members present were requested to sign the attendance record sheet.

In the beginning, a brief obituary was presented in the memory of the IAPT members who left us forever in the span of about two years, namely Prof. R. M. Dharkar (Pune), Dr. Tushar C. Pandya (Ahmedabad), Prof. M. K. Agarwal (Vallabh Vidyanagar) Prof. Ramashankar Prasad (Patna), Dr. K. K. Kamani, Prof. M. I. Savadatti (Mangalore), Prof. N. K. Sinha, Prof. S. K. Sinha, and Prof. M. M. R. Akhtar (all three from Patna) and Dr. V. K. Sinha (Hazaribaug). One minute silence was observed in honour of the departed souls.

1.Welcome by the President IAPT

Proceeding as per the Agenda, the GS requested Prof. Vijay Singh, President IAPT, to accord a formal welcome to the members present. Prof. Vijay Singh thanked the Convention hosts and welcomed the members and said that he was happy to meet them in person after two years. He asked the GS to take up the next item.

2.(a)Reading and confirmation of the minutes of the last AGB meeting held on October 13, 2019 at the 34thAnnual Convention, Allahabad-Prayagraj UP.

The Minutes of the previous GB meeting were published in the IAPT Bulletin, December 2019, p. 362. No comments or suggestions were received in that regard. The GB passed the Minutes.

(b) Discussion of the matter that may arise from the minutes.

No discussion took place, and hence the GS proceeded further.

3. Presentation of the Annual Reports of the last two years, by the General Secretary

The GS Prof. K. N. Joshipura began by paying tributes to the IAPT founder Prof. D. P. Khandelwal, in whose memory the Convention had been dedicated, while the celebration programmes of the DPKBCC were going on. He further said, "We met face to face in the Annual General Body meeting at Allahabad-Prayagraj on October 13 2019, and in 2020 the Convention could not be organized due to Covid-19. The pandemic took toll of not only our near and dear ones but also of our time, but it has taught us many things. Thus a very large number of online webinars as also a few offline programmes were organized by various RCs and were quite fruitful. In the last 2-year period, several important developments have taken place and I can try to highlight a few of them here." He then listed a few of the activities and developments, as follows.

i. The IAPT Constitution Review Committee was formed in July-August 2019 with Prof. J. P. Gadre as the Member-Secretary. Later on, the EC discussed and passed certain Amendments to be put up in this GB.

ii. Prof. D. P. Khandelwal Birth Centenary Celebration Committee was formed in early 2021 under the Convenership of Prof. S. C. Samanta (Midnapore)and several programmes have been conducted in memory of our founding father Prof. Khandelwal.

iii. During 2021, the online EC meetings were held on March 07, April 18 and July 25th, while the Finance Committee meetings (online) were held on April 28th and Sept 19th. In the April-18 meeting, the RC (sub-RC) presidents and Secretaries were also invited to attend. Other smaller (online) meetings were also held for discussing the IOQ exams, APhO etc.

iv. A small but important development took place when the Ministry of Tribal Affairs New Delhi provided motivation and full support for organizing Teacher Training Workshop for the Science Teachers of

Eklavya Model Residential schools, and the first such Workshop was conducted last year by RC-09, for teachers of MP and partly from Chhattisgarh and Rajasthan. This was followed by a Workshop conducted this year by RC-07 Gujarat. While both the Workshops were quite successful, there are certain practical difficulties in extending this activity to other RCs, the main problem being the quite small number of EMRS schools in a given state or RC. We can put efforts and try to organize such Workshops in the other RCs.

v. An important joint activity is the *PRL-IAPT Dr. Vikram Sarabhai Annual lecture* organized in collaboration with and support from PRL Ahmedabad. The 3rd annual lecture held online on Feb 11, 2021 was well received nationally as well as internationally. The Report has been published in our Bulletin, and the lecture on '*Neutrinos, the invisible messengers*' is published as an article written by the Speaker Prof. Mrs. S. Goswami, in *Pragaami Tarang* 2021.

vi. Attempts to reach out to Universities/institutions to join IAPT as Institutional members have been revived, and a fresh application form has been prepared. Two institutions which have joined recently are Charusat University (Changa – Anand, Gujarat) and Physical Research Laboratory Ahmedabad.

vii. As regards the IAPT elections, the GS thanked the central RO Prof. P. D. Lele and his team, the Grievance Redressal Committee, and all the ROs of the Regional Councils for the excellent work they have done. He said further, "…And how can I forget the Bulletin team led by Prof. Kushwaha, Prof. ManjitKaur and others who have meticulously published the election notifications-announcements and the results as submitted to them in time…! Academic articles are also published regularly."

viii. A very good news received recently was about the Indian team that won 4 golds and 1 silver medal at Astronomy& Astrophysics Olympiad 2021 held online. And now we eagerly look forward to host APhO 2022, to be organized at Dehradun.

ix. The outgoing GS is highly thankful to the President and the EC members, the RCs and all other organs of our IAPT and all members for their excellent support provided in the last 3 years….!

4. Submission of accounts and audit reports of IAPT for the FY2020-2021, and Presentation of the revised budget for the FY2021-2022

IAPT Secretary Dr. Sanjay Kumar Sharma and Treasurer Dr. D. C. Gupta presented the accounts report. Income and expenditure statement (hard copy circulated) for FY ended March 31st 2021 was circulated and discussed by the members. The statement mentioned among other items, the expenditure in the monthly bulletin, and the corresponding income generated from the Corpus Funds established long ago. Also mentioned were the Anveshika expenditure and the income (funds) for the KendriyaVidalaya Workshop and the Vigyan Prasar Workshop. There was some discussion on less balance amount in the FY 2020-21. The support amount given by IAPT for the convention at IIIT, Allahabad (2019) was returned by the team Allahabad with some excess amount. The EC thanked the team Allahabad for this gesture, and recalled a similar good gesture by the 2018 Convention team of Ranchi. A proposal was moved for increasing the IAPT Life-membership fee from Rs. 1500/- to Rs. 2000/-wef April 1, 2021. It was reiterated that all the RCs should submit their audited reports by 30th April every year. The audits-accounts report was passed unanimously. Members appreciated the services of our silent worker Shri Vinod Prajapati of the Kanpur office.

5. Soft copy of the Bulletin over the next year due to budgetary constraints – an appeal

An appeal was made earlier through the bulletin, to opt for soft copy of the monthly bulletin, as a measure to save on expenses, and a separate email account was created for members for conveying their option to the GS. Till the deadline, about 40 mails were received of which about 30 opted for soft copy, the rest wanted the hard copy. It was decided to put more stress on this matter in order to reduce the printing cost. After discussion it was resolved to publish the appeal (final call) in two issues of

the bulletin and to invite IAPT members' choice through their email to Kanpur office. It was also decided that if no response is received from the member, then it will be taken for granted that he/she doesn't want hard copy and only soft copy will be sent to their registered email id. The IAPT members will also be requested to update their email id and if possible, provide their phone numbers also.

6. Report on the IAPT exams, from the CCE

The CCE, Dr. B. P. Tyagi was not able to attend the convention. In his absence, Dr. Anil Kumar Singh –Coordinator, NGPE presented the report. The NGPE exams were successfully conduced even during the pandemic in the offline mode in January, 2020 and January, 2021. Five Gold medalists each from both these exams were invited in this convention and were felicitated by the Chief Guest in the inaugural function. If these gold medalists pursue their career in physics after their graduation, then Rs. 20,000/- per year will be electronically transferred to their registered bank account as a support for their academic pursuit. The members were apprised of the MOU signed by IAPT and other similar organizations with HBCSE, for the ensuing IOQ exams.

7. Proposed Amendments in the IAPT Constitution, discussion and approval by the General Body

On this item, the GS requested the President to highlight the efforts made in the constitution Amendments in the last two years or so. Prof. Vijay Singh recalled that the Constitution review Committee was formed in July 2019, with Prof. J. P. Gadre of Pune as the member-Secretary. The amendments as proposed by the Committee after discussions were further discussed in the EC at length and approved more than a year ago. Thereafter, there were some more suggestions in this matter and so were discussed once again. The draft on the proposed changes was then finalized in the online meeting of the EC dated March 07, 2021. As per him, majority of the amendments were cosmetic only, except a few. In this regard, 'a note on (i) Constitution amendments, and (ii) table of changes' were published in the October issue of the bulletin p. 377. The proposed amended constitution, along with these two documents was also uploaded on the website *Indapt.org*. The President outlined the Amendments and proposed with the GB to approve them. Dr. Mrs. Sarmistha Sahu wanted to have more discussion on it. However, Prof. Singh said that the new EC, which would be taking charge on 1st January, 2022 will take care of it. The amendments were approved by the General Body.

Resolution-1

The IAPT General Body hereby unanimously approves and ratifies all the amendments in the IAPT Constitution as proposed earlier by the IAPT EC, and discussed here in this meeting.

The constitution amended in 2021 will now come into force from 1st January, 2022.

8. Any other item from the Chair, or with the permission of the Chair.

A suggestion was made about the bulletin, viz. that for any article submitted to the bulletin, the formal acknowledgement should be sent soon to the author.

Some of the members inquired as to whether there was any proposal about the venue of the next Annual Convention in the year 2022. In this context Dr. Himanshu Pandey of RC-19 (Bihar) proposed to organize it at Patna. He was requested to send a formal proposal from the Organizers, for holding the next annual Convention.

Dr. Ravi Bhattacharya proposed to thank the President and the General Secretary, and the EC members for their services during the last three years.

With all the agenda items discussed fully, the GB meeting ended with big thanks to all from the outgoing GS Prof. Joshipura.

K. N. Joshipura
Out-going General Secretary

IAPT Election 2021
Report - Observations and Suggestions

Committees were formed for conducting election, for Counting of Ballots and for Grievance redressal by the General Secretary in consultation with the President.

RO (Dr.Lele) suggested holding elections online. After some discussion it was decided that IAPT constitution has not been revised and therefore online elections cannot be held until it is done.

Announcements were made for conducting elections for central EC and also RCs and were published in the IAPT Bulletin in August 2021 issue. Meetings were held and panel recommended by central EC along with the panels recommended by RCs were published in the IAPT Bulletin in November 2021 issue.

After the last date of withdrawal (22nd October 2021) was over, The RO (Prof. Lele) announced the results of candidates elected unopposed to Central EC which was published in The IAPT Bulletin in November 2021 issue.

Some RCs could not produce a panel and did not send any response to the General Secretary till the last date. Some other RCs published their panels but their recommended candidates did not fill in their nominations forms and sent those to the R O (Prof. Lele) till the last date. Therefore, when results of elected unopposed candidates to central EC were published in bulletin in November 2021 issue shows these RC representative positions as VACANT.

Later after the last date of nominations was over some of these candidates sent their nomination to the RO (Prof. Lele). These nominations have been considered as **INVALID.** Hence the results published in bulletin in November 2021 issue stands as it is. The EC members to the vacant RCs will be filed by the new EC central body as per IAPT constitution.

Elections for the posts of President IAPT and Vice President IAPT (West Zone) were announced since there were two candidates for each of these posts. The announcement and ballot papers were published in The IAPT Bulletin in November 2021 issue.

Professors Kalpana Suley, Ashok Modi, Atul Modi, Mrunal Waze, Mahesh Shetty, Shekar AM and Vinayak Katdare were invited for Counting and declaring result of elections held for the posts of President IAPT and Vice President IAPT (West Zone) on 23rd December 2021 at Professor Lele's residence. Professors Ashok Modi and Atul Modi could not attend while all the others attended.

The counting of ballots and preparing of result started sharp at 4:00 p.m. and was completed around 11 p.m. All the members took great pains and worked in good faith impartially according to the spirit of constitution for marathon 7 hours continuously. The RO (Prof. Lele) is personally very much thankful to all his counting team colleagues for their exemplary work.

Observations

Professor Sanjay Kumar Sharma of Kanpur head office promptly sent the members list sorted both by life membership number and name and also by pin code. The RO (Prof. Lele) is very much thankful for this cooperation.

The RO (Prof. Lele) got two copies each of membership lists (sorted in two different ways) printed and spiral-bound for verifying life membership numbers and names while counting the ballots.

However, while counting it was found extremely time consuming to verify from the printed list. Here Professor Mahesh Shetty pitched in to help. Using the desktop PC, he found that all these membership lists are available on the website. He helped and verified all the names of voters and their life memberships by using **SEARCH**facility and IAPT website. He also verified life membership numbers by inputting their names and alternately by inputting their membership numbers verified their names.

Verification by using the internet and IAPT website made it possible to complete counting and declare the results on 23rd December. If we had to use only printed lists, it would have taken one more day and

another continuous 10 hours of work to complete the counting. The RO (Prof. LELE) is very much thankful to Professor Mahesh Shetty for the timely support.

The R O (Prof. LELE) totally failed to judge the time it would take to Count the ballots; he had estimated (anywhere between 1500 to 3000 ballots) and had estimated 2 hoursto a maximum of 4 hours to complete the counting. Accordingly, if counting will start at 4:00 p.m.; all should be over by 6:00 p.m. to a maximum of 8:00 p.m. But it turned out that to count a little less than 1000 ballots 7 hours were required and that also with the use of technology and internet to verify life membership numbers and names of the voters.

The verification of life membership numbers and names of the voters using website, counting of ballots, number of team members engaged and the pace of counting was all perfect and ok.

SUGGESTIONS

1 Many voters (at least 20%) do not know how to stick the envelope. Therefore, the envelopes had to be torn carefully to retrieve the inner ballot paper and the voter details intact.

2 Membership numbers list series 86 xx had additional pre-fixed more digit numbers. This series numbers were not easily accessible on the website and there was lot of difficulty in finding the membership numbers and matching their names and addresses. Maybe series 85xx also have this problem. These numbers have to be updated in membership list.

3 Some life membership number had more than one names and addresses. Similarly, some member's names had more than one life membership number allotted to them.

Therefore, all our life membership lists need to be revised and updated. The IAPT Kanpur office should meticulously and carefully spend a significant amount of time to update life membership lists.

4 We may decide not to issue life membership numbers of old and expired life members to new life members.In that case all life members from beginning till today and also in future will have a unique life membership number.

5 We can have life membership number, names and addresses all the life members who have expired put in a separate ARCHIVES membership file and store it. Then life member number address details of expired members can be removed from the current life membership list put on the website.

6 Only names of current life members should be put on the website. We may like to include email addresses and if possible Aadhar card number in our membership list. We may make an arrangement for online change of addresses for our life members who can do it sitting in their own houses.

7 Another important suggestion is that IAPT should do a little marketing in these days and we should attract young teachers and professors.

For this purpose, following points should be considered:

A We should make life membership certificate printed on thick paper which will include details of our life member-- his name,address, life membership number, email address,Aadhar card number,his date of birth and send it by speed post. This will involve expenditure of around 15 rupees for a certificate and 35 rupees for Speed Post roughly rupees 50 on the average life member but it is worth.

B We should also send invitation letter to any life member when we form any committee in hard copy on our letterhead by post.

C We should also send appreciation letter in hard copy for any work done by any committee member.

D Such letters on our letterhead should be sent to all people invited as resource persons for any activity. These will be very useful to our young for promotions and recognition and also their career building, this is the need of the day. In

education field it is essential to produce such certificates and documentary evidence to give you additional points and credits for outreach activity and promotion of science in your institutional advancement and improving the biodata. Highlighting your performance. This also improves your status in community.

E No doubt this process will cost some money but this money can be obtained from life members by increasing the life membership by some small amount.

F Similarly, we can ask old life members to donate generously to IAPT. IAPT is academic Institute and also requires money. Lot of erosion in the value of Rupee due to steep rise in prices has forced us to get some more money from life members at regular intervals of say 5 years or 10 years.

G We can also think on the lines of other countries like USA and UK where the fellowships like FRCS have to be renewed periodically at regular intervals by paying money to the institute to continue the membership. Institute of Engineers India also has similar arrangement.

My suggestions are in the form of Open Thinking and my personal thoughts. These need to be discussed in detail.

My last suggestion is that the next elections after 3 years should be held through online digital platform for that purpose our membership lists have to be made perfect.

Also, we have to get these matters discussed at different committees, placed them in EC as well as in AGM and get the constitution revised.

Another important practical suggestion is to make small video on how to vote using ballot. Our ballot has Part A – which has details of VOTER and Part - B which has the VOTE. We have to cut the two parts. Fill in the details in Part - A and sign it. Put VOTE mark in Part - B. Then Part - B should be put in small inner envelope and closed using gum. Then this small envelope along with the Part - A has to be put in outer envelope and closed using gum.How this process can be done without sticking ballot paper Part -A and also Part - B to the walls of the envelopes. Now address has to be written on outer envelope and posted to the RO. We should make a small video of this and put on our website for benefit of all voters.

I take this opportunity to thank our General Secretary and President and all our election teams members for their excellent cooperation.I also express my thanks to all the candidates for support. Thanking you all.

P. D. Lele

Returning Officer

IAPT Elections 2021

REPORT

Congratulations

Prof. H.C. Verma, our Vice President(general) and Coordinator of the NANI, has been conferred the Doctorate of Science (Honoris Causa) at the 67th convocation of IIT Kharagpur on 18th December 2021 in recognition of his contribution towards Physics Education in the Country.

Union Education Minister Dharmendra Pradhan was present at the event as the chief guest. Sanjiv Goenka, chairman of the RP-Sanjiv Goenka Group and chairman of board of governors at IIT Kharagpur, was also present on the occasion.

Our Congratulations to Prof. Verma.

REPORT

Science Pedagogy Webinar

Government College of Education, Chandigarh, **Science Club, NAVONMESH** in collaboration with **RC-3** (Chandigarh and Himachal Pradesh) organized an Interactive Session in the blended mode on the topic **'21st Century Skills Towards Redefining Science Pedagogy'** for the member students of Science Club of the college on Saturday, 18-12-2021 from 10:15 a.m. to 11:45 a.m. The Resource Person for the said event was Science Educator, national Awardee Physics teacher Sh. Paramjeet Singh, Lecturer in Physics at GMSSS-Sector-8, Chandigarh Life Member of IAPT.

The event started with the welcome of the Resource Person Sh. Paramjeet Singh and the Guest of Honour, Prof. C.N. Kumar, President RC-3, by the Principal Dr. A.K. Srivastava. It was followed by introduction of the Science Club and theme of the day by Dr. Sanjeev Kumar, Associate Professor and the Convener of the programme. Prof. C.N. Kumar, in his address briefed the audience about IAPT and its activities/ programmes for quality science education and wished this programme a great success in inspiring the students of pedagogy of science. Sh. Paramjeet Singh very aptly contextualized his interactive presentation with NEP-2020 and highlighted the four pillars of quality science pedagogy for the 21st century. He discussed in detail how 24x7 high-quality active science learning is possible through use of various open-source digital tools and platforms widely available for free. He demonstrated the use of 'PhET Simulations' (developed by Colorado University) in visualizing the experiments of Science, like Reflection and Refraction of light, Dispersion of Light through prism and electricity and magnetism related experiments for school level. The students enjoyed the session thoroughly and asked many questions to clarify their doubts. He also explained the use of Microsoft tool 'Sway' for interactive teaching learning of Science and demonstrated how an interesting as well as effective digital lesson plans with proper feedback and comprehensive evaluation embedded in it can be prepared using these tools. It was a great learning session for all the student members of the Science Club.

The programme was compeered by Poonam Sharma, B.Ed. 1st Semester student and President of the Science Club. Vote of thanks was proposed by Secretary of the Science Club Umisha Kalia, B.Ed. 1st Sem. The programme was co-ordinated by Dr. Sheojee Singh and Dr. Lilu Ram, Associate Professors of Physics of the college and Life Members of IAPT.

Sheojee Singh
Convener

REPORT

Workshop on
Hands on Training for Scientific Toy Making and Sky Observation Programme

Date: 11/12/21; **Time:** 3pm to 9.30pm
Venue : Rajaram College, Kolhapur
Organized by: IUCAA Science Popularization Team
Pune, RC-08

The workshop was chalked out with a motto of popularizing Physics and Astronomy among students studying from Highschool to UG level. The workshop was a grand success with 50 enrollments from high school, 25 from junior college and 50 from Undergraduate level and was conducted offline following COVID norms. It was inaugurated in the presence of Hon Principal of the college, IQAC Coordinator, Resource Persons and participants.

First Resource person Ms. Shivani Pethe -Kane madam from science popularization section of IUCAA demonstrated how to devise toys using basic principles of Optics, Sound, Light, Mechanics and Electromagnetics. Students thoroughly enjoyed this session with group discussion. They realized learning physics can be fun. They were taken aback when they realized how they have applied the laws of physics in toys

without even taxing their minds. They understood the various applications of Physics in day- to -day life. The concepts like creating vacuum, making sounds of varying frequencies and intensities through straws, applying Newton's laws of motion through pulling the string backward in the mini-train, understating the magic of colors with dispersion and laser show using total internal reflection, multiple reflections with plane mirrors, demo of propagation of waves through broom sticks and straws, image creations using convex and concave mirrors and lenses were thoroughly explained using simple discarded objects. Plasma concept too was beautifully explained by discharge of electricity in a gas tube. Understanding Physics even from waste was also another message given thorough this program. Students voluntarily came forward to conduct some experiments. The very purpose of making physics simple and enjoyable to students was served.

Second Resource person, Shri Atharva Pathak, an Instrumentation engineer from IUCAA, Pune introduced Astronomy to the students. He started with fascinating career opportunities in this subject and the role of IUCAA in popularizing it through its various public outreach programs reaching every nook and corner of the country. The different areas of Astronomy were very nicely explained to the children making the students realize its wide scope of learning. Gravitational waves and importance of LIGO was also explained in a lucid manner. The magnificent beauties of universe, origin of life on earth, story of birth of Universe were other attractive features of this session. Students from high school and junior college along with their teachers had flurry of questions which were satisfactorily answered by the resource person. The spectacular slide show on differential celestial objects like planets, stars, meteors, comets and various moons of the planets were apple of everyone's eye. Without even a blink, the eyes of all the participants were glued to the screen, the treasure trove of the universe were getting revealed through the sliding images on the screen in dark room. Students were very impressed by the wonderful images captured and efforts taken by the astronomers to bring it so close to them. Students realized the importance of Science and Technology in space exploration.

Third session was on sky observation program. It was conducted under the able guidance of our third Resource person Dr. Aviraj Jatratkar from Shri Y. P. Science College Solankur. He along with Pathak Sir guided the students about how to watch the sky, proper handling of telescope and how to focus and zoom the image to get best quality images. The phases of the brightest star Venus was the first image captured, second was Saturn Planet, third image was of Jupiter and its moons. Finally, the craters of the moon were shown. Three telescopes were mounted. An ultra modern rotating and programmable telescope was a center of attraction for the entire crowd gathered for the observation. The event was mesmerizing not only to the teacher and student participants but also to common people who came voluntarily to enjoy this event.

Ketaki Patankar
Convener
Mob.9890693356

National Competition for Innovative Experiment in Physics -NCIEP-21

NCIEP-21 was held on November 28, 2021 during 35th annual convention at Shri Vaishnav Vidyapeeth Vishwa Vidyalaya, Indore. Total 18 entries were received. However 14 selected entries were invited for the participation, 10 in category A (age less than 45 years) and 4 in category B (age more than 45years).

The judges were

1)Dr. B. D. Shrivastava, President, RC 09

2) Dr. Pravin Pathak, Senior Scientist at Homi Bhabha Centre for Science Education, TIFR, Mumbai.

The result of the competition:

Category A:

First Prize: (Cash prize of Rs 5000/- and a certificate)
Mr. Avinash Jayswal, Airport School, Ahmedabad.
Second Prize: (Cash prize of Rs 3000/- and a certificate)
Mr. Yash Chauhan, St. Xavier's college, Ahmedabad.
Third Prize: (cash prize of Rs 2000/- and a certificate)
Mr. Farhaan Khan, St. Xavier's college, Mumbai.

Category B:

Second Prize: (Cash prize of Rs. 2000/- each of the two participants)

I) Dr. Sarmishtha Sahu, Retired Prof. Maharani Lakshmi Ammanni Women's college (Autonomous), Bangalore.

ii) Dr. Usharani D. MES College, Malleshwaram, Banglore.

The certificates and prizes were awarded to the winners during valedictory function.

All the participants were given participation certificates.

I take this opportunity to thank our esteemed judges Dr. B. D. Shrivastava and Dr. Pravin Pathak.. I also Thank Dr. Uttam Sharma, Convenor and his team, Dr. P. K. Dube, EC member, Staff members and student volunteers from SVVV for excellent arrangements for the competition

Rekha Ghorpade
National Co Ordinator

Anveshika Activity for College Teachers

Organized by: Karnataka Higher Education Academy, Dharwad
Date: 11 Dec 2021 **Time:** 9am - 4 pm
No. of govt college teachers: twenty-five
Duration: Continuous Wholistic Teaching Program for a fortnight.
Topic: Constructivism, a Pedagogy of doing and self-learning
Morning session: 9.30 to 11 am - Explore & Elaborate with Multiple Reflections
Mid-morning session: 11.20 am - 12.50 pm - Effulgence in Electricity-Magnetism
Afternoon session: 1.30 -3.00 pm - Manifestations of Light
Resource Person: Sarmistha Sahu

Karnataka State Higher Education Academy,an institute of teaching, learning and research has geared up to great heights in a couple of years. The assistant professors of govt colleges expressed their satisfaction and learning in the 12 days of CW Training Program they had completed. The17- point evaluation methodology was evident in their interaction-time management, research aptitude, interpersonal-skills, pedagogy capabilities; innovative practices are things that the teachers had

picked up in the class.

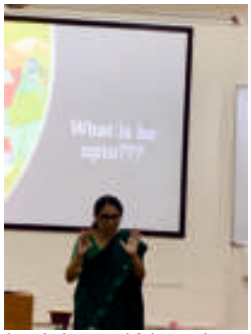

Figure 1 emphasizing self-learning methodology.

Constructivism, pedagogy of teaching was introduced with pictures and questions. The participants realized soon that constructing knowledge, they were doing it always! And, facilitating the students to construct themselves in classroom will improve their self-esteem and ownership of knowledge.

A couple of teachers were provided with some mirrors, protractor, coloured cap and tape. Playing with it culminated in data collection, hypothesis and finally the *formula* between planar angle and images, a scientific way of looking at a problem! Further, they devised methods of determining the angles without using any protractor or other angle measuring apparatus. They explored and created radian protractor all by themselves. A scientific innovative technology!

But this discovery was insufficient to measure solid angles. Playing with potatoes, cutting, and forming images with mirrors hinted at the connection between the solid angle and images. Soon, the group worked on the model and concluded the *formula* of solid angle and images. Absolutely new idea, from the 'students' and we called it the *CWTP* discovery! Many new thoughts, ideas, queries, and suggestions filled the room.

The tea-break was a Multiple-reflection-discussion ground.

Second session on *Effulgence of Electricity* was in another auditorium with circular sitting arrangements made interaction of the teacher and taught one -to-one. Simple models exhibited magnetic effect, heating effect, electromagnetic induction, thermoelectricity, piezoelectricity and many more, with a new perspective. Questions like 'have you seen electromagnetic induction developed in a copper coil when magnet is moved close to the axis of the coil? Have you watched the effect when the magnet is stationary, and the coil is moved? Can you see the effect when both the coil and the magnet are stationary??? Demo of all this surprises the 'students'! Yes it can happen, you watch and start thinking. It was the inquiries, question, answers, probing, linking, and expansion which made it interesting. Though all this was taught in their classroom from textbooks before, the teachers were encouraged to teach with demos and activities to lighten up the classroom. If assistant professors with 10 years' experience can get excited and interested in the phenomena, what about the young minds? This message was hammered by the Director of the institute many a times during the session. “Change your style of teaching and see the gleam in your students' eyes”, said Prof Shiva Prasad of Higher Education Academy, Dharwad.

Manifestations of Light is a trump card for many events. Green and red laser was used to show interference, diffraction with razors and combs. The intensity pattern of single hole and double hole can be so different and non-intuitive!Laser light with *parallel* beam and *divergent* beam can exhibit Fraunhofer and Fresnel diffractions with the same slit, features are miles apart. A curve plane produces Newtons 'rings' , convex lens of small focal length can function as a beam expander, many such techniques caught the eye of the audience.

Their interaction during all the sessions, involvement in the demos, linking the activities with their teaching practices in their colleges, questions and discussions evolved gradually but surely.Each one of the participants actively participated and demonstrated a willingness to learn and practice, back in their institutions. Tips they collected to try the activities with their students kept them agile. The concluding remarks at the end by Director and Dean, to the participants were mesmerizing. A participant said, “Every day we had very good sessions, but the 13th day event is exceptional”. “We forgot time”, “never felt bored”, “completely immersed in the day-long activities”,”it was so good, we promise to adopt this in our classes”, are few comments by the participants.

Ask me, and I will also say, that the day was well worth the trouble! All the three sessions were a kind of its own, with constructvist approach threading them all. Each demo was carefully crafted by me, to exhibit a couple of concepts emphatically. Simple demo left an indelible memory.

Sarmistha Sahu
Coordinator

ANNOUNCEMENT

Final Call For The Hard Copy Of The Bulletin

Members desirous of receiving the hard copy of our IAPT Bulletin must write accordingly, with their current address, e-mail id and contact number, to any one of the following addresses.

Managing Editor
Flat no. 206, Adarsh complex, Awasvikas -1,
Keshvaouram, Kalyanpur KANPUR – 208017
Or mail to:
iaptbulletin@gmail.com

Otherwise the hard copy to you will be discontinued, but you will continue to get the soft copy of the Bulletin.

Note:- The Bulletin is uploaded on the IAPT website *indapt.org* on a regular basis.

K.N Joshipura
General Secretary

ANNOUNCEMENT

New Institutional Members

We are happy to welcome the following institutions who have joined IAPT as Institutional members recently.

1. Charotar University of Science & Technology (Charusat), Changa - Dist. Anand, Gujarat
2. Physical Research Laboratory, Ahmedabad

The Institutional membership has been revived, and a fresh membership form for this category is now available with our Kanpur office.

K. N. Joshipura
General Secretary

ANNOUNCEMENT

Announcement regarding IOQ examinations scheduled in January 2022

In view of the worsening situation of the Covid-19 pandemic across the country, and consequent closure of educational institutions and travel restrictions announced by the central government and different state governments, the following decisions regarding the Indian Olympiad Qualifier (IOQ) examinations in Sciences scheduled in January 2022 are announced.

1. Indian Olympiad Qualifier in Junior Science (IOQJS) examination scheduled to be held on January 9, 2022 is postponed. The new dates of the examination will be announced later.
2. The Indian Olympiad Qualifier in Physics (IOQP) and Indian Olympiad Qualifier in Biology (IOQB) examinations scheduled to be held on January 16, 2022 are postponed. The new dates of these two examinations will be announced later.
3. The final decision on the conduct of Indian Olympiad Qualifier in Astronomy (IOQA) and Indian Olympiad Qualifier in (IOQC) scheduled to be held on January 23, 2022 will be announced after January 10, 2022.
4. The currently issued Hall Tickets for the examinations on January 9 and January 16 stand cancelled. Fresh Hall Tickets will be issued after new dates for the examinations are announced.

B P Tyagi

Chief Coordinator (Examination)

The Story of Cosmology through Postal Stamps- 11

MEDIEVAL ASTRONOMY

ISLAMIC (700AD-1500AD)

Revival of astronomical studies occurred and led in 7th century by the Arabs. The origin of Islamic Astronomy is interwoven with the knowledge derived from India and ancient Greeks.

Astronomical observations made by Arabs contributed greatly in the field of observational instrument and setting up truly astronomical institutes.

Stamp with tag- depict Madrasa founded by Ulngh Beg at Samarkand were also used as astronomical observatories

Ulugh Beg(1394AD) with astrolabe

Mohammad Taragai Ulugh Beg, Tartar Prince (1394) founder of astronomical observatory at Samarkand

Al-Zarqawi (1402), Spain- invented perfect astrolabe –"the tablet of al Zarqawi" or Saphaea

Ali Qushji-(1403)-Samarkand-wrote 9 work on astronomy

Al – Khwarizmi(820), Iran, Parcian polymath am=nd astronomer prepared first comrehensive astro table Zijes – Sindhind.

Ibrahim Hakk Erzuruni(1756), sufi saint- wrote - ***Marifetname*** explaining observational astonomy

Al Nath- arabic name of Beta Tauri-second brightet star in Taurus, Gint Star 134 LY away

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