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Aurora Over Arctic Henge

Reports of powerful solar flares started a seven-hour quest north to capture modern monuments against an aurora-filled sky. The peaks of iconic Arctic Henge in Raufarhöfn in northern Iceland were already aligned with the stars: some are lined up toward the exact north from one side and toward exact south from the other. The featured image, taken after sunset late last month, looks directly south, but since the composite image covers so much of the sky, the north star Polaris is actually visible at the very top of the frame. Also visible are familiar constellations including the Great Bear (Ursa Major) on the left, and the Hunter (Orion) on the lower right. The quest was successful. The sky lit up dramatically with bright and memorable auroras that shimmered with amazing colors including red, pink, yellow, and green -- sometimes several at once.
(Link: https://apod.nasa.gov/apod/astropix.html)

The Story Of Cosmology Through Post Stamps 3

COMET

κομητης- KOMETES-LONG HAIRED

Appearance of comet in the night sky have always aroused admiration and curiosity, often accompanied with surprise and fear. This led people to associate its arrival with disaster or major event and attached it with religious stories and myths, before 1600AD comet were essentially considered to be heavenly omens and were not clearly established as celestial rather a meteorological phenomenon

11th century *Bayeux Tapestry*- Comet is depicted portending the death of Herold and the triumph of the Normans in the battle of Hasting (1066)

1682 painting -observation and recording the appearance of comet in the sky

Appearance of comet is a divine event so comet and sun are personified as Divinity

Earliest known reference of comet may have occurred around 466BC in the sky over Greece according to researcher Graham and Hintz

Comet and mountain road

***Bayeux Tapestry*- wool embroidery on linen 11th century Scene32- *Isti Mirant Stella* -these men wonder at star Appearance of comet and King Harold Receive bad news**

***Adoration of the Magi* 1301- Gitto-painted comet as star of Bethlehem.**

Old sketch of comet along with modern image taken by telescope

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IAPT and Virtual Space

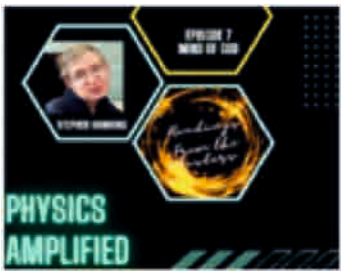
Education has entered a very challenging era with the presence of chat bots, AI chat bots and ChatGPT making its entry with a bang. It is attracting approximately 100 million visitors per month with rise of revenue to 1 billion dollars with an estimated accuracy of 85%, which is bound to growfurther like a tsunami. Once again chatter is getting louder that will this make teachers redundant. All the phases through which we have passed through in the last about 60 years, it was during Covid that we realized that a good mix of offline and online modes is the in thing, and naturally IAPT can make best use of it by having a robust online infrastructure with minimal investment in the cloud to reach out to the young audience. This is without doubt the need of the hour.Teachers have emerged more innovative and bolder with their experiences during and after, within and outside the classroom. It has led to a realization why human interface is indispensable.

In the last one-year, IAPT has taken many steps in this direction. We have entered social media space with our *official IAPT face book page*. We have also started an ambitious group on Facebook namely *Let us Solve it* to hone the problem-solving skills by generating a dialogue around a problem and encouraging members to post possible solutions. We have already reached a membership of 979 in this group. A very encouraging sign. There are many other steps which are planned in this direction to develop critical and computational thinking.

Last year we organized an online *workshop on Moodle* to provide our members a skill in creating Moodle courses and developing validated Moodle question banks with classification of questions as per Bloom's Taxonomy. These are expected to lead to mock tests and problem-solving hackathons as is the case with The International Young Physicists Tournament (IYPT) which is referred to as *Physics world Cup*and is carried out in the spirit of the real-world scientific research for secondary school students. Let us not forget what National Education Policy 2020 has envisaged in this direction.

To have regular conversations on Physics and around Physics, which is our pivot, IAPT has invested in Zoom Platform which is being used now to arrange programs at the central IAPT level and at the level of regional councils. It is also planned to bring Physicists/Scientists from across the country and internationally to have best exposure for our students and teachers at all levels. We invite your suggestions to move forward in this direction. We have already initiated a series of lectures on Physics Education Research and Artificial Intelligence on our Zoom platform.

From 1st April 2023 we have rolled out a beta version of our dynamic website www.indapt.org.in. It is hoped that it will stabilize in the next 3 month with your indulgence in it. We plan to have all our activities showcased under the umbrella of this website to avoid confusion around multiple websites. A space has also been created for each regional and subregional council on this website so that community comes to know about their activities without delay and administered by their own designated admins.



A very good initiative of IAPT's YouTube channel is already available to us, which I hope will start getting populated as more and more user generated and vetted videos, reels, talk shows emerge,and a robust community builds around its playlists. Podcasts are fast becoming a very popular media among young internet users and we need to populate that space as well. We also wish to start a podcast channel of IAPT. I am sharing a cover design with you here.

We need to talk about latest areas which are fast emerging around physics like Machine Learning, Artificial Intelligence, Quantum Computers and ……. Let us make our students part of the exciting horizons emerging in Physics. Let us Brainstorm, make proposals and implement. May the teams emerge to learn and engage and let thousand ideas bloom.

PK Ahluwalia
President

PHYSICS NEWS

An experimental method for examining ultra-light dark matter using millimeter-wave sensing

A team of researchers at Kyoto University have now established an experimental method for examining ultra-light dark matter around 0.1 milli-electron volts, applying a technology for millimeter-wave sensing in cryogenic conditions, characterized by low thermal noise. A dedicated millimeter-wave receiver is cooled to -270 ℃ to suppress thermal noise to accommodate weak conversion photons. This cryogenic receiver is used to search for DPDMs with a mass range of about 0.1 MeV. Ordinary photons are theoretically converted from dark photons using metal plate surfaces. These conversion photons correspond to the mass of dark photons because of energy conservation. The conversion photon frequency of 10–300 GHz corresponds to dark photon mass from 0.05 to 1 MeV.

By conducting their experiments with unprecedentedly stringent constraints, tighter than cosmological constraints, they opened up possibilities for investigating dark matter.

Read more at: https://phys.org/news/2023-03-experimental-method-ultra-light-dark-millimeter-wave.html

Original paper: Physical Review Letters. DOI: 10.1103/PhysRevLett.130.071805

Researchers make breakthrough in high-pressure magnetic detection

In this study, the researchers have for the first time realized high-pressure in-situ quantum magnetic detection based on the silicon vacancy (V_{Si}) defects in silicon carbide and solved the problem of high-pressure magnetic detection. The researchers used ion implantation to generate shallow V_{Si} defects on the surface of a processed silicon carbide anvil cell. By using ODMR technology on V_{Si} defects, the researchers observed the pressure-induced magnetic phase transition of $Nd_2Fe_{14}B$ magnets at about seven GPa, and measured the critical temperature-pressure phase diagram of the $YBa_2Cu_3O_{6.6}$ superconductor. This technique is of great significance to the field of high-pressure superconductivity and magnetic materials, according to the researchers.

This work opens the door to new studies of quantum materials using Moissanite anvil cells.

Read more at: https://phys.org/news/2023-03-breakthrough-high-pressure-magnetic.html

Original paper: Nature Materials DOI: 10.1038/s41563-023-01477-5

A crystal, but not as we know it

When we think of crystals, we think of ice, kitchen salt, quartz, and so on—hard solids whose shapes show a regular pattern. Research performed in the group of UvA-IoP physicist Noushine Shahidzadeh shows that crystals can be quite different: they can be soft and deformable shapes without the familiar facets. Crystals are generically hard solids, and are usually identified by their well-defined geometrical shape that reflects the underlying highly ordered molecular structure. In their paper, the physicists show that surprisingly, some salts that contain water in their crystalline structure can behave remarkably differently.

When these salts are slowly dissolved through contact with humid air, they become soft, deformable and lose their facets. This is in contrast to regular crystals, which keep their faceted shape and stay hard while dissolving. Thus, the microcrystals that were studied simultaneously are crystalline in the bulk of the material, but show liquid-like molecular mobility at their surfaces.

Read more at: https://phys.org/news/2023-03-crystal.html

Original paper: Nature Communications. DOI: 10.1038/s41467-023-36834-0

Soumya Sarkar
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Determination of the Height and Distance of a Building with Smartphone Photography

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Abstract

Smartphones have become an almost 24 hour companion of a large section of the urban populace in India. However, most of the students of physics are not aware that the phone can be used as a tool for carrying out physics experiments. The instrument can be used as a powerful physics teaching and learning aid. In this work we have shown how to use the camera of the smartphone to find the height and distance of an object with great accuracy just by photographing the object from a distance.

Introduction

Physics teaching methods at the high school and undergraduate level have undergone a huge change in recent times, all over the world, with the advent of the smartphone as an important tool for experiments. Hundreds of physics experiments are being performed with the help of sensors built into the smartphone[1,2]. Several software have been written to facilitate physics experiments and are freely downloadable from the internet. We have performed an experiment with the camera of a smartphone where we have measured the distance and the transverse width of an object simply by photographing the object from two positions separated by a distance along the line of sight of the camera [3]. It is possible to determine the width of the image formed on the sensor of the camera with a very high degree of accuracy. By applying the rules of simple geometrical optics of high school standard, we have determined the height of our school building by photographing it from the playground in front of the school.

Theoretical Background

When an image is formed by a convex lens, we have the very common relation

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}. \qquad (1)$$

Here u is the object distance and v is the image distance measured from the lens which is assumed to be thin; f is the focal length of the lens and is positive according to our sign convention. When a real image is formed by a convex lens, object and image positions are on the opposite sides of the lens and the image is inverted. Transverse magnification(m) produced by the lens is given by

$$m = \frac{v}{u} = \frac{I}{O} \qquad (2)$$

where I and O denote the transverse sizes of the image and the object respectively and the magnification is negative. From the above two equations we have,

$$m = \frac{1}{1+\frac{u}{f}}. \quad (3)$$

From equation (3) we get

$$\mathrm{u} = f_c(\frac{1}{m} - 1) \quad (4)$$

where f_c is the focal length of the lens of the camera. This equation involves 4 quantities. Object width and its distance from the camera; the focal length of the lens and the image size on the sensor. We have eliminated the image distance from this equation as we cannot directly measure the sensor distance from the lens. Magnification is always determined from the ratio of the image and object width. If we know three of these quantities we can get the fourth. If we find the size of the image from the photograph of the object, we can determine the focal length of the lens [3] if we know the object width and its distance from the lens.

The camera sensor of a smartphone comprises a rectangular array of pixels. A pixel is a CMOS device with the linear dimension of the order of a micron. One can learn about the electronics of the camera sensors from [4] and innumerable texts on electronics. The image size on the sensor of the camera can be found by opening the photograph with the 'Paint' software of Windows Operating System(OS)[5]. People using Apple OS can do this using the software 'Preview'. When the cursor of the Paint software is coincided with one edge of an image, it gives the coordinates of the point in terms of pixels. If the image is lying along the X axis, its length can be determined by finding the X coordinates of the two edges of the image. The difference of these two readings is what we call the pixel for the length of the image on the sensor. One can find the width of 1 pixel of one's camera sensor in micron from the website [6] relevant for one's smartphone model number. This pixel number can then be converted into mm/cm to find the real image width on the sensor. The great advancement of modern technology has allowed us to measure the image width on the sensor at micron level accuracy. We used a smartphone Apple iPhone 12 Mini.

If it so happens that we do not know the width and the distance of the object, we still can find them if the object is photographed from two positions separated by a distance D. In Figure 1 we have shown the lens configuration. If $u1$ and $u2$ are the distances of the object from two positions of the camera with transverse magnification m_1 and m_2 respectively, we get

$$\mathrm{D} = f_c(\frac{1}{m_2} - \frac{1}{m_1}) \quad (5)$$

where $D = u2 - u1$. This displacement should be along the line of sight of the camera lens. In terms of the object and image sizes we can write

$$\mathrm{D} = f_c(\frac{O}{I_2} - \frac{O}{I_1}) \quad (6)$$

where O is the size of the object and I_1 and I_2 are the image sizes formed on the camera sensor. Hence we get

$$O = \frac{D}{f_c(\frac{1}{I_2}-\frac{1}{I_1})}. \quad (7)$$

The lens in the displaced position has been shown with dash marks in the figure. In our convention $u1$ and $u2$ are negative and f_c is positive. If I_1, I_2 are negative quantities, equation (7) ensures that the object size turns out positive for all situations. For simplicity in calculation we can write

$$O = \frac{|D|}{f_c\,|(\frac{1}{I_2}-\frac{1}{I_1})|}. \quad (8)$$

We find the size of the object O using equation (8) by determining I_1, I_2 and the distance D since we already know the focal length of the lens. Using equation (4) we get the distances of the object from the two positions of the camera when we put m with its proper sign. For calculation of the magnitude of the object distance, we write equation (4) as

$$|\,u\,| = f_c(\frac{1}{|m|}+1). \quad (9)$$

Using the last two equations we can find both the width and the distance of an object. We have used the last two equations to determine the height and distance of our school building by photographing it from two position

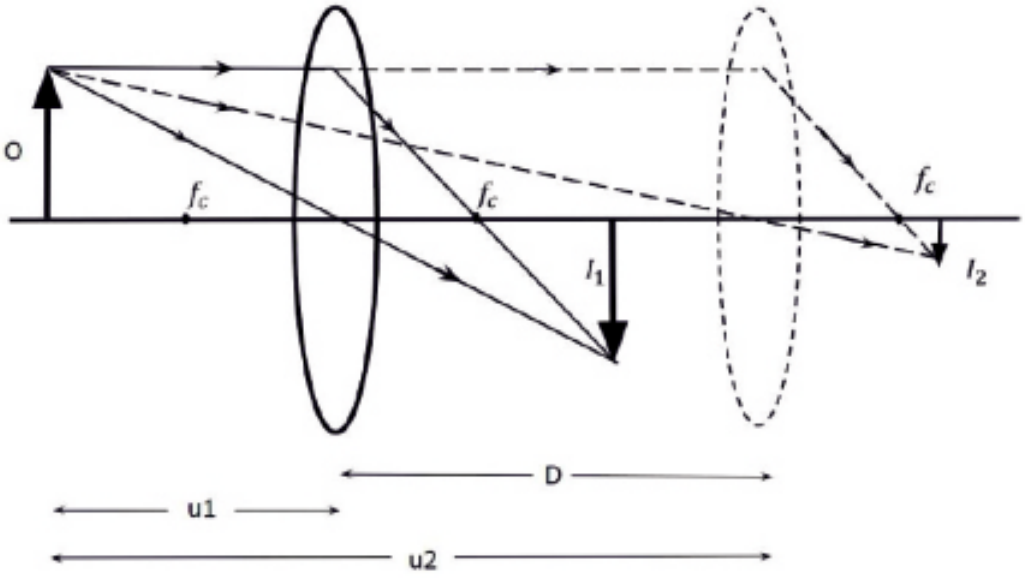

Fig. 1 Image formation at the two positions of the lens

Experimental results

The pixel size of our camera sensor was found from the website[6] to be 1.4μm. The focal length was measured to be 4.22mm [7]. The focal length can be found from the relevant website also [8]. However, we determine the focal length with better accuracy. The website gives the focal length as 4.2mm.

In Table 1 we show the data for the measurement of our school building. We have photographed the building from two positions separated by D which has been shown in the 5th column of the table. The pixel counts px1, px2 for the image sizes from two positions of the camera are shown in columns 1 and 3 and the sizes converted to real lengths are shown in the 2nd and 4th columns. In the 6th column we show the height of the building estimated using equation (8). The average height of the building turns out to be 7.5±0.1m. Here the error shown is the standard error or the error in the mean. Just for checking, we measured the height of the building by dropping the free end of a 30m tape measure from the roof of the school building. It was found to be 7.4m which matches very well with our measurement by photography. The distances of the camera from the school building are estimated using equation (9). We show in column 7 the distance of the school building from the first position ofthe camera. The distance from photography matches very well with the distance measured by the tape shown in the last column of the table. In this measurement, the pixel counts of the image from two positions px1 and px2 should be large and should differ by a fairly large amount for minimizing error. When one puts the cursor of the program Paint coinciding the two ends of the image, there can be an error in repeated measurements. With quality measurements it should not be more than about 3 pixels. So, px1 and px2 should differ by pixel counts that are large compared to this possible error.

Table 1: Focal length of the camera lens $f_c = 4.22mm$; 1 pixel=1.4μm; Building height measured by a tape =7.4m

px1 for first position.	l_1 (cm)	px2 for second position	l_2 (cm)	dist. D between 2 pos. (m)	object height (m)	distance from 1st.pos (m)	distance measured by tape (m)
748	0.105	448	0.063	20.0	7.5	30.0	30.0
1661	0.233	960	0.134	10.0	7.5	13.5	13.0
1661	0.233	738	0.103	17.0	7.4	13.5	13.0
1661	0.233	797	0.112	15.0	7.7	13.9	13.0
750	0.105	555	0.078	10.0	7.2	28.9	30.0
745	0.104	448	0.063	20.0	7.6	30.7	30.0

Conclusion

Taking advantage of the advanced sensor technology incorporated in modern smart phones, we have developed a method of finding the distance and the transverse width of an object accurately by photographing it from two positions separated by a distance along the line of sight of the camera. Here we have directly measured the distance and the transverse width of the object just to check our

measurements from photography. We show that they match very well. This gives us confidence that the method works well. When it is not possible to find the width and the distance of the object by direct measurement, the method may be useful in determining them in a very short time. Students might find the method interesting to find the height of a tall tree or a hillock and similar other objects just by photographing them from two positions.

The method is useful in other measurements also. We have presented our results on the determination of the refractive indices of water and glass by this method [7]. We have determined the RI of water to 3 significant digits after decimal. We have also measured the RI of a glass slide of thickness as small as 1mm by apparent depth method.

References

1. Collen Lanz Countryman, "Familiarizing Students with the Basics of Smartphone's Internal Sensors," Phys. Teach. **52**,557 (2014).
2. Martin Monteiro and Arturo C.Marti,"Resource Letters MDS-1:Mobile Devices and Sensors for Physics Teaching," Am.J.Phys. **90**,328 (2022).
3. Soumen Sarkar, Sanjoy kumar Pal, Surajit Chakrabarti,"Determination of the transverse width and distance of an object with a smartphone camera ", Phys. Teach. **61,** 58 (2023) (AAPT).
4. Jesus J.Barreiro et al., "Diffraction by electronic components of everyday use," Am.J.Phys. **82** 257 (2014).
5. Jun Wang and Wenqing Sun, "Measuring the focal length of a camera lens in a smart-phone with a ruler,"Phys.Teach. **57**,54 (2019).
6. https://www.gsmarena.com/apple-iphone-12-mini-10510.php
7. Surajit Chakrabarti, Sanjoy Kumar Pal, Soumen Sarkar, "An accurate determination of the refractive indices of water and glass by smartphone photography," Phys. Educ. 58 (2023) 035010 (IOP Publishing)
8. https://www.metadata2go.com/

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ARTICLE

Analysis and Verification of the Angular Separation between Jupiter and Venus as seen from the Earth during their Conjunction on March 2, 2023

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Abstract:

A Planetary Conjunction of two planets, with reference to the Earth occurs when the two planets and Earth form a straight line, as seen from the top of the Solar system. Such a Conjunction occurred between Venus and Jupiter on March 2, 2023, as seen from the Earth.

A correlation study is done to correlate the angular separation as seen from the Earth and the Planets' Longitudinal and Declination angular data obtained in a Sun Centric Ecliptic plane, around the time of Conjunction, which was around 1106 hrs IST. Verification is done by finding out the angle, on almost a "Virtual Sky", in an Application Software. A very good match has been obtained (< 0.1° Error) between the estimated value of Angular Separation and the value obtained from the Topo-centric Data (Local Azimuth/Elevation), available from the Stellarium application software.

At the time of Conjunction, the Planets lie on the same Ecliptic Longitude as seen from the Earth's Centre, but differ in Declination or Latitude, depending on the Planetary Declination in the Sun Centric Ecliptic plane.

These Declination (Angle from the Sun Centric Inertial Reference Ecliptic plane) values have been used with a simple Geometrical Sun Centric Orbital diagram of Venus, Jupiter and Earth, to get the Declination angle from the Ecliptic Plane as seen from the Earth. In the specific case, the obtained value of 0.48° of the Angular Separation matched very closely with 0.49° , that obtained with the Planetary data as seen using the Stellarium application at around 1106 hrs IST of March 2, 2023, the estimated time of the Conjunction.

1.0 Introduction

Planetary Conjunction events generate lot of curiosity and interest for viewing the planets around the Conjunction time. Sometimes, it is very interesting to see the physical closeness of the Planets, as seen from the Earth. While observing one such Conjunction of Jupiter and Venus which occurred on March 2, 2023, it was felt that the angular separation between them was close to 0.5° or so to the visual eye. The angle was estimated, based on placing an imaginary Sun in between them, since we know that the Sun subtends an angle of very close to 0.5° to our eyes.

The angular separation occurs due to the fact that the Orbits of the Planets do not lie in the same plane. This plane is the plane containing the Sun and the Earth, referred to as the Ecliptic plane. Each planet's Orbit is inclined, with

different Inclination Angles. The maximum value of the inclination is close to 3.4° for Venus. Had the planets not been in different inclined planes, every conjunction would have been a perfect Occultation.

Assumptions like, perfectly circular Orbits of Venus and Jupiter at 0.723 AU and 5.0 AU respectively, 2D graphical view of the Orbits, since the orbit inclination values are < 3.4°, etc, have been made.

A very close theoretical value of the Angular separation is obtained, using **a)** The Longitude/Declination values with reference to Sun centre (Sun Centric Ecliptic Plane), **b)** Close estimation of Earth to Planet distance in AU, graphically and **c)** Simple trigonometric Tangent angle rule in a right angled triangle , for calculation of Declination angles as seen from the Earth.

Stellarium Application used , shows Stars/Planets present in the visible hemisphere on top on a Planetarium dome. After obtaining the above, the angular separation, viewed in the calibrated angular grid lines of the Local Azimuth/Elevation, is measured. These local grid lines can also be understood as a local Longitude/Latitude (Direction/Altitude) structure above an observer, with 0° Longitude representing the local North Direction. Constant Altitude (0° to 90°) lines are circular lines extending from 0° to 360°. Local Horizon is 0° Altitude and the Local Zenith is the 90° Altitude.

The line segment joining the Planets, during the Conjunction can be seen as a small part of the Ecliptic Longitude. The Angular separation being the magnitude difference between their Declination values as seen from the Earth.

2.0 Explanation of the terms used in this Article

Ecliptic Plane: The plane containing the Sun and Earth, **Ecliptic Longitude (Sun Centric Ecliptic plane Reference)**: Angle in °, measured on the Ecliptic Plane from Inertial Equinox direction, **Equinox**: Earth-Sun Inertial Direction on March 20/21. **Ecliptic Longitude (Earth Centric Ecliptic Plane Reference):** Angle in degrees, measured on the Ecliptic Plane from Inertial Equinox direction or Inertial 0°(First Point of Aeries or Mesharambh, occurring around April 14/15 presently), **Declination:** Angle in degrees of the Planet's Orbit Vector, measured from the Ecliptic Plane in the Vertical Plane passing through that point in the Orbit, **Orbit Vector:** It is the vector represented by the straight line joining the Sun Center and the Planet

3.0 Description

3.1 Jupiter/Venus Planetary Conjunction and Visible Angular Separation

Fig-1 shows the Orbital positions of Earth, Venus and Jupiter, on March 2, 2023. It can be seen from the Fig that Earth /Venus/Jupiter lie on a straight line. In other words, Jupiter and Venus will be seen very close to each other at the time of Conjunction, as seen from the Earth. Due to the Declination difference in the Planets, although in the same direction , seen from the Earth, there is an angular separation , as seen from the Earth. The angular position with reference to the Earth-Sun line was close to 31° or so, in such a way that the planets were comfortably visible within 1-1½ hours after Sunset.

3.2 Important details of an Inclined Planet Orbit around the Sun

Fig-2 shows an Inclined Orbit of a given planet around the Sun, inclined at θi. The Orbit intersects the Ecliptic plane at 2 points, the Ascending and Descending node as shown. The Declination is defined at any instant in the orbit as ð, the angle which the Orbit Vector of the Planet makes with the Ecliptic plane. Fig-2 shows the relationship of ð with the instantaneous Orbit Vector angle θv (0° to 360°). It can be seen that the peak value of ð is ± θi, occurring at θv = 90° and 270°.

3.3 Venus Orbital position

Fig-3 shows the Orbit of Venus and Earth around the Sun. From the Longitude/Declination data obtained [1], it was seen that on March 2, 2023 @ 0 UT, the Longitude of Venus was close to 55.4° (0° being the Equinox Direction as referred from the Sun Centre). The Equinox (March 21) line, as drawn from the Sun Center is about 19° (~ 1°/day rate of Earth revolution), in the Anti clockwise direction (Planetary revolution direction) from the present position of March 2,2023. Fig-2 also shows the Longitude and Declination values around March 2,2023 @ UT. The declination change in 24 hours, being close to 0.2°, is linearized to get the value at around 1106 hrs IST. Also, the declination value ,ðs at a time very close to the Conjunction around 1106 hrs IST, works out to be 1.17°. Fig-3 also shows 2 Right angled triangles, one drawn from the Earth Center and the other one from the Sun center. for computation of the Declination Angle of Venus as seen from the Earth. Considering the ratio 0.723/1.36, ðe works out to (0.723/1.36) * ðs. ðe is the Declination of Venus as seen from the Earth. ðe is therefore calculated as -0.62°

3.4 Jupiter Orbital position

Fig-4 shows the Orbit of Jupiter and Earth around the Sun. From the Longitude/Declination data obtained [1], it was seen that on March 2, 2023 @ 0 UT, the Longitude of Jupiter was close to 17.0° (0° being the Equinox Direction as referred from the Sun Centre). The Equinox (March 21) line, as drawn from the Sun Center is about 19° (~ 1°/day rate of Earth revolution), in the Anti clockwise direction (Planetary revolution direction) from the present position of March 2,2023. Fig-4 also shows the Longitude and Declination values around March 2,2023 @ UT. As can be seen, ðs at a time very close to the Conjunction around 1106 hrs IST, works out to be -1.29°. Fig-4 also shows 2 Right angled triangles, one drawn from the Earth Center and the other one from the Sun center. for computation of the Declination Angle of Jupiter as seen from the Earth. Considering the ratio 5.0/5.8, ðe works out to (5.0/5.8) * ðs. ðe is the Declination of Jupiter as seen from the Earth. ðe is therefore calculated as -1.11°

3.5 Estimation of the time of Conjunction

The time of Conjunction is calculated [2], using the Longitude values of Venus and Jupiter on March 2, 2023 @ 00 UT, and March 3, 2023 @ 00 UT, with reference to the Earth Center (Earth Centric Ecliptic Plane). Jupiter has a values of 347°55' and 348°08' and Venus has values of 347°41' and 348°54'. From these values it can be seen that a) The Conjunction happens between March 2, 2023, 00 UT and March 3, 2023, 00 UT. b) Jupiter Longitude changes by 13' in 24 h (13/24'/h), while Venus Longitude changes by 73' in 24 h (73/24'/h). Considering these changes as linear, and the initial difference of 14' between them, the Longitude of Conjunction works out to be

347°58' and time in hours from 00 UT of March 2,2023 works out to be 5.6 hours. Hence, the time of Conjunction is 0536 UT or 1106 IST on March 2, 2023.

3.6 Computation of Angular Separation between Jupiter and Venus

As seen in 3.3 and 3.4 the Mag{ (∂e(J) - (∂e(V) }works out to be 1.11° – 0.62° = **0.49°**. This can be seen as the Declination difference between Jupiter and Venus for the same Earth Centric Longitude. Hence, as seen from the Earth, the visual angular difference should be close to 0.49°. It is equivalent to saying that a place near Delhi and Bangalore lie on the same Longitude of around 77°E but have a Latitude difference of about 16°.

3.7 Stellarium Application software for actual angular separation measurement

To verify the result obtained in 3.6, the Sky map @ 1106 IST on March 2, 2023 was seen in the Stellarium Application [3]. Fig-5 shows the output, with measured angle marked. From the Azimuth/Elevation angular scale, the difference between Jupiter and Venus is close to 29' or **0.48°**, taking the Altitude scale into account.

4.0 Results and Discussion

From 3.6 and 3.7 it can be seen that the calculated value of 0.49°, and what we can say with very large confidence as the observed value of the Angular difference, match within 0.01° (0.49° - 0.48°). The theoretical computations could always have been done, but the availability of the Stellarium Application software, has made possible, sky observation at any time, and from any place. The close match of the result gives a clearer understanding of the Conjunction, as seen from the Earth or the Earth Centric Ecliptic plane. This procedure can be adapted for any other Conjunction. In fact, there are frequent Conjunctions of Moon with other planets.

References and Acknowledgements

[1] Jet Proportional Laboratory/Horizon Systems/App **ssd.jpl.nasa.gov** for Longitude (Right Ascension) /Declination values of Jupiter and Venus.

[2] Date' Panchang for Shake' 1944 (2022-23) page 74, Publisher: Date Panchang, 624 Dakshin Kasba, Solapur-413007,for Ecliptic Longitudes of Jupiter and Venus in Earth Centric Ecliptic plane, with 0° as Mesharambh or First point of Airies. **www.datepanchang.com**

[3] Stellarium Astronomy Software **stellarium.org**

I sincerely express my gratitude and acknowledge the invaluable contribution of Dr. Girish Pimpale of Nashik, Maharashtra towards the realization of this Article. I sincerely also thank Mr. Bharat Acharya of Chamarajanagar (Mysuru), Karnataka for providing the required Stellarium outputs in the required format.

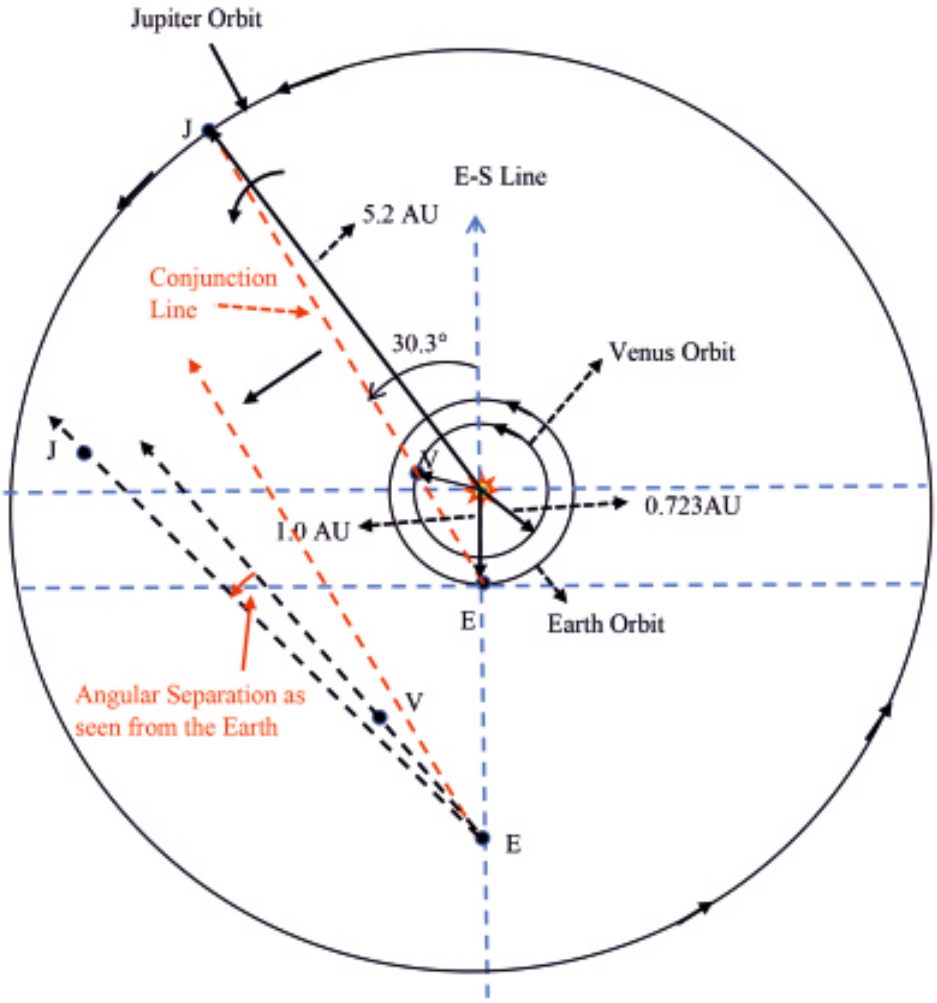


Fig-1: Earth/Jupiter/Venus relative positions with reference to Sun on March 2, 2023

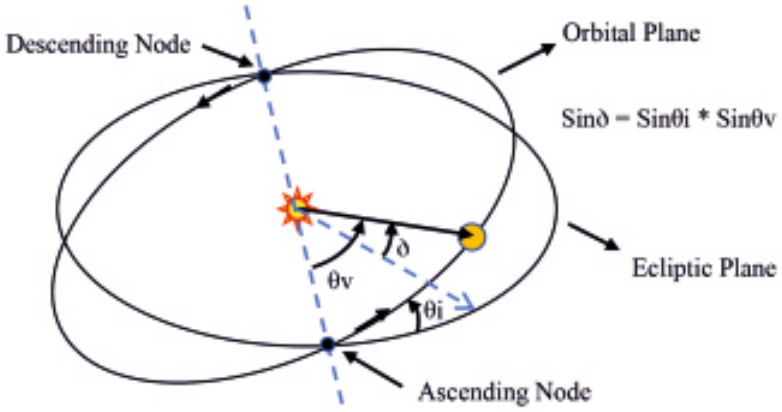


Fig-2: Orbit Inclination/Declination of a Planetary Orbit

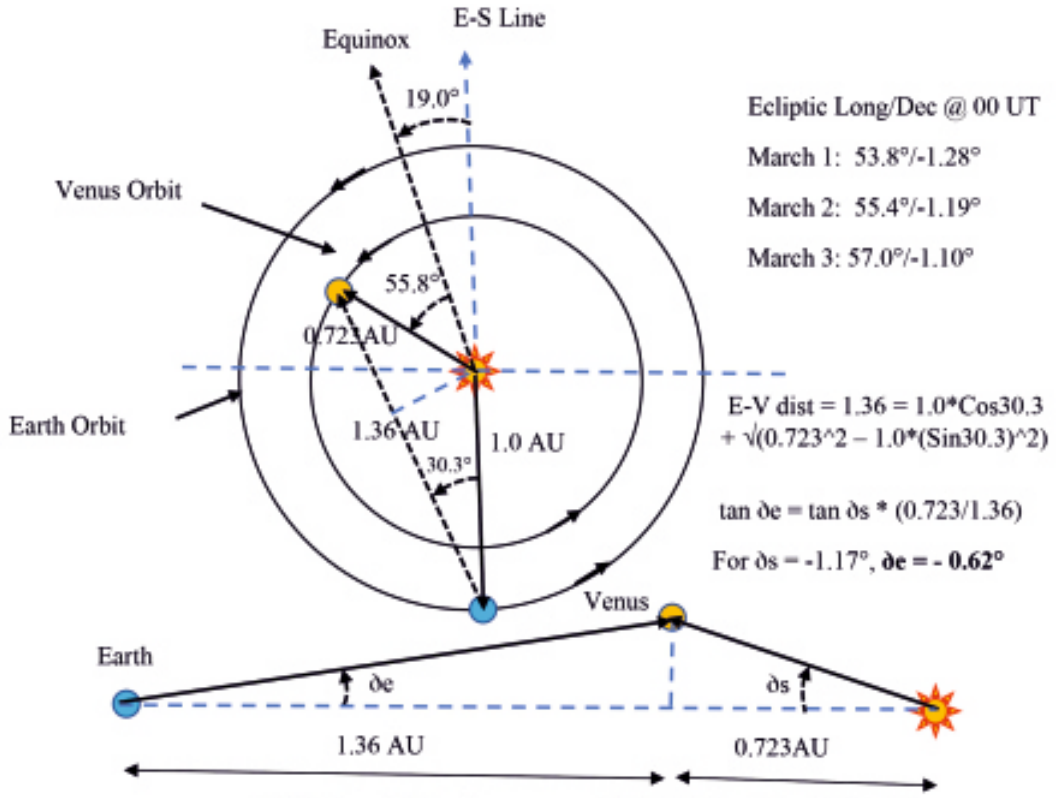


Fig-3: Venus Orbital parameters @ 1106 IST on March 2, 2023

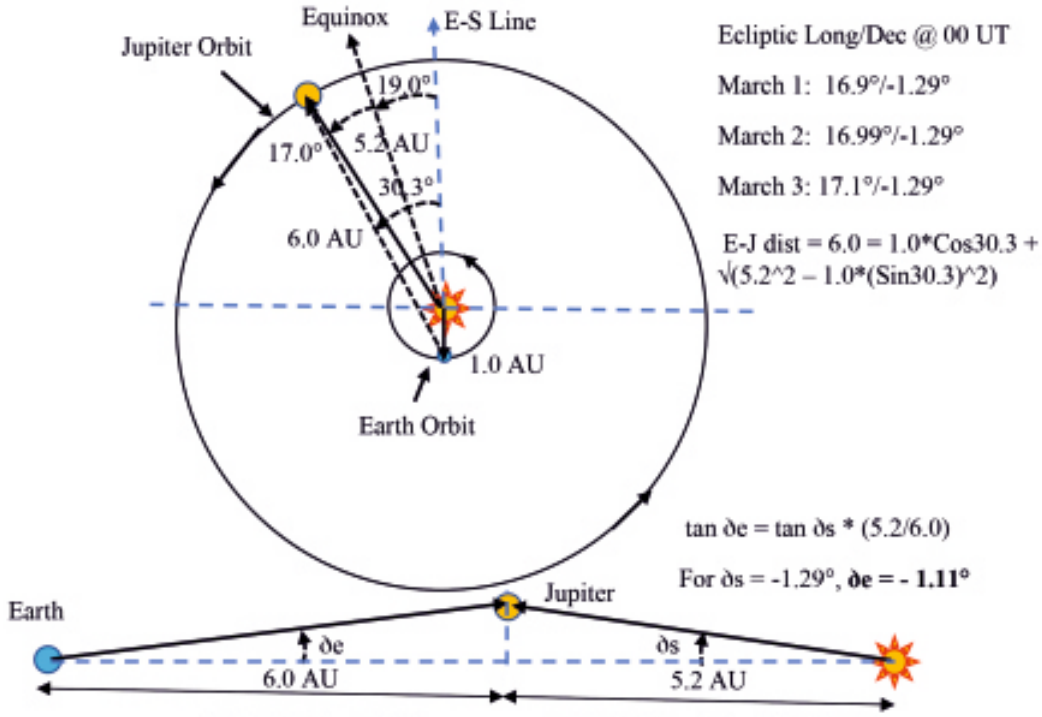


Fig-4: Jupiter Orbital parameters @ 1106 IST on March 2, 2023

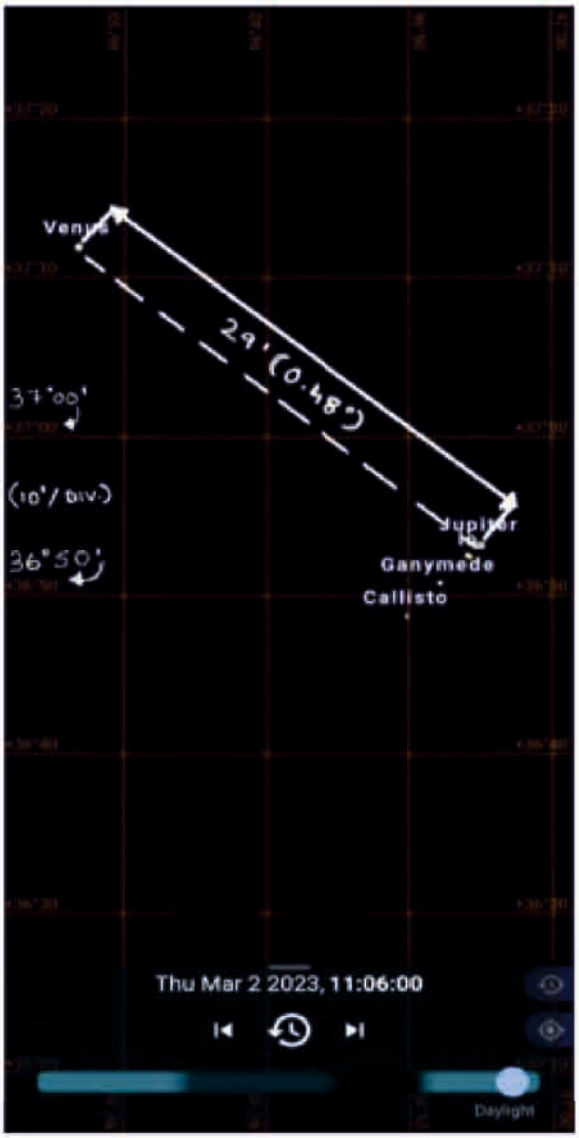


Fig-5: Stellarium Output showing Venus and Jupiter in the sky. Altitude scale used to make angular measurements inserting appropriate marking on the image.

International Conference On Recent Trends In Materials Science (ICRTMS - 23)

7th March 2023
Venue: A2 Auditorium, Kristu Jayanti College (Autonomous), Bengaluru -77, Karnataka.
Number of Participants: 162;
Oral Presentations - 47;
Poster Presentations – 8
Student Participants : Other than Kristu Jayanti College : 20, Kristu Jayanti College: 60
Volunteers: B.Sc., Students, Kristu Jayanti College : 27

Inauguration of the conference ICRTMS – 2023 was held on 7th March at 9.15 A.M by lighting the lamp and with invocation by students of B.Sc., Physics, Kristu Jayanti College.

Releasing the conference abstract book by dignitaries

International Conference on Recent Trends in Materials Science started with the invocation followed by a welcome address by Dr. Calistus Jude A L, Dean, Faculty of Sciences. A brief overview of the conference was given by Conference Co-convener Dr. Shivaraj Maidur. Rev. Fr. Joshy Mathew, Director, Library and Information Centre, Director- HR Department, Head, Department of English in his inaugural address, highlighted the use of materials science in day-to-day life and its relevance in the development of new technologies, and also congratulated the department. The chief guest, Prof. Karuna Kar Nanda, Director, Institute of Physics (IOP), Bhubaneswar, emphasized the relevance of research in materials science in the current scenario and use of materials research in all the fields. The Conference abstract book was also released by the dignitaries.

After the formal inauguration, **Prof. Karuna Kar Nanda, Director, Institute of Physics (IOP), Bhubaneswar**, delivered the keynote address on **"Breathing of Nanostructured Materials"** where he elaborated adsorption of oxygen on materials surface is essential for a variety of applications including gas sensing, photodetection, pressure sensing, oxygen reduction reaction, oxidation and in monitoring several properties such as hydrophobicity, conductivity, nature of doping, work function and etc. He explained the key applications and properties of various carbon and oxide nanostructures associated with oxygen adsorption and provided a correlation among them.

Inaugural address by **Prof. Karuna Kar Nanda**

The technical session 1 started with the talk on Nonlinear Optical Applications of Novel Materials, by **Prof. Reji Philip,** Senior Professor, Ultrafast and Nonlinear Optics (UNO) Lab, Light and Matter Physics (LAMP) Group**, Raman Research Institute Bengaluru.** He emphasized on

the second and third order nonlinear optical effects, experimental techniques and the application of some novel material in optical limiting devices. He highlighted some of the materials such as carbon nano tubes (CNTs), Fullerene and organic dyes for optical limiting applications. It was surely a very informative session.

The technical session 2 started with the talk on Modelling the Mechanical Behaviour of Shape Memory Helical Springs, by **Dr. R. Santhanam,** Senior Scientist, Aerospace Structures Division**, Defence Research and Development Laboratory (DRDL),** Hyderabad**.** He explained behavior of Shape Memory Helical Springs and described SMA springs can be used for high performance soft actuation. Different characterizations of SMA springs were discussed. He presented study on variation on coil diameter of SMA springs, development of constitutive modes for SMA springs and effect of geometric properties of bias springs actuation. The session was interactive and the speaker covered all key concepts.

The technical session 3 started by **Dr. Madan Kumar Shankar**, Postdoctoral Researcher, Department of Physics, **Uppsala University, Sweden,** elaborated on Time-Resolved Serial Femtosecond Crystallography of Photoactive Protein in detail, briefing his research and experiences. He presented one of the hot topics in scientific community; ultrafast protein structure dynamics at Femtosecond and picosecond using cutting edge technology X-ray free electron lasers. His talk comprised of available XFELs all over the world and importance of measuring structure dynamics at the fast rime scales (Femtosecond and Picosecond). During his talk, he presented some of the research work carried on Photoactive proteins bacterial rhodopsin, phototosystem II, Photoactive yellow protein and phytochromes. These studies are very important on the field of fundamental advance and optogenetics.

After the invited talk, posterr and oral presentations were conducted in M1 and A2 Auditorium. Paper Presentation sessions were chaired by **Dr. Basavaraj Angadi**, Professor, Bangalore University, Bengaluru, and **Dr. E. Parasuraman**, Assistant Professor, Indian Academy Degree College, Bengaluru. The papers reflected current trends in materials science and condensed matter physics, Solar cell, Super conductors, Nanoscience, polymers, and catalysis to name a few.

Soon after the oral and poster presentations, **Dr. P. Nagaraju**, Vice President, Indian Association of Physics Teachers (**IAPT**) south zone gave concluding remarks about the keynote sessions, technical sessions , oral and poster presentations and the activities of IAPT such as, IAPT Bulletin, Journal of Physics Education, Student Journal of Physics, National Standard Examinations (NSEP, NSEC,NSEB, NSEJS, NSEA), National Graduate Physics Examination (NGPE), National Competition for Innovative Experiments in Physics (NCIEP), National Competition in Computational Physics (NCICP), National Competition for Essay writing (NCEWP) and Conventions. He also announced the best papers and poster awards. The Indian Association of Physics Teachers (IAPT), Regional council (RC) 12A has sponsored cash prizes for the best papers (both oral and poster category). **Dr. P. Nagaraju**, and **Prof.**

Somasekara, member, **IAPT** presented the cash prizes with certificates to the winners. The Prizes for oral and poster are as follows:

Oral Presentation:

- 1st Prize: M. Dhivya Angelin, National College, Trichy, Tamil Nadu
- 2nd Prize: Dr. Anusha Ekbote, KLS Gogte Institute of Technology, Belagavi, Karnataka.
- 3rd Prize: Dr. Ganesh Shridhar Hedge, KLE's Society S. Nijalingappa College, Bengaluru, Karnataka.

Poster Presentation

- Best Paper Award: Cyril Benny, Raman Research Institute, Bengaluru, Karnataka.

Finally, Dr. M Ambrose Rajkumar, Convener of the International Conference (ICRTMS-23) thanked the Principal and Management, Kristu Jayanti College, for their support and guidance, and Karntaka State Council for Science and Technology (KSCST), for providing the collaboration and financial support to conduct the conference. He also recorded his gratitude to Dr. P. Nagaraju, vice president, Indian Association of Physics Teachers (IAPT), south zone for the collaboration with IAPT and accepting to give best paper cash awards and Prof. Ramasamy, President, Indian Association for Crystal Growth (IACG) and Dr. Muthu Senthi Pandian, member, IACG for their collaboration and guidance to conduct this conference successfully. **Conveners** – ICRTMS - 23: **Dr. M Ambrose Rajkumar, Dr. Shivaraj Maidur and Dr. Vadhana Sharon.**

P Nagaraju

Vice President, South Zone

Report (RC- 08)

One Day Workshop: Astronomy & Sky Observation.

Organized By: Department of science & humanities
RIT, Rajaramnagar
Venue: RIT, Rajaramnagar, Tal – Walwa, Dist.: Sangli
Date & Time: 15th February 2022-23, 10.00 am onwards
Number of participants: 280

T

he workshop was organized for the Diploma students on 15th February 2023. The workshop started with the welcome of the guest Prof. Nitin S. Shinde, Vice Principal of K. B. P. College, Islampur and Dr. H. S. Jadhav, Dean (Diploma) RIT, Rajaramnagar.

Session I (Guest Lecture)

In this session, guest lecture was delivered by Prof. Shinde. He gave information about the Planetary system. He tried to dispel the superstition such as Horoscope, thought about Mars & Saturn planets, Kalsarpyog, Gurupushamrut, 36 Gunas in the society. Using power point presentation, he explained "power of zoom from micro to infinity". He explained how the constellations & zodiac sign are formed. He also explained Janam Kundali, an astronomical chart, in which Rahu & Ketu are two invisible planets, not seen in our solar system.

Session II (Sky observation)

In this program we learnt how to do the Sky observation with help of Telescope. This session was conducted by Dr. Shinde , Mr. P. H. Patil & Mr. B. B. Jadhav. It is exciting to observe satellites, zodiac signs, Jupiter, Venus and its moons, Mars etc. Mrs. Ashwini M. Jagtap HOD of science and Humanities (Diploma), RIT, Rajaramnagar, Workshop Coordinator Mrs. PradnyaM. Vibhute Assistant Professor in Science and Humanities (Diploma), RIT, Rajaramnagar, Dr. H.S. Jadhav, Dean (Diploma) RIT, Rajaramnagar, Dr. Mrs. S. S. Kulkarni, Director RIT, Rajaramnagar Tal- Walwa Dist. – Sangali organized this workshop very energetically, enthusiastically. 280 students enhanced their knowledge about astronomy and sky observation through this workshop.

Pradnya M. Vibhute

REPORT (RC-03)

Discoveries in Science and Sustainable Development

Name of the Activity: Two day Program to Celebrate National Science Day-2023 **"Discoveries in Science and Sustainable Development"**
Organizers: St. Bede's College Shimla, in collaboration with IAPT & ISCA
Venue: St. Bede's College, Shimla
No. of Students: 275
Class: Undergraduate
Program Convener: Dr. Sapna Sharma

Keeping in view the theme, for the National Science Day of this year "Global Science for Global Wellbeing", St. Bede's College, Shimla in collaboration with prominent organizations that work towards advancing science education and research, Indian Association of Physics Teachers (IAPT) & Indian Science Congress Association, (ISCA), Shimla Chapter, organised two day program entitled **"Discoveries in Science and Sustainable Development"** to create awareness and promote scientific thinking among students and general public. The program was attended by students of various colleges, namely Rajkiya Kanya Mahavidyalya (RKMV) Shimla, Government College, Theog, College of Excellence; Sanjauli, Shimla, Shoolini Institute of Life Sciences and Business Management (SILB); Solan, Rajiv Gandhi Government degree college Chaura maidan: Shimla, Shoolini University Solan, and St. Bede's College, Shimla.

Day 1: Dedicated to Prof. H. S. Hans

Day 1 of the program was dedicated to honouring the contributions of, founder member of IAPT, and a pioneer in the field of accelerator technology, Padam Shri Prof. H. S. Hans as a part of his birth centenary celebrations. One of his most significant achievements was the building of India's first cyclotron, which was installed at Punjab University in 1974. This milestone marked a significant advancement for Indian science and technology. Through the program, attendees were able to learn more about Prof. Hans' contributions to the field and his legacy.

Session1 & Session 2

The First session of the event started with a captivating and informative presentation by Prof. P. K. Ahluwalia, President of IAPT, on the topic **"Star Performer of Big Science: Cyclotron"**. He began by introducing the audience to the life story and notable achievements of Sir C.V. Raman, and highlighting the significant contributions of past scientists in the field. Prof. Ahluwalia then delved into the underlying physics of the cyclotron and its diverse applications in various domains such as medical diagnosis and treatment, enabling environmental monitoring, and industrial efficiency. He also emphasized the potential for students to explore and innovate in this area, thereby contributing to the sustainable development of society.

During the second session of the day, a film called **"Cyclotron"** was screened to honour Professor Hans. The film chronicled the setting up of the cyclotron by Prof. Hans and his team in Panjab University Chandigarh. Following the film, a quiz was conducted by Dr. Neha Katoch and Dr. Preeti Kaundal in which the audience participated enthusiastically. This engaging activity helped to reinforce the knowledge presented in the movie and encouraged the participants to learn more about the history and significance of the cyclotron and its impact on the field of particle physics.

Session 3: Live Physics Demonstrations

This session was made meaningful by Dr. Arun Kumar, Assistant Professor Govt. PG College, Bilaspur. He explained a range of different concepts through his demonstrations using low cost apparatus including induction and conduction, photo electric effect, the concept of centre of mass, spectroscopy, refraction, diffraction, angle of incidence and angle of refraction.

Exhibition by students:

An exhibition was put up by the students of physics, chemistry, botany, zoology, maths and computer science students to showcase their scientific knowledge and gave fascinating glimpse of the world of science and technology.

Day2:

Session 4: Sustainability and Micropolltants

This session began with the invited talk by Prof. S. S. Kanwar on the topic **Microplastics: Omnipresent Pollutant and Health Issue** highlighting the ubiquitous presence of micro plastics as a pollutant in the environment

.

Session 5

Session 5 was an Inter College Science Quiz Competition. It featured six participating teams including GDC Theog, Shimla; Centre of Excellence, Sanjauli; RGGDC Chaura Maidan; Shoolini University, Solan; RKMV, Shimla and St. Bede's College, Shimla. The questions in the Quiz covered a wide range of scientific fields. Dr. Jyotika Brari and Dr. Shruti Gupta were the quiz masters. The final result of the Quiz competition was: St. Bede's College team of Ms. Sadhna and Ms. Archana Mullick secured the first position, followed by Shoolini University team of Mr. VaibhavRana and Mr. Sarthak Sharma in second place , and RKMV team of Ms. Preeti Sharma and Ms. Geetanjali taking the third position

Session 6 Live Physics Demonstrations & Sky watching

In session VI, Dr. Hemant Kumar, Secretary of IAPT RC03 and founder president of Kalpana Astro Club Nahan, delivered a live demonstration using low cost apparatus that operate on scientific principles. Through his presentation, Dr. Hemant discussed a range of topics, including the various principles of gas law, torque,

angular momentum, gyroscope, radiometers, and their relevance to the instruments employed. To inspire a sense of wonder and awe about vastness and complexity of the universe, a sky watching session was also organized by Dr. Hemant Kumar, by explaining the history of sky watching, the tools and techniques used by astronomers etc.

Sapna Shrama

Report (RC-02)

Celebration of National Science Day

Activity: Inter College competition of Slide Show and Poster presentations.

Topic: "Global Science for Global Wellbeing".

Resource Persons: Dr. Shaweta Sharma (IFSC, Panjab University, Chandigarh)

Schedule: 04.03.2023 at 09:00AM onwards

Beneficiaries: 100students

Venue: Multipurpose Hall and Library Reading Hall of DAV College Bathinda

Sponsored: Punjab State Council for Science & Technology, Chandigarh,DBT-SCS and (RC-02)

Activity Incharge: Dr Ranjeet Singh Mann

Program Coordinator: Dr. Kulwinder Singh Mann

National Science Day was celebrated at DAV College, Bathinda, under the aegis of DBT Star College Scheme on March 4, 2023 which was financially supported by Punjab State Council for Science & Technology, Chandigarh. The Chief Guest and the Resource Person on the occasion was Dr. Shaweta Sharma (IFSC, Panjab University, Chandigarh). Faculty members of all the science departments were present during the event. The programme commenced with an introductory note by Dr. Gurpreet Singh, talking about the importance of National Science Day, commemorating the discovery of Raman Effect by nobel laureate, physicist Sir C.V. Raman in 1928.

Dr. Shaweta Sharma in her lecture emphasized upon how Forensic Sciences plays a vital role in criminal cases and provides an unbiased scientific opinion on the evidence collected.

The theme for the Slide Show was "*Scientific Discoveries that Change Human Life*". The slide shows by the students amazed the audience and acquainted them with the spellbinding discoveries which have revolutionized the lives of citizens around the world. The first prize in this category was bagged by Anjali and Manpreet (B.Sc. II Medical) DAV College Bathinda, second by Livanshi (B.Sc. III M) DAV College Bathinda, third position went to Rahul (University College Guddha) and the consolation prize was won by Akanksha (B.Sc. I Non-Medical) DAV College Bathinda. The posters were judged by Prof. Aman Malhotra, Dr. Kriti Gupta and Dr. Vikas Duggal.

The theme for pre-prepared poster presentation was "*Global Science for Global Wellbeing*". The posters depicted many solutions while addressing the present day global challenges. The first position was won by Sachit Aggarwal (B.Sc. III) DAV College Bathinda, second by

Mehakpreet Kaur (B.Sc. II) DAV College Bathinda; Anmolpreetkaur (University College Guddha), third position went to Priti Yadav (M.Sc. I Chem) DAV College Bathinda and the consolation prize was given to Gurinderjeet & Rajni, University College Guddha& Mahan Singla (B.SC. II) DAV College Bathinda. The judges for the poster presentation were Dr. Paramjeet Kaur and Dr. Amar Santosh Singh.

Principal Dr. Rajeev Kumar Sharma thanked Dr. Shaweta Sharma for gracing the occasion with her presence. He stated that the college believes in building the capacities of the spirit of inquiry and creativity. This occasion of celebrating the National Science Day is therefore an attempt at igniting the young minds with the passion to discover and develop scientific temperament and mentoring them through innovative experimental techniques. He further stated that Science is a way of life and to let peace prevail and the development of the nation, science embedded with creativity should be made an integral part of our daily lives. He expressed immense happiness at witnessing the enthusiastic participation of the students. The stage was conducted by Dr. Neha Jindal, Dr. Ranjeet Singh Mann and Prof. Ramil. The Vote of thanks was extended by Prof. Meetu S. Wadhwa.

K S Mann

Report (RC-08)

Workshop: Fun with Maths and Science

Organized by: Department of Physics, K.B.P.College, Islampur

Venue: Shri Parvati Khemchand Vidyamandir Takari, Tal-Walawa, Dist- Sangli

Date: 13th February, 2023

Numberof participant:50

The workshop was organized for the school students on 13th February, 2023. The workshop started with the welcome of the guest Dr. Sudam B. Mane, former Principal of R.B.P Sugartech, College, Islampur and Mr.Suraj Urmila Sunil, Director, DLA. In the first session, Dr.Mane demonstrated many physics concepts like reflection, refraction, formation of image and working of eye by using a small instrument. He provided thermometers to all students in groups for the measurement of own body temperature. With the help of bar magnet, magnetic properties like attraction between unlike poles, repulsion between like poles, formation of magnetic lines and suspension of bar magnet in north-south direction.

In the second session, funny maths experiments were demonstrated by Mr.Suraj UrmilaSunil, e.g. Song of maths, Maths salute, Bottle puzzle (centrifugal force), Tangram puzzle, Holein puzzle and application of mathematics in real life apart from calculations etc.

Prof. Shinde, Head of the Physics department, K.B.P.College, Islampur, workshop convener Dr. Vaishali V. Mane, Assistant Professor in physics

(CHB), Mrs. Alpana Thorat,Head Mistress, Shri Parvati Khemchand Vidyamandir Takari, Tal- Walawa, Dist- Sangli andMrs. Rekha Patil organized this workshop very enthusiastically. 50 students enhanced their practical knowledge in Maths and Physics through this workshop.

Vaishali Mane

ANNOUNCEMENT

National Competition In Computational Physics - 2023
(Physics Simulations & Software-based Physics Experiments)
(NCICP – 2023)

The annual IAPT competition NCICP 2023 will be held online before the Annual IAPT Convention. The details of the venue and dates of the IAPT Convention-2023 will be announced in due course of time.

Important Dates (Notice a bit of Change in Procedure. See the point 4)

1	**Submission of Title and One-Page Abstract**	**31-5-2023**
2	**Online Interaction between the Experts and the Participants**	**15-6-2023 to 21-6-2023**
3	**Final Submission**	**31-07-2023**
4	**Final Presentation (online) and Interaction for Evaluation**	**20-08-2023 to 31-08-2023**
5	**Demonstration of Projects by Awards winners, and Special invitees**	**During the IAPT Convention-2023**

TENTATIVE RUBRIC FOR EVALUATION

cc	Metric	Weightage
1	Novelty & Innovativeness	20
2	Literature Survey	5
3	Presentation & Interaction	15
4	Software/Methodology	25
5	Analysis of Results	25
6	Discussion	10
7	Scope of Future work & Conclusions	10
8	Bibliography & Resources	10
9	Practical Usage & Overall Impression	20
10	Documentation	10

About the Competition

This competition will be held in two categories: (a) Student, and (b) Teacher.

A. STUDENT Category: The competition is open to UG/PG level students.

B. TEACHER Category: The teachers at the school and UG and PG levels are eligible to participate in the competition. The participant can even be an M.Phil. / Ph.D. awarded or pursuing M.Phil/Ph.D. or a scientist from regional/national laboratory or a science communicator in recognized institutions, etc. He / She needs not to be an IAPT member.

The work to be presented should be an original one.

The **best three presentations** in **each category** will be given cash awards of Rs. 7000/-, Rs. 5000/- & Rs. 4000/-, respectively, and a certificate. ***THE DECISION OF THE JUDGES WILL BE FINAL.***

Theme of the Competition

INNOVATION (i.e. new idea, new method, new device, new algorithm involving physics) is the main theme. The following kinds of Physics-based Simulations/Experiments are included in this competition:

1. Experiments with software-based modeling using Android phone / PC/ smartphone etc.

2. Experiments with transducer / sensor / actuator / PID interfaced with Microcontroller / Microprocessors / PC

3. Experiments using ARDUINO coupled with Android phone / PC / ExpEYES / Any other Interfacing device.

4. Solving physics problems by simulations or adopting numerical techniques (using Psilab / Matlab / Mathematica, Spreadsheets, Fortran, C++, Python etc.)/any other software.

How to register & What to do next
Follow the website: www.indapt.org

Your cooperation in abiding by the last date will be highly appreciated.

For any query:
Dr. Pradipta Panchadhyayee, Coordinator, NCICP-2023
Associate Professor, Department of Physics (UG & PG)
Prabhat Kumar College,
Contai; PO: Karkuli DSO, Dist-Purba Medinipur, WB, 721404
Mail id: ppcontai@gmail.com
WhatsApp:(+91) 9476161100

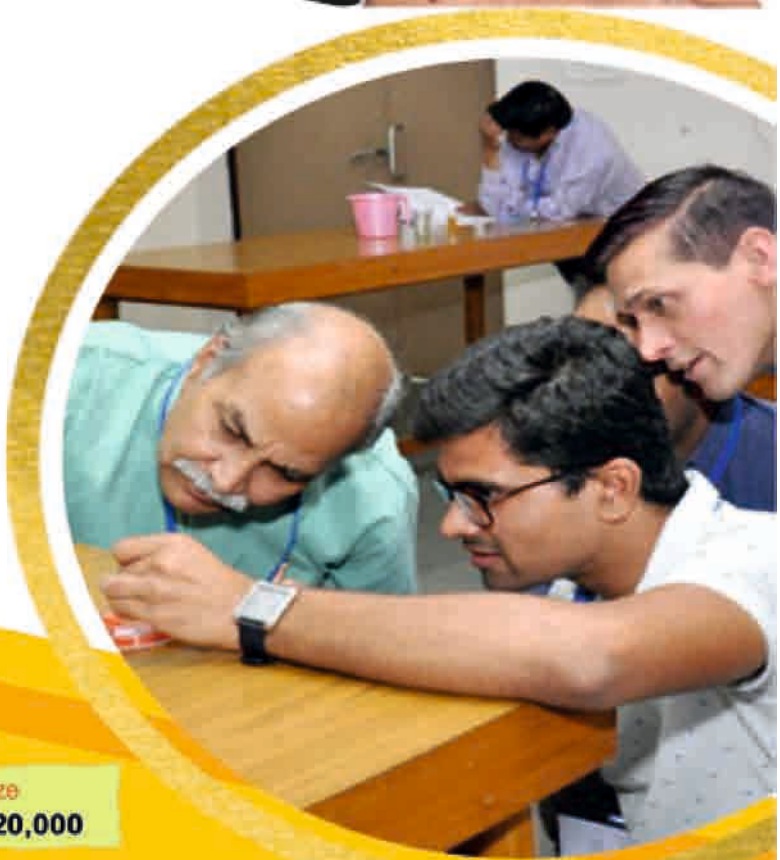
NAEST 2023

National Anveshika Experimental Skill Test

Registration Begin 1st April 2023

Eligibility Criteria :-
Junior : Std IX -XII
Senior : B.Sc & M.Sc

Register @
https://naest.shiksha-sopan.org/



Maximum Scholarship upto ₹80,000 for four consecutive year

Cash Prize
Maximum ₹20,000

Find More Info

8081176889 naest@shiksha-sopan.org

NO CHARGES AT ANY LEVEL

National Co-Ordinator :- Padma Shri H.C Verma

Organised By
National Anveshika Network Of India, Shiksha Sopan ,Kanpur

National Gratuate Physics Examination - 2023

National Toppers

The following **Sixty** Students are shortlisted as the National Top 1% of NGPE - 2023

SR NO.	CENTRE	ROLL NO.	NAME OF STUDENT	GENDER	FATHER	CLASS	COLLEGE / INSTITUTE
1	G-1102	23003	DEEPAM SHARMA	M	DRM	B Sc III	Shivaji College DU New Delhi
2	**G-1104**	**23003**	**SAKSHI AGARWAL ***	**F**	**MS**	**B Sc III**	**Motilal Nehru College DU New delhi**
3	G-1104	23009	VIKASH SHARMA *	M	RCS	B Sc III	Motilal Nehru College DU New delhi
4	**G-1104**	**23401**	**SAKSHI ***	**F**	**SS**	**B Sc III**	**Kalindi College DU Delhi**
5	**G-1109**	**23027**	**TANU KUMARI ***	**F**	**SKM**	**B Sc III**	**Miranda House DU Delhi**
6	G-1109	23029	NEHA	F	R	B Sc III	Miranda House DU Delhi
7	G-1110	23008	MEHAK GUPTA	F	SKG	B Sc III	Daulatram College DU Delhi
8	G-1110	23016	JYOTI	F	R	B Sc III	Daulatram College DU Delhi
9	G-1110	23017	MANSI	F	JL	B Sc III	Daulatram College DU Delhi
10	G-1112	23419	PRIYANSHU SHUKLA *	M	AS	B Sc III	Hansraj College DU Delhi
11	G-1112	23429	HARSH RAJ	M	SPG	B Sc III	Ramjas College DU Delhi
12	**G-1112**	**23438**	**SHARDA ***	**F**	**D**	**B Sc III**	**Hansraj College DU Delhi**
13	**G-1112**	**23457**	**ASHUTOSH JOSHI ***	**M**	**SJ**	**B Sc III**	**Hansraj College DU Delhi**
14	**G-1603**	**23016**	**RINKU ***	**F**	**N**	**B Sc III**	**Panjab University Chandigarh**
15	G-2129	23404	RAVI PANDEY	M	SP	B Sc III	Banaras Hindu University Varanasi (UP)
16	G-3117	23012	MANISHA *	F	JR	B Sc III	University Maharani's College Jaipur (RJ)
17	G-3117	23401	RAGHAV KUMAWAT *	M	RCK	B Sc III	S.S Jain Subhod (Auto) PG College Jaipur (RJ)
18	**G-4004**	**23401**	**SEJAL UDAY LOTLIKER ***	**F**	**UL**	**B Sc III**	**Chowgule College of Arts & Science (Auto) Nuvem Goa**
19	G-4213	23015	SHINDE RAJAT VIKAS	M	VS	B Sc III	Indian Institute of Science Education & Research Pune (MS)
20	**G-4213**	**23023**	**GARVIT BANSAL**	**M**	**KB**	**B Sc III**	**Indian Institute of Science Education & Research Pune (MS)**
21	G-4213	23030	NIKHIL T H	M	KP	B Sc II	Indian Institute of Science Education & Research Pune (MS)
22	G-4213	23037	ANARGHA MONDAL	M	AM	B Sc I	Indian Institute of Science Education & Research Pune (MS)
23	G-4213	23044	OM KISHOR HEBBAR	M	KH	B Sc I	Indian Institute of Science Education & Research Pune (MS)
24	**G-4213**	**23077**	**HEERAK SHARMA**	**M**	**MS**	**B Sc II**	**Indian Institute of Science Education & Research Pune (MS)**
25	G-4213	23080	DHARMESH YADAV	M	RY	B Sc III	Indian Institute of Science Education & Research Pune (MS)
26	**G-4213**	**23097**	**VIVEK GURUNATH SABARAD**	**M**	**G**	**B Sc III**	**Indian Institute of Science Education & Research Pune (MS)**
27	G-4213	23401	ELAF ANSARI	M	BA	B Sc III	Indian Institute of Science Education & Research Pune (MS)
28	G-4215	23005	DHIYANSH G	M	G	B Sc II	UM – DAE CEBS, University of Mumbai, Mumbai (MS)
29	G-4215	23015	ANIRUDH RAMESHAN	M	AR	B Sc III	UM – DAE CEBS, University of Mumbai, Mumbai (MS)
30	G-4215	23017	VIBHU PANDYA	M	HP	B Sc I	UM – DAE CEBS, University of Mumbai, Mumbai (MS)
31	**G-5652**	**23418**	**ANINDYA GURIA**	**M**	**SG**	**B Sc II**	**Indian Institute of Science Bangalore**
32	**G-5652**	**23420**	**ANUBHAV SRIVASTAVA**	**M**	**MKS**	**B Sc II**	**Indian Institute of Science Bangalore**
33	G-5652	23423	ASHISH OMAR	M	RKO	B Sc II	Indian Institute of Science Bangalore

34	**G-5652**	**23424**	**PANCHAJANYA DEY**	**M**	**PD**	**B Sc II**	**Indian Institute of Science Bangalore**
35	**G-5652**	**23432**	**ANWESHA MALLA**	**F**	**GM**	**B Sc I**	**Indian Institute of Science Bangalore**
36	**G-7101**	**23001**	**SOUMESH GHATAK ***	**M**	**AG**	**B Sc III**	**R K M Residential College (Auto) Narendrapur, Kolkata (WB)**
37	G-7101	23002	SAYAM MAITY	M	SKM	B Sc III	R K M Residential College (Auto) Narendrapur, Kolkata (WB)
38	**G-7101**	**23005**	**ARIJIT MAJI ***	**M**	**AKM**	**B Sc III**	**R K M Residential College (Auto) Narendrapur, Kolkata (WB)**
39	G-7101	23007	DEBAJYOTI PATRA *	M	PP	B Sc III	R K M Residential College (Auto) Narendrapur, Kolkata (WB)
40	G-7101	23020	SNEHANGSU BISOI	M	SB	B Sc III	R K M Residential College (Auto) Narendrapur, Kolkata (WB)
41	G-7101	23022	DEBANJAN HALDER	M	SDNH	B Sc III	R K M Residential College (Auto) Narendrapur, Kolkata (WB)
42	G-7103	23005	SUBRATA SIL	M	PN	B Sc III	Midnapore College (Auto) Midnapore (WB)
43	**G-7103**	**23007**	**SUMAN DE ***	**M**	**SKD**	**B Sc III**	**Midnapore College (Auto) Midnapore (WB)**
44	G-7103	23009	SATHI DAS	F	SD	B Sc III	Midnapore College (Auto) Midnapore (WB)
45	**G-7103**	**23403**	**ARNAB MANNA ***	**M**	**AKM**	**B Sc III**	**Midnapore College (Auto) Midnapore (WB)**
46	**G-7113**	**23001**	**KAMALENDU DINDA ***	**M**	**KD**	**B Sc III**	**R.K.Mission Vidyamandira Belur Math Howrah (WB)**
47	**G-7113**	**23409**	**SWARAJIT DHAR ***	**M**	**SD**	**B Sc III**	**Serampore College Serampore (WB)**
48	**G-7113**	**23414**	**SHIBASHIS MUKHOPADHYAY**	**M**	**AKM**	**Int II**	**Indian Institute of Science Education & Research Kolkata (WB)**
49	G-7124	23405	ARITRA GHOSH *	M	PKG	B Sc III	RKM Vivekananda Centenary College Rahara Kolkata (WB)
50	**G-7124**	**23410**	**SAYAN DUTTA ***	**M**	**MD**	**B Sc III**	**RKM Vivekananda Centenary College Rahara Kolkata (WB)**
51	G-7124	23414	SANKHADEEP DAS	M	SKD	B Sc III	RKM Vivekananda Centenary College Rahara Kolkata (WB)
52	**G-7124**	**23418**	**SANDIPAN RAKSHIT ***	**M**	**RR**	**B Sc III**	**RKM Vivekananda Centenary College Rahara Kolkata (WB)**
53	G-7124	23422	SOURAV DANDAPAT	M	SD	B Sc III	RKM Vivekananda Centenary College Rahara Kolkata (WB)
54	**G-7124**	**23423**	**ANIRBAN BOSE ***	**M**	**KKB**	**B Sc III**	**RKM Vivekananda Centenary College Rahara Kolkata (WB)**
55	**G-7124**	**23425**	**ANIMESH GHOSH ***	**M**	**MG**	**B Sc III**	**RKM Vivekananda Centenary College Rahara Kolkata (WB)**
56	G-7129	23407	SOHAM BHATTACHARYYA	M	SB	B SC II	Indian Association for The Cultivation of Science Kolkata (WB)
57	G-7129	23421	AKASH SARKAR *	M	PBS	B Sc III	St. Xavier's College Kolkata (WB)
58	G-7129	23453	ABHINABA PAHARI *	M	TKP	B Sc III	Jadavpur University Jadavpur Kolkata (WB)
59	G-7129	23462	SRISHTI SIKDAR *	F	PS	B Sc III	Bethune College Kolkata (WB)
60	G-7522	23010	AYUSH ABHIGYAN DAS	M	AD	B Sc II	Fakir Mohan (Auto) College Balasore (OD)

The Bold names are the top 25 students eligible for NGPE - 2023 Part C (An Examination in Experimental Skill) while the names with star have been forwarded to S N Bose National Centre for Basic Sciences Kolkata to be considered for direct admission to integrated PhD (only B sc III students). For detailts see: http://bose.res.in/admission.html or write mail to nibedita.konar@bose.res.in OR admission@bose.res.in

The NGPE-2023 Part C will be held on June 3 & 4, 2023 at Department Physice Shri Vaishnav Vidyapeeth Viswavidyalaya Indore (MP)

The students are advised to get their train reservation (Sleeper class) timely. Each of them will receive an official letter from IAPT examination office for NGPE - 2023 Part C (An examination in experimental skill) for final selection of Five Gold Medalists.

Prof B P Tyagi
Chief Coordinator (Examination)

Dr Anil Kumar Singh
Coordinator NGPE

State - wise Enrolment of National Standard Examination - 2022

and

The number of students shortlisted for the Indian National Olympiad - 2023 in respective subjects

SR NO.	STATE	NSEP - 2022		NSEC - 2022		NSEB - 2022		NSEA - 2022			NSEJS - 2022	
		MI = 134 MAS = 83		MI = 148 MAS = 93		MI = 112 MAS = 70		Group A MI = 126, MAS = 79 Gropu B MI = 124, MAS = 77			MI = 107 MAS = 67	
		Enrol	Short Listed	Enrol	Short Listed	Enrol	Short Listed	Enrol	Short Listed Group		Enrol	Short Listed
									A	B		
1	ANDAMAN & NICOBAR	7		5		4		2			_	
2	ANDHRA PRADESH	2314	20	2267	23	583	6	883	9	9	992	32
3	ARUNACHAL PRADESH	30		25		53		5			54	
4	ASSAM	1006		553	3	481	3	149	1		194	
5	BIHAR	1036	12	872	26	375	14	413	21	7	659	3
6	CHHATTISGARH	342	7	388	7	284	6	117	6	1	294	1
7	CHANDIGARH	487	5	453	5	154	5	197	5	10	111	1
8	DADRA & NAGAR HAVELI	85		90		59	2	9			16	
9	DELHI	2219	10	1942	19	932	20	828	7	26	903	6
10	GOA	127		133		94	1	40			43	
11	GUJRAT	2427	13	2354	13	1700	13	717	11	25	739	12
12	HIMACHAL PRADESH	396		286		243		50			327	1
13	HARYANA	1763	10	1575	9	1069	8	514	7	13	1534	11
14	JHARKHAND	813	6	611	6	335	6	296	5	3	474	1
15	JAMMU & KASHMIR	181		94		121	1	36	1		235	
16	KARNATAKA	2717	14	2312	14	1994	14	738	13	12	1201	10
17	KERALA	983	6	817	8	791	8	294	7	1	444	1
18	LADDAKH	1						1			22	
19	LAKSHADWEEP	1		1		1						
20	MAHARASHTRA	5218	28	4598	29	3666	30	1631	24	33	2106	10
21	MEGHALAYA	80		105		125	1	8			24	
22	MANIPUR	25		21		47		3			76	
23	MADHYA PRADESH	1702	13	1512	19	1255	19	593	16	6	842	3
24	MIZORAM	9		5		9		1			5	
25	NAGALAND	1		2							1	
26	ODISHA	1107	7	912	10	811	12	477	8	5	709	3
27	PUNJAB	1190	7	1122	7	708	7	392	6	3	512	1
28	PUDUCHERRY	11		11		12		1			3	
29	RAJASTHAN	3162	33	2918	22	2215	18	851	16	27	1701	39
30	SIKKIM	13		7		31		2			70	
31	TELANGANA	2965	38	2827	35	770	9	1223	13	34	2057	17
32	TAMIL NADU	3399	13	3140	19	2558	17	783	14	6	1966	13
33	TRIPURA	101		89	1	83	1	24			64	
34	UTTARAKHAND	640	3	570	5	443	5	171	3	1	383	
35	UTTAR PRADESH	3516	40	3187	51	1855	53	1253	43	9	2061	2
36	WEST BENGAL	1384	16	1027	21	799	21	500	18	19	572	4
		41458	**301**	**36831**	**352**	**24660**	**300**	**13202**	**254**	**250**	**21394**	**171**

Prof B P Tyagi
Chief Coordinator (Examination)
Indian Association of Physics Teachers

National Standard Examination - 2022											
Held on November 26 & 27, 2022											
SUMMARY											
Exam	**Enrolment**	**Average of Top Ten Scores**	**MAS**	**MI**	**Students above MI**	**Students above MAS**	**Students shortlisted for INO - 2023**	**Male**	**Female**	**Other**	**% Present**
NSEP	41454	167.6	83	134	62	593	301	29800	11653	5	69.02
NSEC	36831	186.1	93	148	173	1343	352	25117	11712	2	67.85
NSEB	24657	140.1	83	112	68	867	300	10492	14166	2	64.31
NSEA	13201	**A** - 158.6	79	126	75	790	254	10383	2818	1	71.50
		B - 155.0	77	124	18	266	250				
NSEJS	21392	134.6	67	107	16	171	171	13097	8295	2	72.81
Total	**137535**										

MAS: Minimum Admissible Score, MI: Merit Index, INO: Indian National Olympiad

Prof B P Tyagi
Chief Coordinator (Examination)
Indian Association of Physics Teachers

The Story Of Cosmology Through Post Stamps 4

COMET

STRUCTURE

Core of the comet is of size of few kilometre, composed of ice, carbon dioxide, methane, ammonia and rocky materials. When comet approaches the sun, its ice began to vaporize and vapours are being pushed away from the Sun by solar wind. thus, it forms Tail of the comet, always pointing away from the direction of the Sun.

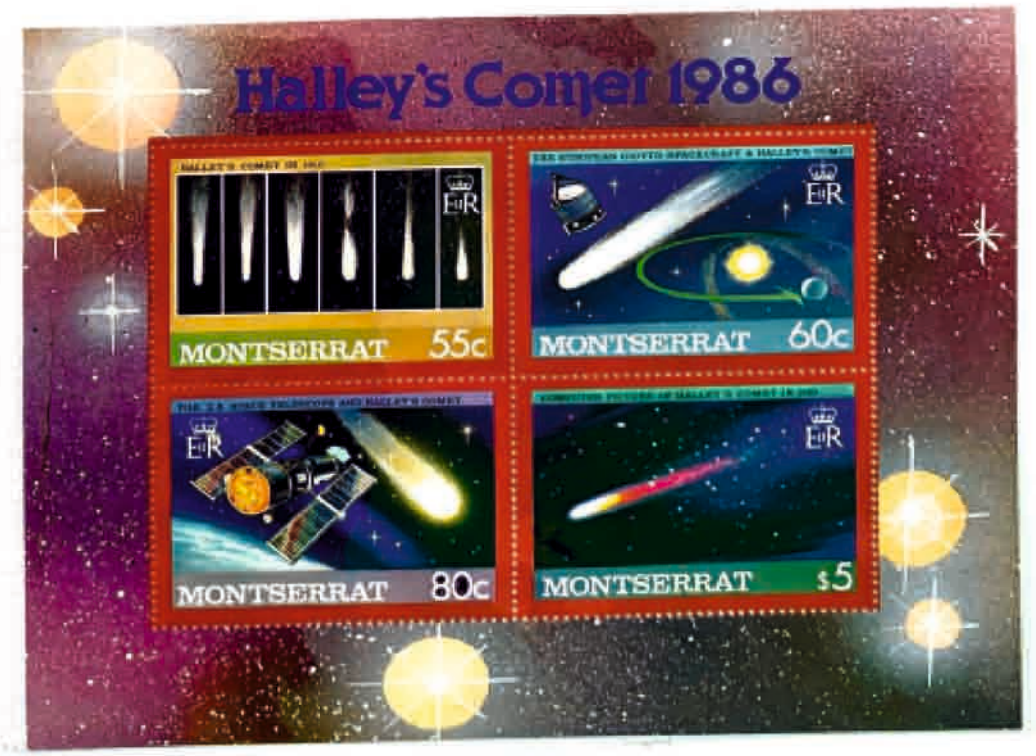
Block of four stamps – **illustrating the image of Halley's comet and its ion tail form from volatile gases in the coma when ionized by UV light and glow bluish due to presence of CO^+ ions**

Computer processed image of comet depicting the structure -t nucleus, coma, ion tail and dust tail- in false colour

The dust tail of the comet, blowen back by Solar Radiation Pressure

Comet with distinct two tails – Ions Tail and Dust Tail

Souvenir sheet- commemorating arrival of Halley's comet 1986
Stamps depict-
1.diferrent stages of comet 1910. as it approaches the sun in its orbit
2.Giotto space probe to explore and study comet from closeup
3.Space telescope Hubble and comet
4.Coma and ion tail of the comet



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If underlivered please return to :

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