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a. Mirror symmetry operation

b. Quasi-symmetry operation

Ever since the discovery of the quantum Hall effect (Nobel Prize 1985), symmetry has been the guiding principle in the search for topological materials. Now an international team of researchers from Germany, Switzerland, and the U.S. has introduced an alternative guiding principle, "quasi-symmetry," which leads to the discovery of a new type of topological material with great potential for applications in spintronics and quantum technologies.

As distinct from a proper symmetry which acts on the whole object uniformly, the quasi-symmetry operation acts selectively on different parts of the system. Theoretically, it corresponds to a system that has exact symmetry when taking only the basic approximation into consideration while additional approximative terms break such symmetry. The cover picture depicts comparison between a mirror symmetry and quasi-symmetry operation. A mirror symmetry operation consistently acts on the whole object. In contrast, the quasi-symmetry operation acts differently on different parts of the system.

(https://phys.org/news/2022-05-quasi-symmetry-cosi-reveals-topological-material.html)

The Story Of Cosmology Through Postal Stamps 20

CELESTIAL NAVIGATION

ASTRNOMICAL TOOLS FOR NAVIGATION

It is an ancient as well as modern practice of position fixing without relying on estimated calculation called ***dead reckoning***. This method used by Sailors, travellers or navigators employ measurement of angular separation of celestial body and visible horizon are angle of Polaris, sun, Moon or Planets. astronomical tools employed by navigators were: Sextant, Karnal, Astrolabe, Octant, Back Staff Compass, Marine Chronometer, Hour Glass, and Almanac.

Maximum Card-Jacobs Staff or a Cross Staff to measure the Sun's angle above the horizon at mid-day to ascertain vessel's latitude

Meridian Circle-for observing the transit of celestial bodies across the meridian.

Training sailors to use tools -Nautical Academy, Peru

Nocturnal and sundial, 16th century

Octant – (1730) used to measure the altitude of sun or other celestial bodies

The Borda Repeating Circle - to make topographical observation

Astrolabe

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From President's Desk

Olympiads and IAPT: Reading Between the Lines

As I write this piece, Asian Physics Olympiad 2022 (APHO2022) opened with a grand ceremony on 23.05.2022 and is underway till 31.05.2022. I was present at Graphics Era Hill University, Dehradun for inauguration which is the international node for APHO2022. In this Olympiad in all 28 countries are participating with approximately The hard work which makes it credible was visible. There was a buzz all around to make this participation not only visible but memorable also. I was witness to the process which goes into its preparation and the rigour which is required to make it a success. It is a great way to train teachers for designing problems, setting challenging experiments and conducting the whole exercise to take it to participants.

National Standard Examinations in Physics are one of the flagship programs which culminate in selection of candidates to different Olympiads, International Physics Olympiad (IPHO) and Asian Physics Olympiad (APHO). Selection process starts with NSE's, out of which top 1 percent toppers are selected from different states and top 300 are than selected for second step of examination to identify candidates for orientation and selection camps to identify Indian team for Olympiads. I was just wondering if we can also have ***Physics Olympiads at Regional Council*** levels also to give a wider exposure to the 1% toppers to participate in a competition beyond Ist step. Each of the regional councils can conduct this examination at regional level and reward top three candidates with a certificate of merit and suitable monetary incentive. Effort has to be to incentivise not just say ten candidates but also at least 66 candidates, three each from each region. Making use of a suitable IT platform like Moodle can help us handle such an exercise followed by a test of experimental skills via an open-ended examination. I hope this will help IAPT identify more students at the state/regional level also, who may get interested in pursuing physics and become partners with IAPT activities as ***IAPT Student Ambassadors***. They can also be given a free subscription of e-Bulletin of IAPT.

To attract more teachers and students to IAPT activities we can also start an online service for students to raise a question and seek answer from a Physics Expert on www.indapt.org. The best three questions with answers can be published in the bulletin every month. Prof. U.S. Kushwaha shared two questions of this type with me which were raised by students playing in a park at Panchkula during his morning walks:

(i) Why we can see pearly dew on grass but not on roads and rooftops?

(ii) Why is a rope with many strands is stronger than a single strand of the rope?

What do you think about the issues raised above? Can you suggest a suitable name to question corner of IAPT Bulletin? Please do share your responses through the columns of IAPT Bulletin.

Prof. P.K. Ahluwalia

PHYSICS NEWS

Using renormalization group methods to study how the brain processes information

Past neuroscience research suggests that biological neural networks in the brain could self-organize into a critical state. In physics, a critical state is essentially a point that marks the transition between ordered and disordered phases of matter. Researchers have recently introduced a theory that could help to explain criticality in the brain. This theory is based on a prototypical neural field theory, known as the "stochastic Wilson-Cowan equation."

To classify different types of criticality physicists typically use methods within the so-called renormalization group. These are essentially formal approaches that can be used to systematically investigate changes in a physical system at different scales. In their study, the researchers adapted these traditional methods and integrated them with a prototypical neuronal field model first proposed by Wilson and Cowan. They then specifically applied them to the field of neuroscience to examine criticality in biological neural networks.

Read more at : https://phys.org/news/2022-05-renormalization-group-methods-brain.html

Original paper : Physical Review Letters (2022). DOI: 10.1103/PhysRevLett.128.168301

Algorithms empower metalens design

Compact and lightweight metasurfaces - which use specifically designed and patterned nanostructures on a flat surface to focus, shape and control light - are a promising technology for wearable applications, especially virtual and augmented reality systems. Today, research teams painstakingly design the specific pattern of nanostructures on the surface to achieve the desired function of the lens, whether that be resolving nanoscale features, simultaneously producing several depth-perceiving images or focusing light regardless of polarization.

Researchers have developed a new method for designing large-scale metasurfaces that uses techniques of machine intelligence to generate designs automatically. The method will enable new metasurface designs that can make an impact on virtual or augmented reality, self-driving cars, and machine vision for embarked systems and satellites.

Read more at : https://www.sciencedaily.com/releases/2022/05/220517160511.html

Original paper : Nature Communications (2022). DOI: 10.1038/s41467-022-29973-3

Remarkably strong pairing of charge carriers in bilayer antiferromagnetic Mott insulators

Superconductivity has so far been primarily observed in materials that are cooled to very low temperatures, typically below 20 K. Some materials, however, exhibit superconductivity at high temperatures, above 77 K. Many of these materials, also known as high-temperature superconductors, are known to be antiferromagnets. An aspect of high-temperature superconductivity that physicists have been trying to understand better is the formation of pairs of mobile dopants in antiferromagnets, which has been observed in antiferromagnet high-temperature superconductors.

Researchers have recently unveiled high-temperature pairing of mobile charge carriers in doped antiferromagnetic Mott insulators. Their paper could shed new light on the formation of mobile pairs of dopants in antiferromagnets. While conducting their studies, the researchers ultimately realized that bilayer materials could be ideal platforms to examine the formation and pairing of charge carriers, as in these materials the string-based pairing mechanism they observed can develop at its full strength.

Read more at : https://phys.org/news/2022-05-remarkably-strong-pairing-carriers-bilayer.html

Original paper : Nature Physics (2022). DOI: 10.1038/s41567-022-01561-8

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ARTICLE

Recent Developments In Light Emitting Diode

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Abstract:
Flexible Displays with fascinating characteristics are the emerging future technology. The flexible form factor of these displays increases its demand for bendable, light weighted wearable devices. Quantum Dots owing to its outstanding electroluminescence properties serves as excellent light emitting material due to its narrow spectral emission with high quantum yield. In this review the recent development and technological challenges of Quantum Dot LEDs are discussed.

Introduction:

Flexible display is an emerging display technology with potential applications such as smart phones, automotive displays, and wearable smart devices. Flexible display is visual output surface which has thin, lightweight, and non-breakable characteristics. Currently available commercialized displays are mostly rigid displays whose shape cannot be changed whereas flexible displays can be fabricated on curvilinear surfaces and allow their shapes to be transformed1. In 2008, Nokia announced a flexible and bendable mobile display named Morph. In 2013, first curved television (TV) was demonstrated by Samsung Electronics with wide field of view, high color purity, and outstanding contrast based on organic Light emitting diodes (OLEDs). The future technological goal in next generation display is to develop LEDs with mechanical deformability as well as excellent device performances2. Though inorganic LEDs shows high brightness (10^6–10^8cdm^{-2}) and low turn-on voltages (<2V), thick and brittle active layers limits their flexibility3. Organic LEDs have self-luminous active layer, enable reduction in display thickness. However, the flexibility of the current OLED display is still limited by thick encapsulation layers and long-term electroluminescence (EL) stability and high color purity remain practical challenges of OLEDs4. Figure 14 shows future interactive displays with flexible form factors from wearable smart watches to ultrathin displays on human skin in the form of electronic tattoos.

Consequently, with unique physical and chemical properties Quantum Dots (QLEDs) have received great attention because of their outstanding color purity (full-width-at half-maximum (FWHM) ~30 nm), high brightness (up to ~200,000 cd m^{-2}), low operating voltage (V< 2V), and easy process ability5. Recent advances in patterning techniques have made it possible to achieve ultrahigh-resolution full-color (red, green, and blue; RGB) QLED array4. QDs provides utilisation in display applications due to its narrow bandwidth emission and high PLQY to create a wide colour gamut6.

Figure 1. Representative examples of display devices.

Physics of QLED:

Fig.2 shows a typical QLED energy band diagram. The emitter QD is implanted between anode and cathode for hole and electron injection into the valence band maximum (VBM) and conduction band minimum (CBM) of QDs and various organic or inorganic charge

transport materials should be applied to the QLEDs to facilitate the charge injection from both electrodes into the QDs via large energy offsets, considering the mobility, band alignment and electron and hole block property of the materials7.

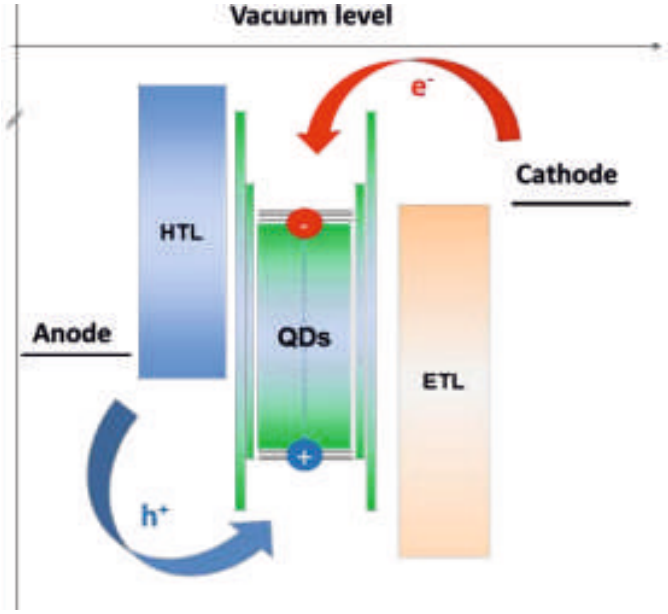
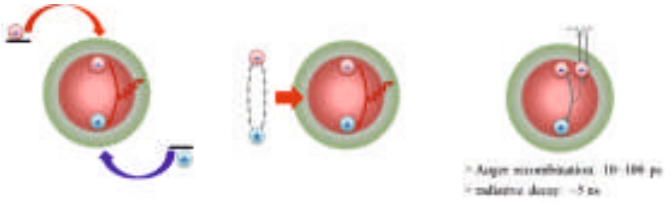


Figure 2. Energy band diagram of a typical conventional QLED

The excitons recombine to emit a photon is directly formed through the direct electron and hole injection by the adjacent CTL as shown in Figure 3a. Forster resonance energy transfer (FRET) (Figure 3b) is also another mechanism to generate an exciton in QDs. Through dipole-dipole coupling the generated exciton energy on the luminescent species is non-radiatively transferred to the QD7. The FRET occurs only when the emission spectrum of the donor overlaps with the excitation spectrum of the acceptor and the donor and acceptor are in close proximity within Forster radius8



b)

Figure3. Schematic of QLED mechanisms.

(a) Charge injection

(b) Energy transfer.

(c) Auger recombination exciton quenching.

There are processes which limit the performances of QLEDs. The non-radiative Auger recombination quenching process attributed to the charge carrier unbalance in QLEDs in Figure 3c9. This process is emerged from charged excitons. The energy of recombined charged exciton can be transfers to the other charged electrons or holes in the QD film and relaxes to the ground state through the interactions with the phonons7. This process is extremely efficient due to the relaxation of linear momentum conservation in the QDs, which is originated from the discrete energy levels of the nanoparticles9. The process rate of non-radiative Auger is faster (c.a. 10 - 100 ps) than the radiative recombination process (c.a. 5 ns), for efficient and stable device the charge carrier balance should be controlled delicately8.

Recent trends in the solid state lightings which holds the promise of far more energy efficient LED light sources than available at present. Though countless improvements made in materials growth and device structures, still need to explore new avenues to reach ultimate LED device efficiencies. These proposed ultimate LED device efficiencies should be 260-280 lm/W, assuming that the internal quantum efficiency, extraction and electrical efficiencies are ~90% for all primary colours.

Future Scope

Tremendous efforts that have been made for the improvement of Electroluminescence performance of QLEDs by optimizing the quantum dot synthetic methods and device structures4. Various challenges like long-term device lifetime, low EL efficiencies for blue emissions. QLEDs evince unique characteristics that transcend other types of LEDs, such as high brightness, excellent color purity, low turn-on voltage, high resolution RGB array patterning, and ultrathin form factors10. These supremacy makes the QLEDs a better alternate for the next generation display, especially in the field of flexible and wearable electronic gadgets and the recently demonstrated proves that QLEDs can be successfully integrated with

numerous wearable electronic gadgets, which includes wearable sensors, data storage, touch interfaces, and flexible wireless data transfer devices for fully integrated systems4. In the future, home appliances and mobile phones will pair with wearable displays to visualize the information for users. These technological advances shed light on the promising future of flexible ultrathin QLEDs and related next-generation display devices.

Reference: –

(1) Sekitani, T.; Nakajima, H.; Maeda, H.; Fukushima, T.; Aida, T.; Hata, K.; Someya, T. Nat. Mater. 2009, 8 (6), 494499.

(2) Choi, S.; Lee, H.; Ghaffari, R.; Hyeon, T.; Kim, D. H. Adv. Mater. 2016, 28 (22), 42034218.

(3) Kim, R. H.; Kim, D. H.; Xiao, J.; Kim, B. H.; Park, S. Il; Panilaitis, B.; Ghaffari, R.; Yao, J.; Li, M.; Liu, Z.; Malyarchuk, V.; Kim, D. G.; Le, A. P.; Nuzzo, R. G.; Kaplan, D. L.; Omenetto, F. G.; Huang, Y.; Kang, Z.; Rogers, J. A. Nat. Mater. 2010, 9 (11), 929937.

(4) Choi, M. K.; Yang, J.; Hyeon, T.; Kim, D. H. npj Flex. Electron. 2018, 2 (1), 114.

(5) Yang, J.; Choi, M. K.; Kim, D. H.; Hyeon, T. Adv. Mater. 2016, 28 (6), 11761207.

(6) Liu, Z.; Lin, C. H.; Hyun, B. R.; Sher, C. W.; Lv, Z.; Luo, B.; Jiang, F.; Wu, T.; Ho, C. H.; Kuo, H. C.; He, J. H. Light Sci. Appl. 2020, 9 (1), 123.

(7) Kim, Y. Doctoral Thesis 2018.

(8) Anikeeva, P. O.; Madigan, C. F.; Halpert, J. E.; Bawendi, M. G.; Bulović, V. Phys. Rev. B - Condens. Matter Mater. Phys. 2008, 78 (8).

(9) Bae, W. K.; Park, Y. S.; Lim, J.; Lee, D.; Padilha, L. A.; McDaniel, H.; Robel, I.; Lee, C.; Pietryga, J. M.; Klimov, V. I. Nat. Commun. 2013, 4, 18.

(10) Bang, S. Y.; Suh, Y. H.; Fan, X. B.; Shin, D. W.; Lee, S.; Choi, H. W.; Lee, T. H.; Yang, J.; Zhan, S.; Harden-Chaters, W.; Samarakoon, C.; Occhipinti, L. G.; Han, S. D.; Jung, S. M.; Kim, J. M. Nanoscale Horizons 2021, 6 (2), 6877.

ARTICLE

Nobel Citation Of Einstein: Why The Theories Of Relativity Went Missing?

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ABSTRACT

Albert Einstein was awarded the 1921 Nobel Prize in physics and the announcement came in 1922. The citation of the Prize did not include the mention of his Special Theory of Relativity (STR) or his General Theory of Relativity (GTR).It was a shock for one and all, since Einstein is specially remembered for these two theories. In this article an attempt has been made to take a closer look at the events and to some concerned people that led to such a surprising announcement by the Nobel Committee in Physics, and some of the subsequent happenings

Introduction

The physics Nobel Prize of 1921 was announced along with the physics Nobel Prize for the year 1922 in Stockholm on November 9, 1922. Both the prizes had sole winners, and the 1921 Prize, that was kept on hold, went to Albert Einstein (1879 – 1955) while Niels Bohr (1885–1962) was the winner for the 1922 Prize. These selections were highly expected, and were possibly overdue. Yet the 1921 Prize surprised many in the scientific community not because of its winner but because of the citation by the Nobel Committee in physics that mentioned the work of Einstein for which this award was being given away to him. Only then the world came to know that Albert Einstein is being awarded the deferred Physics Nobel Prize of 1921 for his contribution to 'Theoretical Physics', especially for the 'law of photoelectric effect'. And there was no place for his Special Theory of Relativity (STR) or for General Theory of Relativity (GTR) together often referred to as the theories of relativity. The exact language of the citation of the Prize went like this; *"for his services to Theoretical Physics, and especially for his discovery of the law of the photoelectric effect."*

The Presentation speech and the philosopher

Einstein came up with the Special Theory of Relativity (STR) in 1905 and then with the General Theory of Relativity (GTR) in 1915-1916. The 1905 theory could not draw much attention of the scientists beyond only a small section of the scientific community and remained confined as a matter of discussion only among the theoretical physicists. One of the main reasons for this was the fact that it came from a 26-year-old clerk located in the patent office at Bern, Switzerland well beyond the close-knit world of the researchers in universities and institutes, generally referred to as academia. But the GTR had wider ramification. In 1915 Albert Einstein was a very established scientist working among the giants of world science in Berlin. When he formulated GTR he was careful and did not go for its immediate publication. He actually wanted to test the veracity of the theory by applying it on a long-standing problem that he felt is a perfect case for testing the theory.

On December 10, 1922 the Nobel Prize ceremony for Physics was held in the Swedish capital of Stockholm in presence of the dignitaries. The President of the Physics Nobel Committee rose to deliver the presentation speech for the 1921 physics Nobel Prize. The President was none other than the well-known Swedish chemist Savante Arrhenius who himself had won the 1903 Nobel in Chemistry. The 1921 winner Albert Einstein was not present in the ceremony, but was away in Japan on a pre-scheduled lecture tour. It is indeed interesting to go through the very first paragraph of the 1921 Physics Nobel Prize presentation speech. The speech began *"There is probably no physicist living today whose name has become as widely known as that of Albert Einstein. Most discussion centers on his theory of relativity. This pertains essentially to epistemology and has therefore been the subject of lively debate in philosophical circles. It will be no secret that the famous philosopher Bergson in Paris has challenged this theory, while other philosophers have acclaimed it wholeheartedly. The theory in question also has astrophysical implications which are being rigorously examined at the present*

time."

Arrhenius through his speech pushed the theories of relativity to the domain of 'epistemology' i.e., in the realm of philosophy carrying the meaning of 'theory of knowledge'! Did he try to offer some sort of a justification offered for excluding the theories of relativity from the Nobel citation of Einstein? Actually, lot of people felt so. In fact, numbers of physicists who actually sent nominations in favour of Einstein for his theories of relativity were actually outraged. They felt, a philosopher, however famous he might be, was no way connected to the Nobel nomination for physics. On the other hand, the philosopher was so influential that Arrhenius did not have any hesitation to mention his name in the official speech in the contest of not acknowledging the theories of relativity through a Nobel Prize. Philosopher's opinion came in the way to rule out the theories of relativity from the citation of the Prize though the theories have already accumulated some scientific evidence in favour of them. The French philosopher mentioned in the speech i.e., Henri Bergson (1859-1941), was a very well-known figure in academic and intellectual circles hundred years back. He had large number of followers on the both sides of the Atlantic. And he was no doubt quite influential among the intellectual groups in Europe and America at that time. His thoughts on time and its nature were not only well-known but were matter of critical studies in the philosopher's and academic circles. So, one philosopher's objection was quoted as the reason for the exclusion of theories of relativity from the citation of a physics Nobel Prize. In 1922 these theories, particularly the GTR had actually accumulated some experimental evidences in favour of it proving this to be a path breaking theory that may provide answers to number of questions about the Nature.

Henri Bergson himself went on to win the 1927 Nobel Prize in literature and his standing as a philosopher of international repute 100 years ago was taller than that of Einstein. But the '*astrophysical implications'* that Arrhenius talked about by that time were profound and were very difficult to ignore. People have begun to appreciate that particularly the GTR may be a mathematically complex one, but the real-life applications of the theory just cannot be brushed aside. And let us see why.

Einstein puts GTR to test

The precession of the perihelion of the planet mercury was well known. This implies that the closest distance of approach to the sun by the planet mercury i.e., the perihelion of the mercury could not be the same point after the completion of a revolution round the sun. It used to get shifted albeit by a very small angle. This shift could be detected and measured but could not be explained on the basis of the conventional calculations though similar issues could be resolved for other planets with the available tools for calculations at the disposal of astronomers and physicists. The case demands a bit of an elaboration.

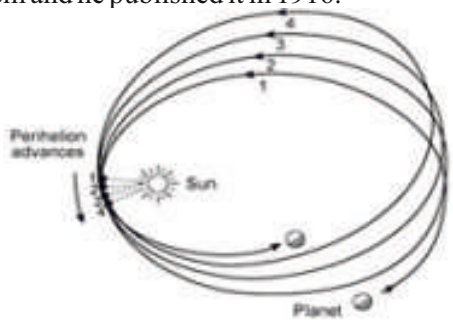
It began in early nineteenth century. Uranus was the first planet beyond the Saturn to be discovered using a telescope through an earth-based observation. It was 1781 and William Herschel could locate the Uranus and could identify it as a planet. Its orbit was calculated using the existing theory based on the Newtonian mechanics and everybody was apparently happy. Uranus was supposed to take 84 earth years to complete one full revolution around the sun. But the clouds of doubt began to accumulate some 25 years after its discovery as the astronomers began to feel that the Uranus is not strictly following the charted path. It appeared there were some perturbations that were causing the deviation of Uranus from the calculated orbit.

With full faith on the Newtonian mechanics once again the astronomers made fresh calculations and predicted the existence of another planet beyond the Uranus that was causing the disturbance to the orbit of Uranus. In fact, the astronomers could predict the possible distance and the expected location of the suggested planet. In England and in France astronomers took up a special effort to search and locate the 'predicted' planet. Finally,

Neptune was discovered in 1846, and it was exactly at the predicted position at the time when it was first observed. Thus, Neptune turned out to be the first planet to be theoretically predicted and then actually discovered. Neptune's existence and other features could take care of the deviation in the orbit of Uranus from its predicted trajectory.

By that time the precession of perihelion of the planet Mercury was well known. And this also could not be explained by the conventional calculations. Empowered with the discovery of Neptune influencing the orbit of Uranus a section of the astronomers proposed the existence of a planet even closer to the sun than the Mercury so that the perturbations offered by that planet to the orbit of Mercury could explain precession of its perihelion. Some enthusiastic people even named the imaginary planet as 'Vulcan' according to the Roman and Greek god of fire and forge. And some even more active people could 'observe' or 'locate' it though these could not survive the real test of scrutiny and no new planet could actually be found out. And in the process this problem with Mercury remained an unsolved problem for the astronomers and astrophysicists.

Einstein took up this problem and applied his newly developed GTR before going for its publication. The precession of perihelion could be explained in terms of the space time curvature caused by the strong gravitational field of the sun and the mercury being the nearest planet proved to be a 'victim' of that. Calculations based on GTR even matched quantitatively. While the observed precession was (574.10 ± 0.65) arc second per century the calculations based on GTR showed that to be 575.31 arc second per century. It was indeed an excellent agreement keeping in mind the role of experimental uncertainties in physics. In the process Einstein became sure that his GTR has passed the test by solving a real-life problem and he published it in 1916.



More observations in favour of the theories of relativity

GTR talked about space-time as some sort of inseparable entities. The possibility of the bending of light beam under the influence of strong gravitational field and all these were so radical that it was a very momentous step forward to bring in a very significant change of worldview. By the time Einstein's award was announced apart from the problem of the precession of perihelion of Mercury that the GTR solved; the observations recorded by Arthur Eddington during the total solar eclipse of 1919 provided support in favour of the bending of light beam while passing close to a gravitational field. And if one goes to check the evolution of the STR it can be found that the Einstein actually proposed STR to explain the null results of Michelson-Morley Experiment. That way it came up to explain an experimental observation; leave aside the other measurements based on the theory that could be done much later. The detailed descriptions of these two events have not been taken up for discussion here. Emboldened with the support from the experiments, the theories of relativity were on a reasonably strong ground in early 1920s, yet they could not find mention in the Nobel citation for Einstein.

The philosopher's views

It is now well known, particularly from the Nobel Prize presentation speech that was delivered by Svante Arrhenius on December 10, 1922 at Stockholm that there were objections to the Einstein's idea of space-time as envisaged in his theories of relativity from some unusual quarters, the philosophers. Henri Bergson who was held at very high esteem by his fellow philosophers and his followers particularly he had his own analysis and interpretation about the nature of 'time' that did not at all match with that of Einstein. Even the clash did not concern with the absolute nature of time or not, but on the measurement of time, simultaneity of events and simultaneity of observations and some more thoughts that were based on intuition and was not linked with science anyway. Yet educated people of that time were highly in favour of the views of Bergson that they believed could be understood by logical approach and without any mathematical skill.

A somewhat chance meeting of Bergson and Einstein

took place in the Societe Francaise de Philosophie (French Society of Philosophy) in presence of the students and the followers of Bergson in the eventful year of 1922 in Paris, to be precise on April 6 of that year. Einstein came to Paris on an invitation from his friend and physicist Paul Langevin to deliver a few talks on theory of relativity in College de France. He agreed to a request to attend a discussion-meeting with the philosophers and their guru Bergson.

In this meeting Einstein stated in no uncertain terms that there cannot be anything called 'philosopher's time'. He firmly asserted what the philosophers were suggesting he may term that as psychological time the existence of which may be accepted as a subjective one. Apart from physical time measured by the clocks there is definitely no time that may be termed as 'philosopher's time'. Bergson's followers did not like the Einstein's views on time as a physical quantity that is measurable and not absolute. Moreover, the dependence of time on the observer and her frame was not acceptable to them. Even the concept of space-time as two in separable entities as per GTR were not of much appeal to this group. They felt, following Bergson, that Einstein's theory is actually concerned with the measurement of time i.e., with clocks and did not have any philosophical implications. Yet the scholarship of Bergson was so overwhelming that his thoughts could go on to influence the Nobel Committee in physics. Though as a philosopher he was no way could be among the nominators for physics Nobel Prize yet his views prevailed and Einstein did not receive his Nobel for theory for his theories of relativity. And Arrhenius could include that statement without any hesitation as he apparently believed that the acceptance of the theories of relativity needs the approval of the philosophers. In this context two written documents from Royal Swedish Academy of Sciences to Einstein again in 1922 are especially significant.

The communications from Stockholm

The first one was a telegram that the Secretary of Royal Academy sent to Einstein intimating his selection for the1921 Nobel in Physics from Stockholm on November 09, 1922 immediately after it was announced in the Press. Einstein however, was not in Berlin he was actually travelling to Japan by the Japanese liner SS Kitanu Maru. He received the telegram through the radio operator of the ship when it made a break of journey in the Chinese port city of Shanghai on November 13, 2022. Telegram was simple and had the following words *"Nobel prize for physics granted you more by letter"*. Those who are familiar with the wordings of now obsolete telegrams should know that the telegrams used to be like this only. One could not expect more words or grammatical correctness and it used to communicate compact information. Yet one gets a little confused about the year of the Prize that possibly could be mentioned as all knew Nobel Committee in Physics was likely to announce the 1922 prize along with the 1921 Prize that was kept on hold. Still this aspect may be ignored considering that it was a telegram but a look at the letter that followed the telegram as promised was not only surprising, some may feel that to be objectionable. The influence of philosopher is also evident from the official letter that was sent to Einstein from the Royal Swedish Academy of Sciences on November 10, 1922, formally communicating him that he had won the Physics Nobel Prize for 1921. On the previous day the announcement before the press was made in Stockholm and the above-mentioned telegram was sent to Einstein in his Berlin address intimating that he has been selected for the award. The letter was also sent on the next day to his Berlin address.

The text of the entire letter that was sent to Einstein by the same person, Christopher Aurivillius, (1843 – 1928) the then Secretary of the Royal Swedish Academy of Sciences is given below.

Stockholm, 10 November 1922

Highly Esteemed Professor

As I already informed by telegram, during the meeting held yesterday, Roy. [Swedish] Academy of Sciences chose to award you with the previous year's Nobel Prize for Physics (of 1921) in reward for your research in theoretical physics and specifically for your discovery of law of photoelectric effect, but without taking into consideration your theories of relativity and gravitation pending future confirmation of their due merit.

On 10 December during the formal plenary session, the diplomas will be awarded to the prize winners along with the gold medals.

In the name of Academy of Science, I therefore invite you

to attend this meeting to receive the prize in person.
According to the § 9 of the Statute it is incumbent upon you to deliver a public lecture referring to the prize-winning text. If you do come to Stockholm, it would be decidedly the best if you hold your lectures on one of the days following the prize awards.
Hoping that the Academy will have the pleasure of seeing you, I am, in utmost respect, sincerely yours
Chr. Aurivillius
Secretary

Have you ever seen any Prizewinner is being intimated about the area for which he is NOT receiving the Prize? But in the first paragraph the last two lines exactly state that. And it goes to add that the 'due merit' of the theories is yet to be established! Was the Nobel Committee very much under the pressure from the intellectual circles? This possibly shows the overwhelming dominance of the educated intellectual section beyond the scientific community in Europe some 100 years back. They had a real aura! The then Chairman of the Nobel Committee in Physics Svante Arrhenius, himself a Nobel Laureate in Chemistry in 1903 did not have any hesitation to put forward officially the reason for not considering the award to Einstein for his theories of Relativity. Though Arrhenius in his official speech mentioned that, "the theory in question also has astrophysical implications which are being rigorously examined at the present time"; but this came more as a caveat. The very previous sentence had already sealed the fate of the theories of relativity as the presentation speech already stated "this pertains essentially to epistemology and has therefore been the subject of lively debate in philosophical circles."So, theories of relativity according to Arrhenius were not in the domain of science but go well as epistemologies i.e., the theories of knowledge.

Responses from Einstein with a veiled message

And Arrhenius or the members of the committee that he headed were not convinced with the observations of Eddington made during the total solar eclipse of 1919, Einstein's calculations for resolving the problem of the precession of perihelion of the planet Mercury or the nominations sent in favour of Einstein for his theories of relativity by number of leading scientists. So, it became very clear that the theories of relativity actually came in the domain of the philosophers and any objection from that side may clinch the decision accordingly. The Nobel Committee could not include the theories of relativity in the citation. And the world came to know that the objection from a philosopher has barred the concerned Committee to award the Nobel Prize to Einstein for his most famous and celebrated theories.

Einstein was possibly not happy for any mention of the theories of relativity in the Nobel citation but he never expressed it through his words or in any of his communications. However, some of his subsequent actions provide us with distinct indications of his reactions. His absence from the Nobel ceremony in Stockholm on December 10, 1922 cannot be taken as his expression of frustration because his Japan tour was fixed up well in advance. It is true, that his friend and Nobel Laureate Max von Laue wrote him in September 1922 not to leave Europe in November-December as some big news may come. Considering the close relationship between Arrhenius and von Laue one may conjecture that von Laue got some hints about announcement of the Nobel Prize in favour of Einstein by the end of that year. Whether it was based on some hints from Arrhenius or just an intelligent guess as the Prize was overdue for Einstein; is difficult to assert. In any case Einstein was in Japan on December 10, 1922 and one could understand that like today there was no provision of seeing the ceremony 'live' from Japan.

However, the commitment of a Nobel Prize winner to deliver a lecture for 'general public' on his or her work had been followed by the laureates as a tradition whether they could attend the ceremony or not. This was clearly mentioned in the letter from the Secretary Aurivillius. Occasionally a Laureate who could not remain present has sent someone else with a written matter to be read out as 'public lecture' to fulfill the conditions of the award. And on other occasions the Nobel laureate had visited Stockholm sometime later to deliver this talk better known as the 'Nobel Lecture ' by a Prize winner. Einstein chose the second option. He actually visited Sweden in July 1923 and delivered this 'Nobel Lecture'. But this was really different. He actually spoke not at Stockholm but at the city of Gothenburg in Sweden in the Nordic Assembly of Naturalists in a gathering of students and teachers there, on July 11, 1923. And the most striking

matter is that the title of his talk was “The Fundamental Ideas and Problems of Relativity' an area that could not find mention in his Nobel citation. So basically, he chose a different city to deliver this 'Nobel Lecture' and spoke on an area that has not been acknowledged through the Prize. Was it an expression of his abhorrence towards the Physics Nobel Committee? In any case the official Nobel site had to keep this in its record as the Nobel Lecture of Einstein. It may appear as some sort of a damage control effort by the Nobel Committee in Physics. It possibly began immediately after the announcement of the Nobel Prize and the subsequent reactions and resentments from the scientific community for the exclusion of theories of relativity. In a way this was not only a natural action from Einstein who had published just one single paper on photoelectric effect in his Annus Mirabilis or miracle year in 1905. In fact, he really did not do any further work, theoretical or experimental, or publish any other paper in the area that found particular mention in his Nobel Prize citation.

In lieu of a conclusion

Modern science, when began its journey was known as natural philosophy indicating that it was a branch of philosophy only. Things gradually changed. However, the Chairs for the Professor of Natural Philosophy are still there in some of the universities in Europe more as some sort of recognition of the evolution of science through the tenets of philosophy and logic. People now occupying these positions are hardcore research scientists in various branches of science. Incidentally, one of the 2019 physics Nobel laureates; Didier Patrick Queloz is now the Jacksonian Professor of Natural Philosophy in the University of Cambridge. There are more such examples. Today people do not know much about Henri Bergson but Einstein is an iconic figure. The debate that took place one hundred years ago was in a way necessary to underline the complexity of science that possibly could no more be comprehended by the intuition of a philosopher. The delinking of natural philosophy from science possibly began from there and it could be observed that philosophy of science cannot be entirely based on the intuition of a philosopher but could be better handled only by those with proper scientific training.

Reference:

1)https://www.nobelprize.org/prizes/physics/1921/ceremony-speech Physics Nobel Prize 1921 presentation speech

2. Aurivillas telegram: Telegram from the Secretary of the Royal Swedish Academy of Sciences, Stockholm, dated November 09, 1922. From the Volume 13, The Berlin Years; Writings and Correspondence January 1922- March 1923 (English translation Supplement Volume 13, Page 328, Document no. 384, https://einsteinpapers.press.princeton.edu/

3)https://einsteinpapers.press.princeton.edu/papers The Collected papers of Albert Einstein Vol 13, The Berlin years (Writings and Correspondence 1922-1923); Letter from the Secretary of the Swedish Academy of Science, Stockholm dated November 10, 1922. (English translation) Supplement Page 328-329, Document no. 386,

4. Max von Laue letter to Albert Einstein (dated September 18, 1922) From the Volume 13, The Berlin Years; Writings and Correspondence January 1922-March 1923 (English translation Supplement Page 287 Document no. 363, Volume 13 https://einsteinpapers.press.princeton.edu/

5) https://nautil.us/this-philosopher-helped-ensure-there-was-no-nobel-for-relativity-4554/#:~:text=For%20Einstein%2C%20this%20led%20him,the%20philosopher's%20task%20even%

Seminar on Applications of Physics in Medical Field

Resource Person: Dr Rajiv Dhawan, Asso. Prof., Department of Radiotherapy Govt. Medical College, Amritsar
Schedule: 10:00a.m.-1:00p.m. on 27/04/2022
Activity Incharge: Dr Gurpreet Singh,
Program Coordinator: Dr. Kulwinder Singh Mann
Beneficiaries: Students of B.Sc. (Non-Medical and Medical)

With an aim to highlight the importance of Physics in the Medical field, the Department of Physics, DAV College Bathinda, organized a talk on 27th April 2022 under the DBT Star college scheme. The resource person, Dr. Rajiv Dhawan, Associate Professor, Department of Radiotherapy, GMC, Amritsar elucidated from basics to an advanced level various diagnostic techniques in the field of medical science and the role of Physics in the field. The Principal Dr Rajeev Kumar Sharma welcomed the expert and participants. He also appreciated Dr. Gurpreet Singh, Head of the Physics Department for organizing such events and providing an opportunity to the students to interact with eminent personalities. All the students of B.Sc. (Medical and Non-Medical, and faculty members from various departments) attended the talk. Dr. Dhawan explained the medical diagnostic techniques used to improve the treatment process of patients. He suggested the students to improve their understanding of the basic principles of physics required in the field of medical physics. Students and faculty members actively participated in the interactive session. During the healthy discussion, Dr. Dhawan clarified many myths and doubts about the use of radiation in the field of chemotherapy, brachytherapy and other techniques using radioactive sources. He impressed upon the students to pursue a career in the field of Medical Physics after completing their M.Sc. in Physics as there is a large scope of placement for students. The seminar was very interesting and useful to achieve the basic objective of the DBT star college scheme. Dr. Dhawan also interacted with the students present in the physics lab and he motivated them to perform practical for understanding the concepts of Physics.The stage was conducted by Prof. Harpreet Kaur Brar, Dr. Vikas Duggal and Dr. Ranjeet Singh Mann were also present in the lecture. Bansi Dhar, a student of B.Sc. final provided the technical support for the event. The event concluded with a vote of thanks by Dr. Kulwinder Singh Mann.

Kulwinder Singh Mann
Programe Coordinator

REPORT (RC-08)

Learning Science and Mathematics by Experimentation

Date: 12th May 2022**; Duration:** 3 Hours 30 minutes
Venue of the activity: Tukaram Savala Kadam Vidhyamandir, Masuchiwadi, Tal: Walwa, Dist: Sangli Maharashtra
Resource Persons: Dr. Sudam B. Mane and Mr. Suraj Urmila Sunil

Welcome by Head Mistress

Thirty two students from 6th to 8th Class and 4 teachers participated in the activity.

In the first part students were divided into six groups, each group was given a set of thermometer, Pair of Magnets Magnetic Needle, thread, Glass slab, Laser Battery. Students were asked to measure room Temperature, Their Body temperature, and Temperature of Water. They were asked to find north side using Magnetic needle, Bar magnet suspended with the thread and asked to observe how it stands and why. Students learnt how the magnetic attraction and repulsion works. With help of Glass slab and they learnt how reflection and refraction of takes place.

Experimenting with Bar Magnet

In the second part the students performed activities related to maths, 24 Games related to Numbers , They also solved the Tangram Puzzels, 3D Maths Activity: Mobile stand, Touch Point Group Activity, Piercing a Big hole in Small paper piece through which the student himself passes.

Sudam B. Mane
Resource Person

INDIAN ASSOCIATION OF PHYSICS TEACHERS

IAPT-DINABANDHU SAHU MEMORIAL AWARD-2022

IAPT-DSM-AWARD RECOGNIZES A PHYSICS TEACHER FOR HIS/HER SIGNIFICANT CONTRIBUTION TO UNDERGRADUATE PHYSICS TEACHING IN ANY INSTITUTION AFFILIATED TO A UNIVERSITY RECOGNIZED BY UGC.

IAPT established by (Late) Dr D P Khandelwal aims at upgrading Physics teaching and teachers at all levels.

ELIGIBILITY CRITERIA

THE AWARD CONSISTS OF A CITATION AND A CASH PRIZE

Competitions of IAPT

NationalCompetition *of* InnovativeExperimentalPhysics(NCIEP),
NationalCompetition *of* InnovativeComputationalPhysics (NCICP),
NationalCompetition *of* EssayWriting *in* Physics, (NCEWP)

Indian Association of Physics Teachers

IAPT-Dinabandhu Sahu Memorial Award

Guidelines, Terms and Conditions

SECTION 1: Steps for conferring the Award

1. A Nominee for the Award should have made significant contribution to **Undergraduate** Physics Teaching and should satisfy the eligibility criteria (*see Section 2*).
2. The Nominee has to be nominated by a Nominator (*see Section 3*).
3. The Nominee has to submit the Application form online only.
4. IAPT Selection Committee selects the Awardee from amongst the Nominees (*see Section 5*).
5. The Award is presented to the Awardee (*see Section 6*).

SECTION 2: Eligibility Criteria

1. At least 5 years of **Undergraduate** Physics Teaching in any institution in India affiliated to a University recognized by UGC.
2. Should be a full time teacher as per the UGC guidelines for teaching at the UG level. However, the Selection Committee may consider minor deviations in cases where extraordinary teaching has been demonstrated.
3. Should not be more than **50 years** of age as on **30 June of the year of award**.

SECTION 3: Nomination

1. The Nominator should be an IAPT Member or a Member of Physics Faculty or Head of the current Institution.
2. A Nominator can nominate only one Nominee per year.
3. In the opinion of the Nominator, the Nominee has made significant contribution to Undergraduate Physics Teaching.
4. The Nominator is requested to submit the Nomination form online https://www.cognitoforms.com/IAPTDSMA/IAPTDSMANominationForm no later than **30 June of the year of award.**

SECTION 4: Application

1. The application form should be submitted online by the nominee at https://www.cognitoforms.com/IAPTDSMA/IAPTDSMAApplicationForm no later than **30 June of the year of award.**
2. The nominee will receive an e-mail with the submitted form in pdf format after the deadline date (30 June of the year of award).
3. Shortlisted candidates will be required to send the soft copies of supporting documents when requested.
4. Please contact mobile 9448437747 or write to iapt.dsm.award@gmail.com for any clarification in this regard.

SECTION 5: Selection Process

1. The Nominations and Applications will be reviewed by a Selection Committee appointed by IAPT for this purpose.
2. Selection Committee Members may have telephonic discussion with nominees.
3. The Screening Committee will make a shortlist of nominees (finalists).
4. The finalists will be informed by end of July.
5. The finalists will be requested to make a video recording of a presentation (~30 minutes) on their contribution to Undergraduate Physics Teaching. The video recording should be uploaded to "YouTube" and the private link e-mailed to iapt.dsm.award@gmail.com .
6. Selection Committee Members may have further telephonic discussion with the finalists, Nominators and Referees.
7. One amongst the finalists, based on his/her significant contribution to Undergraduate Physics Teaching, will be chosen by the Selection Committee for the Award.

SECTION 6: Award Presentation and Lecture

1. The Awardee will be announced, the citation will be read out, and cash prize handed over during the Annual IAPT Convention.
2. After the presentation, the Awardee will be expected to give an Acceptance Lecture (~30 minutes) to the audience highlighting his/her contribution to Physics Teaching. A written version of the Lecture will be required for publication in the IAPT Bulletin.
3. The Awardee will be reimbursed TA as per IAPT norms.

SECTION 7: Terms and Conditions

Following terms and conditions shall apply to the IAPT-Dinabandhu Sahu Memorial Award ("Award").

1. A recipient of the Award cannot be considered for the Award again in future.
2. A nominee can re-apply for the Award in future years if the eligibility criteria are met subject to Section 2 above.
3. Any number of Physics Teachers from the same institution can be considered.
4. Any false information submitted in the Application form will lead to immediate & permanent disqualification of the nominee for the Award.
5. IAPT reserves the right to consider or reject any submitted nomination without informing the nominee/associated institution.
6. The last date for nomination/application for the Award can be curtailed or extended at the discretion of IAPT, as deemed necessary.
7. Once submitted, IAPT has the right to use the information submitted through e-mail or hard copy, as it deems fit, including but not limited to: websites, internet, television programming, radio programming, newspapers, magazines, press, presentations, brochures, Public Relations and any other means of communication.
8. Nominee's personal details will be treated with respect. IAPT will never sell or rent them to anyone.
9. By agreeing with these terms and conditions, the nominee also automatically agrees to all terms and conditions stated by the various platforms used for the Award, including but not limited to: websites, digital platforms, Facebook, LinkedIn and YouTube.
10. **The decision of IAPT in choosing the Awardee is final and cannot be challenged**.

Summer Camp for High School Students

Govt. High School at Hosagavi, MaddurTaluk, Mandya District,Karnataka

Date: May 07, 2022; **Time:** 10.00 AM to 4.30 PM

Resource persons: Prof. B A Kagali, Ex Chairman, Department of Physics,
Bangalore University, Prof G Venkatesh**,** Ex Chief Coordinator, IAPT Exams,
Prof P Nagaraju Vice president IAPT South zone.

Participants: About 100 students of 8th, 9th and 10th standard

Brief account of the experiments / observational exercises by B A Kagali

1. Determination of the exact north-south direction.

We can do this by observing the shadow cast by a long vertical rod placed on horizontal surface. Let circles of different radii be drawn from the base of the rod on a white sheet of paper kept on the horizontal surface. As the sun crosses the local prime meridian from east to west, we have to mark the positions of the tips of the shadow that lie on each circle drawn on the paper.

2. Determining the latitude of a given place.

Various concepts such as the longitudinal circles, latitudinal circles, meridian circles, celestial equator, celestial North Pole, zenith point were explained to the students with drawings. It was also explained why the time when the sun is over the local prime meridian does not coincide with noon time as per our Indian Standard Time. By measuring the length of the shadow of least length, it is possible to estimate the angle the sun makes with the zenith point on each day. The declination of the sun on the day of observation can be estimated.

3. Making and using an equatorial sundial.

It was explained how one can make an equatorial sundial for a given place of observation to estimate the real solar time at that place.

4. Observing the sun with a pinhole camera.

It was explained how one can easily make a pin hole camera with a long (about 1 m long) darkened PVC water pipe and get the image of the sun on a translucent paper. By measuring the diameter of the image as well as the length of the pipe it is possible to estimate the angular size the sun (in radians) and hence the linear diameter of the sun can be estimated assuming the distance of the sun from the earth to be 150 millionkm.

The participating students were shown how all the above-mentioned experiments/observational exercises can be done with low-cost equipment. Photographs of different sundials and pinhole cameras were shown.

Light and light based technologies by G Venkatesh

He gave a talk on the topic covering the following information. Light is a form of energy and its various concept of dual nature, photoelectric effect and its applications. LASER and its applications in industry and holography.LED's- as economically highly durable sources. Liquid crystals and display devices, scattering of light, study by C V Raman and applications in the field of research – medicine, agriculture etc.

The talk included brief biographical sketch of the Physicists and their achievements.

Lecture Cum Demonstration by P Nagaraju

The following experiments were demonstrated

1.When a pen is placed on a single finger it can't be balanced. But, when it is placed with the help of a waist belt, it will be balanced. This

is because of the shift in
centre of gravity.

2. Wave model (Slinky): Longitudinal and transverse wave propagation was
explained with the help of this model.

3. Conversion of solar energy to Mechanical energy, light energy and sound energy:
Working of toy fan (small), glowing of LED and production of sound were shown
by using solar cell.

4. Hot water in one Beaker and Cold water in another beaker were taken and when
Ink drop is dropped in each beaker, the spreading of ink is quicker in hot
water than cold water. This is due to increase in kinetic energy in hot water.

5. Total internal reflection in optical fibre was shown by using LASER beam.

6. It was also explained, how TIR takes place in a glass jar filled with water and
spreading a small quantity of chalk dust in it and passing a LASER beam from
below the jar at suitable angle

7. Formation of the number of images were shown by placing two plane mirrors at
Different angles

8. Focal length of concave lenses using convex lens was shown

9. Explained the eye defect- Astigmatism with help of diagram

10. Explained to find the distance of a distant object using Xerox copy (bigger
size) of protractor

11. Determination of density of irregularly shaped body (stone) by Archimedes
principle

12. Diffraction pattern was shown by using LASER and metal scale

13. Explained the Bernoulli's principle using a small ball (ping pong ball) and a
funnel

14. Night sky Photometer (Built from IUCAA) was also explained

15. Conservation of momentum was explained by using big and small balls.

P Nagaraju
Vice President IAPT South Zone

REPORT (RC-15)

Science Quiz

A Science Quiz Competition was organized for the students of Class IX and X on March 27, 2022 by RC 15, as the second and due part of the celebration of the National Science Day, 2022. In the preliminary level which was conducted through Socrative platform, students from different schools across West Bengal participated. Out of them, six teams (one team consisting of maximum two members) got qualified for the next level, which was conducted through Google Meet. Dr. Chinmoy. Kumar. Ghosh, Former Director, NCIDE, IGNOU, New Delhi, acted as the quiz master.

There were several rounds comprising of different modes of questions (direct, audio-visual etc). Finally, after a neck to neck competition, Pallab Kumar Bhowal and Oishik Mukherjee of Ramakrishna Mission Vidyalaya, Narendrapurwere declared as the Champion team. Disha Mandal and Riya Ghosh of Kuchiakol R. B. Instituion became the 1st runner up and Pratyush Midya and Indrani Midya of Debipur Milan Vidyapith secured the position of the 2nd runner up. Students enjoyed the endeavor immensely and mentioned deep sense of appreciation in their feedback. This entire event was managed by Dr. Achintya Pal, Dr. Bhupati Chakrabarti, Dr. Pradipta Panchadhyayee, Soumen Sarkar, Sanjoy Pal and Dr. Shinjinee Das Gupta.

Pradipta Panchadhyayee
Secretary

Science for Everyone: Play Enjoy and Learn

Conducted by

Professor Y K Vijay, President IAPT RC-06,

Director, CIST IIS deemed to be University Jaipur

Somewhere something incredible is waiting to be known. You didn't bow to Science but you bent to life .With this motto in life our students of IIS live each day of their life.India International School is a learning and curiosity driven innovation centre.We have developed several innovation experiments and concepts which are useful to understand and develop the knowledge on how to play and enjoy with Science in our daily lives.

It was on 6th and 9th of May the students of 6th to 12th had witnessed this in our school's auditorium. The Principal Mala ma'am motivated the gathering for Science learning by encouraging them to do the experiments at home during summer break and learn some additional skills like music, dance, swimming etc.

Students were informed about the greatest scientists in the field of Science from India such as Dr C. V. Raman, Meghnand Saha and SN Bose. A brief introduction to these three Indian physicists was given along with Prof. D P Khandelwal, founder of IAPT and centenary year celebration, by Sir and soon after this many experiments were shown to the students to demonstrate the value of Science in our daily life.

In his PowerPoint presentation he explained about the maximum and the minimum size objects can have which varies within the range of 10^{15} mto 10^{-15} m as explained by him very beautifully through the daily life examples and experiences.

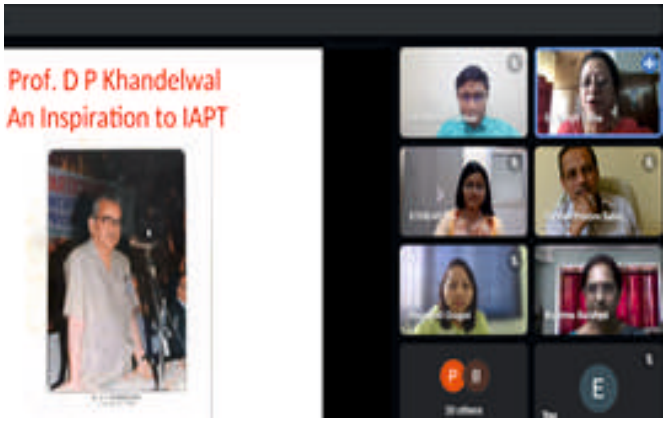
He also explained some other concepts of science like atomic configuration, air pressure, harmonic oscillator,reflection of light to the junior students and some additional concepts to the seniors like fourth state of matter which is plasma, diffraction using laser and magnetic levitation.His demonstration on light, rainbow using a CD and surface waves on water surface were something which left the students awestruck because the way it was flabbergasting the entire screen in the auditorium it was loved by the entire group of students. He also showed experiments on how to use force and its effects like equilibrium and motion.Our students were no less;they also participated with great enthusiasm and zeal.They were called upon by Sir on the stage to perform various experiments on their own which they loved doing. During three sessions, over 1500 students could enjoy this show.

Towards the end Sir promised our students to give them a second round of this **Stage Show** of Science in daily life in next coming months.

Divya Kapoor

Online Conference on
Emerging Trends in High Energy Astrophysics (ETHEAP)

A one-day conference was organized on 16-03-2022 online by the Department of Applied Sciences, Tezpur University (TU), collaborating with IAPT RC-17 (Assam &Arunachal Pradesh). Around 320 participants registered for this conference from all over India. The majority of the participants consisted of undergraduate and postgraduate students. The invited speakers spoke on various topics related to energetic events in the Universe. The primary goal of the conference was to communicate some basic notions to young minds about the growing trends in High Energy Astrophysics.



This Online Conference was dedicated to the memory of Late Prof. D. P. Khandelwal, Founder of IAPT.

The conference began with a brief inaugural ceremony. Dr. Somnath Paul, Head of the Department of Applied Sciences, TU, gave the welcome address. Dr. Biplob Sarkar and Dr. Rupjyoti Gogoi, the conference's Convenor and Joint Convenor, welcomed the participants. After that, Prof. Partha Pratim Sahu, Dean of School of Engineering, TU, delivered an inaugural address. Dr.Ranjita Deka, Vice President, IAPT EAST ZONE, addressed the session by providing a speech on Prof. D.P. Khandelwal and his contribution to the foundation of IAPT. The inaugural session ended with a welcome speech delivered by Dr.Runima Baishya, President RC-17.

Prof. Manjit Kaur from the Department of Physics, Panjab University, Chandigarh, delivered the first talk providing an overview of high-energy particle physics and investigation of neutrinos at the Large Hadron Collider. Dr. Pralay Kumar Karmakar from the Department of Physics, TU, then gave the second talk, which focused on acoustic waves of nuclear origin in degenerate astro-plasmas. Dr. Indu Kalpa Dihingia, Postdoctoral Fellow from the Department of Astronomy, Astrophysics and Space Engineering, IIT Indore, then gave a talk on General Relativistic Magnetohydrodynamics simulations for understanding the properties of accretion flow around black holes.

The post-lunch session began with a fascinating discussion by Prof. RanjeevMisra from IUCAA, Pune, entitled “The Nobel Road to Observing Black Hole Systems.” Prof. Banibrata Mukhopadhyay, IISc, Bangalore, then gave an inspiring discussion on the magnetized accretion flows and underlying jets around black holes. Dr. Aru Beri, Inspire Faculty, Physical Sciences, IISER Mohali, gave the final lecture of the conference. Dr. Beri gave a detailed presentation on multi-band insights into the interaction of stellar remnants and their environments with AstroSat and beyond.

Finally, the conference Convenor, Dr. Biplob Sarkar, conducted the valedictory session. He thanked all the coordinators and faculty members who continuously supported coordinating this encouraging event and made it successful and the delegates and participants who attended the online conference.

Manab Deka

Secretary

Science Educaton In Schools

Iapt Bulletin Editorial

There was a time when science education in schools started at clas IX. And I am one of those lucky persons whose school science teacher Pandit Krishananand, did not go to the black board even once in two years to teach science. The entire time was spent by him (and us) in doing experiments, seeing things and drawing conclusions. He would push us to the blackboard to discuss as a group of ten students what we learnt from our experiments. And there was no examination in practical at that time.

Now, since science has been made a subject in classes lower than IX. And some kind of examination has been added for it. It is worth a close and critical review where this has landed to us. Only a rare school has anything near lab space at this level. Some have bits of items in science, but at best they are shown from class room table. Cases where the children themselves handle some items are very very rare. So the net result is mugging up some definitions and some statements without any experience as such.

Obviously, .More harm than good is being done in the process. The children (and guardians) get wrong signal what science is or should be,and it has adverse consequences later.

At IX-X level things are not better. But the major reason here is different.The teachers do not have adequate knowledge of subject matter, and certainly they are absolutely blank near the horizons. The causes are many. Firstly, " Biology- based" teachers have no command of Physics and "Physics- based" teachers have no command of Biology areas.

The employment system makes no distinction. Secondly, the purchase/ maintenance/ repair system in most institutions is controlled by the " administration", which means killing the initiative, if any, in the science teacher. Both these need remedial steps.Teacher training courses for science teachers need addition of good component of subject matter, particularly between Physics/Biology mutually balance side. And in lab the science teacher should have a direct say (and responsibility) in purchases and management.

The most thing is that an insistence that unless there is a large enough laboratory space, no school should be allowed to carry on science education. When science was made compulsory at High School it was pointed out that we must wait for 2-3 years till every schol has provided lab space. But a surprising statement was made then: " How does it matter if for a few years science is taught from blackboard?" It shocked me then, coming from a science- based person. But, now I find the " few years". Have gone for some 15 years. The damage is very serious. We are repelling students from science.

Then come so called advances in science curricula. It is one thing to make children aware about the frontiers, but it is different if we try to pack of knowledge in capsules, as if every student at (say) XII level is going to proceed to M Sc (Physics). Even teachers collapsing under this kind of load, what to talk about the students. I am not suggesting watering down of the syllabi; the suggestion is to water fown the level of treatment, with most emphasis on concepts and physics, than on mathematical finesse and rigour. Let the children enjoy science learning and let the teachers share that joy with the children under them.

D.P. Khandelwal

January 1992

STATE TOPPERS
IOQA 2021-22 PART 1 (NSEA) (NATIONAL STANDARD EXAMINATION IN ASTRONOMY)

Sr. No.	Roll No.	Name od Candidates	Class	Name of school, city with State
1	AP00-1110-135846	MEDA VENKATA SAI ABHINAV	12	SRI CHAITANYA CO-ED JR COLLEGE GUDAVALLI, KRISHNA, AP
2	AP00-1110-135845	MENDA HIMA VAMSI	12	SRI CHAITANYA CO-ED JR COLLEGE GUDAVALLI, KRISHNA, AP
3	AP00-1110-135838	BHAVYA SRI KOTTANA	12	SRI CHAITANYA CO-ED JR COLLEGE GUDAVALLI, KRISHNA, AP
4	AP00-1110-135841	DARISIPUDI SARANYA	12	SRI CHAITANYA CO-ED JR COLLEGE GUDAVALLI, KRISHNA, AP
5	AS18-1110-102682	AYUSH MANDAL	12	SOUTH POINT SCHOOL 21, BARSAPARA, GUWAHATI, AS
6	BR13-1110-111250	ARUDEEP KUMAR	12	ADARSH VIKAS VIDYALAYA MAHAMADPUR PATNA, BR
7	BR13-1110-111237	ABHINAY KUMAR	12	J.P. CENTRAL SCHOOL WARISNAGAR, SAMASTIPUR, BR
8	BR13-1110-111396	NANDNEE PRIYA	12	JESUS & MARY ACADEMY ALLALPATTI, DARBHANGA, BR
9	BR13-1111-111197	MAYANK KUMAR	12	SHIVAM CONVENT E ASHOK NAGAR, KANKARBAGH, PATNA, BR
10	CG12-1110-129938	ABHINAV RAJESH SHRIPAD	12	K.D. PUBLIC SCHOOL MEENAKSHI NAGAR BORSI DURG, CG
11	CH04-1110-109003	SAURABH RANA	12	STEPPING STONES SR SECONDARY SCHOOL SEC- 37 D, CHANDIGARH
12	DL01-2110-105446	AMOGH	11	THE VIVEKANAND SCHOOL NARELA, NORTH WEST DELHI,
13	DL01-1110-129824	ARUSH UPADHYAYA	12	DHRUVA PUBLIC SR. SEC SCHOOL G-II NAJAFGARH, NEW DELHI
14	DL01-1110-109780	AVIRAL VISHWAKARMA	12	DELHI PUBLIC SCHOOL SECTOR-3, PHASE-1, DWARKA, NEW DELHI
15	DL01-1110-109761	HUMAYUN MUGHAL	12	JAMIA SR SECONDARY SCHOOL GATE NO. 17 JAMIA NAGAR, SOUTH DELHI
16	SR01-1110-109679	OMAR ISLAM LASKAR	12	DELHI PUBLIC SCHOOL SUNDAR NAGAR, SOUTH DELHI
17	DL01-1110-109760	SAMYAK SHEERSH	12	DELHI PUBLIC SCHOOL SECTOR 12, RK PURAM, NEW DELHI
18	GJ09-1110-143875	RAJVARDHAN SHARMA	12	DELHI PUBLIC SCHOOL HARNI, VADODARA, GJ
19	GJ09-1110-159941	DEV YOGESH SHAH	12	PUNA INTERNATIONAL SCHOOL ZUNDAL, GANDHI NAGAR, GJ
20	GJ09-2110-159969	DHRUVI JAYPRAKASH KATARIA	11	KRISHNA INTERNATIONAL SCHOOL KALIPAT, RAJKOT, GJ
21	HR04-1110-108974	TAKSHIT AGGARWAL	12	BHAVAN VIDYALAYA SECTOR 15, PANCHKULA, HR
22	HR01-2110-117389	NAVANSH BANSAL	11	MODERN DELHI PUBLIC SCHOOL SECTOR 87, FARIDABAD, HR
23	HR00-1110-119005	AARNAV SINGH	12	MASD PUBLIC SCHOOL FARIDPUR ROAD, PANIPAT, HR
24	HR00-2100-119022	RISHABH JAIN	10	MODERN DELHI PUBLIC SCHOOL SEC-87, GREATER FARIDABAD, HR
25	JH15-1110-115855	VIKASH KUMAR OJHA	12	DELHI PUBLIC SCHOOL SAIL TOWNSHIP, DHURWA,RANCHI, JH
26	JH15-2110-115770	RICKARYA DAS	11	ST. XAVIER'S SCHOOL SECTOR 1/C, BOKARO STEEL CITY, JH
27	JK06-1110-103413	SYED MOHAMAD TAWSEEQ	12	GOVT. BOYS HIGHER SEC. SCHOOL JAWAHAR NAGAR SRINAGAR, J&K
28	KA00-1110-136255	JATIN VINOD KUMAR	12	RV PU COLLEGE JAYANAGAR EAST, BENGALURU, KA
29	KA27-2100-136508	ABHINAV PEROOR JAYAKRISHNA	10	BGS NATIONAL PUBLIC SCHOOL HULIMAVU, BENGALURU, KA
30	KA27-2111-136587	MURALIDHAR RAO M	11	THE LEARNING CENTRE CFAL, MANGALORE, KA
31	KA00-1110-136241	SHISHIR RK	12	NARAYANA E-TECHNO SCHOOL VIDYARANYAPURA, BENGALURU, KA
32	KL28-1110-142691	ROHAN RAJEEV	12	SARASWATHI VIDYANIKETHAN PUBLIC SCHOOL ERNAKULAM, KL
33	KL28-1110-114085	STANY BENNY	12	ST. ANTONY'S PUBLIC SCHOOL ANAKKAL, KANJIRAPALLY, KOTTAYAM, KL
34	KL28-1110-114216	NIRANJAN ANANTHAKRISHNAN	12	CHINMAYA VIDYALAYA KUNNUMPURAM, THIRUVANANTHAPURAM, KL
35	KL28-2110-142661	PRAKHAR JAIN	11	SARASWATHI VIDYANIKETHAN PUBLIC SCHOOL ELAMAKKARA, KOCHI, KL
36	MH00-1110-155866	ARNAV JAIN	12	NARAYANA JUNIOR COLLEGE MAROL VILL, ANDHERI(E), MUMBAI, MH
37	MH08-1110-151632	SABHYA KHURANA KHURANA	12	ARMY PUBLIC SCHOOL GHORPADI, PUNE, MH
38	MH08-1110-158920	ABHINAV YASHWANT NIMKAR	12	SANT DNYANESHWAR ENGLISH MEDIUM SCHOOL & JR. COLLEGE KHARADI, PUNE, MH
39	MH00-2111-155680	SHAURYA AGRAWAL	10	ELPRO INTERNATIONAL SCHOOL CHINCHWAD, PUNE, MH
40	MH08-1110-151552	TANISH ANANT RAGHUTE	12	CITY INTERNATIONAL SCHOOL WANOWRIE, PUNE, MH
41	MH00-2110-155702	SHOUNAK PUSHKAR RANADE	11	MP INTERNATIONAL SCHOOL AND COLLEGE SHIVJINAGAR,PUNE, MH
42	MH07-1110-153736	OJAS DEEPAK MAHESHWARI	12	NARAYANA JUNIOR COLLEGE MAROL VILL, ANDHERI EAST, MUMBAI, MH
43	MH08-1110-152029	ATHARVA DEEPAK KHOT	12	ANGLO URDU BOYS HIGH SCHOOL & JR COLLEGE NEW MODIKHANA, PUNE, MH
44	MH08-2100-158881	AAYUSH KUTHARI	9	DELHI PUBLIC SCHOOL VILL.MOHAMMADWADI, PUNE, MH
45	MH07-1110-152241	HARSH SANJAY RONIYAR	12	PODDAR BRIO INTERNATIONAL SCHOOL KALYAN-KARJAT RD, THANE, MH
46	MH08-1110-151570	ANUJ NITIN BHARAMBE	12	CITY INTERNATIONAL SCHOOL WANOWRIE, PUNE, MH
47	MP11-1110-126841	ATHARVA VERMA	12	SANMATI HIGHER SECONDARY SCHOOL DOORDARSHAN KENDRA, INDORE, MP
48	MP11-1110-126199	MOHD SUFYAN	12	GVN - THE GLOBAL SCHOOL SECTOR - C GOVINDPURA, BHEL, MP
49	MP11-2100-126892	MRADUL KAUSHAL	11	THE NEW GREEN FIELD PUBLIC ACADEMY SCHEME NO 94, SEC B, INDORE, MP
50	MP11-1100-126792	ATHARVA NILESH MAHAJAN	12	RANKERS INTERNATIONAL SCHOOL NANAWARE ROAD, INDORE, MP
51	MP11-1110-126290	ISHAAN SHARMA	12	SHARDA VIDYA MANDIR BARKHEDI KALAN, RATIBAD RD, BHOPAL, MP
52	OD00-1110-133470	DEEVYANSHU MALU	12	KIIT INTERNATIONAL SCHOOL PATIA, BHUBANESWAR, KHORDA, OD

53	OD17-2111-133028	SANKET DAS	11	SAI INTERNATIONAL PLOT 5A, INFOCITY ROAD, KHORDA, OD
54	PB04-1110-107640	ARYAMAN ANGURANA	12	KUNDAN VIDYA MANDIR SR SEC. SCHOOL NEW KUNDANPURI, LUDHIANA, PB
55	PB00-1110-107399	HARDIK SHARMA	12	BHARTIYA VIDYA BHAVAN'S S.L PUBLIC SCHOOL BATALA RD, AMRITSAR, PB
56	PB00-1110-107447	GURSAHILJOT SINGH GILL	12	DELHI PUBLIC SCHOOL REETHKHERI, SIRHIND RD, PATIALA, PB
57	RJ00-1100-131407	ARYAN KUMAR	12	MAA BHARTI SR. SEC. SCHOOL SWAMI VIVEKANAND NAGAR, KOTA, RJ
58	RJ10-1110-128724	LAKSHYA GADHWAL	12	CENTRAL PUBLIC SCHOOL NEW BHUPALPURA, UDAIPUR, RJ
59	RJ00-1110-155951	TARANG RISHIKESH SHAH	12	DISHA DELPHI PUBLIC SCHOOL SECTOR- A , R. K. PURAM, KOTA, RJ
60	RJ10-2100-129912	SIMAR NARULA	11	DISHA DELPHI PUBLIC SCHOOL SECTOR- A , R. K. PURAM, KOTA, RJ
61	RJ00-1110-131328	PALLAV GOYAL	12	YOGIRAJ PUBLIC SCHOOL NAYA NOHRA KOTA, RJ
62	RJ10-1100-129718	ATHARV SHIVRAM MAHAJAN	12	DISHA DELPHI PUBLIC SCHOOL SECTOR- A , R. K. PURAM, KOTA, RJ
63	TN29-2110-139948	SASTI SARAVANAN	11	NARAYANA E-TECHNO SCHOOL NEW NO.7, GOPALAPURAM, CHENNAI, TN
64	TN29-1110-138076	KISHORE KUMAR E	12	MAHARISHI INTERNATIONAL RESIDENTIAL SCHOOL KANCHIPURAM, TN
65	TN00-1110-140777	PRANAV RAMESH	12	B V M GLOBAL SCHOOL 144, PERUNGUDI VILLAGE, KANCHIPURAM, TN
66	TN29-1100-138632	SHREY RAMANUJAM	12	MANTHAN VIDYASHRAM 2/155 KOTTIVAKKAM, CHENNAI, TN
67	TN00-2110-140794	VISHWAAJITH N K	11	NARAYANA OLYMPIAD SCHOOL 7/2, GOPALAPURAM, CHENNAI, TN
68	TN29-2110-138857	SAHASVAT RAJKUMAR	10	CHETTINAD VIDYASHRAM RAJAH ANNAMALAIPURAM, CHENNAI, TN
69	TN29-2110-139765	BHAVESH SURYA NARAYANAN	11	SRI CHAITANYA SCHOOL PERUMBAKKAM, KANCHIPURAM, TN
70	TS00-1110-124042	LAKSHMI SAI LOHITH REDDY POLU	12	NARAYANA JR COLLEGE PLOT NO. 1296-98, KHANAMET, HYDERABAD, TS
71	TS00-1110-124054	VENKATA SAI SUDHEER REDDY DANDA	12	NARAYANA JR COLLEGE PLOT NO. 1296-98, KHANAMET, HYDERABAD, TS
72	TS26-2110-123994	PALURI GNANA KOUSIK REDDY	11	SRI CHAITANYA COLLEGE MADHAPUR, HYDERABAD,T S
73	SR26-2111-124217	MEHUL BORAD	11	NARAYANA JUNIOR COLLEGE KHANAMET, HYDERABAD, TS
74	TS00-1110-124048	CHARAN TEJA VALAVALA	12	NARAYANA JR COLLEGE PLOT NO. 1296-98, KHANAMET, HYDERABAD, TS
75	TS00-2110-135830	RAMESH SURYA THEJA	11	SRI CHAITANYA JUNIOR KALASALA MADHAPUR, HYDERABAD, TS
76	UK03-1110-104461	DIVYANSHU GUPTA	12	DOON VALLEY PUBLIC SCHOOL 20 AAM BAGH, DEHRADUN, UK
77	UP02-1110-145687	KANISHK	12	CITY MONTESSORI SCHOOL GOMTINAGAR, LUCKNOW, UP
78	UP00-1110-150020	TANMAY SIDDHARTH	12	VANASTHALI PUBLIC SCHOOL SEC 3, VASUNDHARA, GHAZIABAD, UP
79	UP01-2000-147817	BHAVYA BANSAL	11	TRANSLAM ACADEMY INTERNATIONAL RAJPURA, MEERUT, UP
80	UP30-2100-147810	UTKARSH GUPTA	11	KV PUNJAB LINES MEERUT CANTT, MEERUT, UP
81	UP01-1110-148199	UMANG TRIPATHI	12	VISHWA BHARATI PUBLIC SCHOOL SEC 28, GAUTAM BUDDHA NAGAR, UP
82	UP00-1100-150035	AMISH KAKRU	12	AMITY INTERNATIONAL SCHOOL VASUNDARA, GHAZIABAD, UP
83	UP01-1110-147848	SAUMITRA GARG	12	DELHI PUBLIC SCHOOL BAGHPAT ROAD, MEERUT, UP
84	UP01-2110-147119	MALAY KEDIA	11	SETH ANANDRAM JAIPURIA SCHOOL SEC 14, VASUNDHARA, GHAZIABAD, UP
85	UP01-1110-148255	MANAN GARG	12	DELHI PUBLIC SCHOOL SEC-30, NOIDA, GAUTAM BUDDHA NAGAR, UP
86	UP02-1110-145578	DEVANSH BANSAL	12	CITY MONTESSORI SCHOOL SECTOR-D, LUCKNOW, UP
87	WB16-1110-120374	PRATYUSH BISWAS	12	DAV MODEL SCHOOL J.M. SENGUPTA ROAD, DURGAPUR, WB
88	WB16-1100-120385	SHAMBO SAHA	12	DAV MODEL SCHOOL J M SENGUPTA ROAD, B-ZONE, DURGAPUR, WB
89	WB16-1110-120350	JYOTISHKO BANERJEE	12	DAV MODEL SCHOOL J.M. SENGUPTA ROAD, DURGAPUR, WB
90	WB16-1110-120685	ADITYA MISHRA	12	DELHI PUBLIC SCHOOL RUBY PARK, SOUTH 24 PARGANAS,WB

Prof B P Tyagi
Chief Coodinator (Examination)

STATE TOPPERS

IOQP 2021-22 PART 1 (NSEP) (NATIONAL STANDARD EXAMINATION IN PHYSICS)

Sr. No.	Roll No.	Name of candidates	Class	Name of School, city with state
1	AP00-1110-135890	SIDDHARTHA ROY BHYRI	12	SRI CHAITANYA CO-ED JR COLLEGE GUDAVALLI, KRISHNA, AP
2	AP25-1110-133894	KONDURI JEEVAN VARMA	12	SRI CHAITANYA CO-EDN. JR. COLLEGE GUDAVALLI, KRISHNA, AP
3	AP25-1110-135166	PALLETI PRAVEEN KUMAR REDDY	12	NARAYANA JUNIOR COLLEG UMASHANKAR NAGAR, KRISHNA, AP
4	AP25-1110-135192	G. VENKATAKRISHNA SAI SURESH MANIKANTA	12	NARAYANA COLLEGE UMASHANKAR NAGAR, KRISHNA, AP
5	AP00-1110-135842	BHOGI SIRI	12	SRI CHAITANYA CO-ED JR COLLEGE GUDAVALLI, KRISHNA, AP
6	AP25-1110-135078	MANDIPALLI LOHITH REDDY	12	SRI CHAITANYA CO-EDN. JR. COLLEGE GUDAVALLI, KRISHNA, AP
7	AP25-2110-135221	SAKETH NAIDU DASARI	11	SRI CHAITANYA CO-EDN. JR. COLLEGE GUDAVALLI, KRISHNA, AP
8	AP25-2110-135248	VENKATA YUGESH DUGGINENI	11	SRI CHAITANYA CO-EDN. JR. COLLEGE GUDAVALLI, KRISHNA, AP
9	AP00-0110-136059	CHOKKAKU VENKATA YASWANTH	11	NARAYANA ENGLISH MEDIUM SCHOOL PARADESIPALEM, VISAKHAPATNAM, AP
10	AP25-0100-134563	SAI BHANU TEJA BADUGU	12	NARAYANA ENGLISH MEDIUM SCHOOL BRAHMADEVI, NELLORE, AP
11	AP25-1110-135185	NAGA SASI BHUSHAN YANNAKULA	12	NARAYANA COLLEGE UMASHANKAR NAGAR, KRISHNA, AP
12	AP25-2110-135214	PARDHA SARADHI DASARI	11	SRI CHAITANYA CO-ED JR COLLEGE GUDAVALLI, KRISHNA, AP
13	AS30-1110-102686	HARSHIT KAKATI	12	KV KHANAPARA, KAMRUP, AS
14	AS18-1110-102695	RISHAB SONTHALIA	12	COTTON UNIVERSITY PAN BAZZAR, GUWAHATI, ASSAM, KAMRUP, AS
15	BR00-0110-111877	MANAS KUMAR	12	LYCEUM INTERNATIONAL SCHOOL MITHANPURA LALA, MUZAFFARPUR, BR
16	BR00-0110-131749	ADITYA AJEY	12	LEVANA PUBLIC SCHOOL EAST CHAMPARAN, BIHAR
17	BR13-1110-111219	AYUSH KUMAR	12	ADARSH VIKAS VIDYALAYA GORGAWAN, PATNA, BR
18	BR13-2110-129884	YASHASWI RAJ	11	KIDS CAMP INTERNATIONAL SCHOOL MUSHAHRI, MUZAFFARPUR, BR
19	BR13-1110-111297	ABHISHEK KUMAR	12	SHIVAM CONVENT EAST ASHOK NAGAR RD, KANKARBAGH, PATNA, BR
20	BR13-1110-111181	SHRAWAN KUMAR	12	VIDYA SANSKAR SCHOOL BAILEY ROAD; DANAPUR,PATNA, BR
21	BR13-1110-130021	ABHINAV ANAND	12	ADARSH VIKAS VIDYALAYA AT PO MAHAMADPUR, PATNA, BR
22	BR13-0100-111679	VIVSWAN SAVYASACHI	12	MAY FLOWER SCHOOL JAI PRAKASH NAGAR, PATNA, BR
23	BR00-1110-111295	RASHAD ALAM	12	KRISHNA PUBLIC SCHOOL SHIKSHA NAGAR, NEORA, PATNA, BR
24	CG00-1111-113093	PRATIK TRIPATHY	12	DELHI PUBLIC SCHOOL SEMARIYA, RAIPUR, CG
25	CG12-0110-113302	SHIKHAR GUPTA	12	COLONEL'S ACADEMY OF RADIANT EDUCATION MANGLA, BILASPUR, CG
26	CG00-0111-113289	SUYASH SONI	12	SWAMI VIVEKANANDA SCHOOL DAGANIA RAIPUR CG
27	CH04-0110-109053	SOMYA BANSAL	12	GOVERNMENT MODEL SR SECONDARY SCHOOL SECTOR 13, CHANDIGARH
28	CH04-1110-107475	SUJAN JAIN	12	SRI GURU HARKRISHAN SR SEC. PUBLIC SCHOOL SEC-40C, CHANDIGARH
29	CH00-1110-108995	RIJUL SINGLA	12	ST. PETERS SENIOR SECONDARY SCHOOL SECTOR 37-B CHANDIGARH
30	DL00-0110-119159	AARTH BHARDWAJ	12	AMITY INTERNATIONAL SCHOOL SECTOR 7, PUSHP VIHAR, NEW DELHI
31	DL01-2110-146780	ANOOP SINGH	11	PRAGATI PUBLIC SCHOOL SECTOR 13, DWARKA, NEW DELHI
32	DL00-0110-150510	AASHMUN GUPTA	12	DHRUVA PUBLIC SCHOOL G-II, BAPROLA, NAJAFGARH,SOUTH WEST DELHI
33	DL01-0110-116946	GUPIL	12	THE VIVEKANAND SCHOOL NARELA, NORTH WEST DELHI
34	DL01-1110-105417	PRATHAM MALHOTRA	12	KULACHI HANSRAJ MODEL SCHOOL ASHOK VIHAR , PHASE -3 , NEW DELHI
35	DL01-1110-129824	ARUSH UPADHYAYA	12	DHRUVA PUBLIC SR. SEC SCHOOL G-II, NAJAFGARH , NEW DELHI
36	DL00-1110-150094	HARSHIT KUMAR SINGH	12	HOPE HALL FOUNDATION SCHOOL SECTOR VII, R K PURAM, NEW DELHI
37	DL01-0110-157534	DHRUV DHANGAR	12	DPS RK PURAM SEC 12, SOUTH WEST DELHI
38	DL01-1110-147123	NISHANT PANDEY	12	SHAHEED RAJPAL DAV PUBLIC SCHOOL ARYA NAGAR, NEW DELHI
39	DL01-1110-105468	PRIYANSHU AGRAWAL	12	ST XAVIERS SENIOR SECONDARY SCHOOL 4 RAJNIWAS MARG, DELHI
40	DL01-2110-109776	HARSHIT ARORA	11	PRUDENCE SCHOOL PS 2 , C 3 BLOCK, ASHOK VIHAR, NEW DELHI
41	DL00-0100-150760	NITIN SINGH PATEL	12	KRD NORTH WEST DELHI, DELHI
42	DL00-1110-109811	SATWIK	12	SRI VENKATESHWAR INTERNATIONAL SCHOOL SEC-18A, DWARKA, NEW DELHI
43	DL00-0110-105793	SUMUKH BANSAL	12	SCHOOL OF EXCELLENCE SECTOR 17, ROHINI, NEW DELHI
44	DL00-1111-109764	ABHINEET MISHRA	12	PRAGATI PUBLIC SCHOOL SECTOR 13, DWARKA, NEW DELHI
45	DL01-1110-105489	NIKHIL GUPTA	12	LOVELY PUBLIC SR SECONDARY SCHOOL PRIYADARSHINI VIHAR, DELHI
46	DL01-1110-109744	DHRUV MALHOTRA	12	BIRLA VIDYA NIKETAN SEC 4 PUSHP VIHAR SAKET, DELHI
47	GA00-0100-133860	SRAVAN K SURESH	12	MUSHTIFUND ARYAAN HIGHER SECONDARY SCHOOL CUJIRA, GOA
48	GJ00-0100-160267	PARVA SHIRISH SATODIA	11	PUNA INTERNATIONAL ZUNDAL CIRCLE, GANDHI NAGAR, GJ
49	GJ00-0100-160273	HARSHUL SANJAYBHAI SUTHAR	11	PUNA INTERNATIONAL SCHOOL ZUNDAL, GANDHI NAGAR, GJ
50	GJ09-2110-160029	GAUTAM RAVI SINGHVIE	11	PUNA INTERNATIONAL SCHOOL CHANDKHEDA- ZUNDAL RD,GANDHI NAGAR, GJ
51	GJ00-0100-144941	DHYEY SANJAYKUMAR PATEL	12	AMICUS INTERNATIONAL SCHOOL AT & POST - LUWARA,VADODARA, GJ
52	GJ00-0100-160595	ANDODARIYA HRIDAY NILESHBHAI	12	B.H. RATHOD HIGHER SECONDARY SCHOOL OPP. CRYSTAL MALL, RAJKOT, GJ
53	GJ09-0110-143549	KRISH AMRUTBHAI RAKHOLIYA	12	SCHOLAR ENGLISH ACADEMY SCHOOL GAVIYER, MAGDALLA, SURAT, GJ
54	GJ00-1110-144638	RISHIT MILAN KUMAR JAKHARIA	12	ST.XAVIER'S HIGH SCHOOL SECTOR-8, GANDHINAGAR, GUJARAT, GJ
55	GJ09-1110-159914	NIRJAR DINESHBHAI PATEL	12	DIVINE LIFE INTERNATIONAL SCHOOL AHMEDABAD, GJ
56	GJ00-2100-160244	RACHIT TUSHARBHAI JANI	10	PUNA INTERNATIONAL SCHOOL ZUNDAL, GANDHI NAGAR, GJ

57	HP04-1110-118187	CHETAN KUKREJA	12	D.A.V. PUBLIC SR SECONDARY SCHOOL SEC-1 PARWANOO, SOLAN, HP
58	HR01-0110-117725	ASHISH	12	MDN PUBLIC SCHOOL NEAR NEW BUS STAND, ROHTAK, HR
59	HR04-1110-108982	ANIRUDH GARG	12	BHAVAN VIDYALAYA SECTOR 15 PANCHKULA, HR
60	HR01-2110-117399	NAMAN GOYAL	11	MORDERN VIDYA NIKETAN SEC 17, FARIDABAD, HR
61	HR04-1110-107489	MOULIK JAIN	12	BHAVAN VIDYALAYA SECTOR 15 , PANCHKULA, HR
62	HR04-1110-118239	PARV AGGARWAL	12	BHAVAN VIDYALAYA SECTOR 15 , PANCHKULA, HR
63	HR04-1110-108954	MD ISFARUL HAQUE	12	BHAVAN VIDYALAYA SECTOR 15 , PANCHKULA, HR
64	HR00-0111-119222	AKSHAT	12	DGV SR. SEC. PUBLIC SCHOOL ROHTAK, HR
65	HR01-1110-117547	ANSH AGRAWAL	12	MODERN DELHI PUBLIC SCHOOL SECTOR - 87, FARIDABAD, HR
66	HR04-0110-117126	AAYUSH ADLAKHA	12	WISDOM WORLD SCHOOL SECTOR 4, KURUKSHETRA, HR
67	HR01-1110-117700	HARSHIT	12	RED SCHOOL TALAO ROAD, JHAJJAR, HR
68	HR04-1110-107424	AGRIM MITTAL	12	BHAVAN VIDYALAYA SECTOR 15 , PANCHKULA, HR
69	JH15-1110-115855	VIKASH KUMAR OJHA	12	DELHI PUBLIC SCHOOL SAIL TOWNSHIP, DHURWA, RANCHI, JH
70	JH15-1110-115946	SRIJAN RANJAN	12	VIDYA BHARTI CHINMAYA VIDYALAYA EAST SINGHBHUM, JH
71	JH15-2110-115889	ADITYA PRAKASH	11	STAR INTERNATIONAL SCHOOL CITY OFFICE, KOKAR, RANCHI, JH
72	JH15-1110-115813	SASMIT ADITYA	12	DELHI PUBLIC SCHOOL SAIL TOWNSHIP, DHURWA, RANCHI, JH
73	JH15-1110-115815	AYUSH KUMAR	12	DELHI PUBLIC SCHOOL SAIL TOWNSHIP, DHURWA, RANCHI, JH
74	JH15-2100-115831	SABIL AHMAD	11	JAWAHAR VIDYA MANDIR MECON COLONY, RANCHI, JH
75	JK06-0110-103469	HAZIK JAVID KIRMANI	12	GOVT. MODEL BOYS HR. SEC. INSTITUTE HANDWARA, KUPWARA, J&K
76	KA00-0100-136715	SHIVESH PRAKASH	12	NARAYANA E-TECHNO SCHOOL BENGALURU, KA
77	KA00-0111-136778	PUNEETH M ATHREYA	12	RV PU COLLEGE JAYANAGAR 3RD BLOCK, BENGALURU, KA
78	KA27-0110-136933	PRANAV CHOUKSE	12	DELHI PUBLIC SCHOOL SURVEY NO 35-1A, SATHNUR VILL, BENGALURU, KA
79	KA00-0110-136664	KAUSTAV MISHRA	12	DELHI PUBLIC SCHOOL DOMMASANDRA, BENGALURU, KA
80	KA27-0110-137149	JAGADISH PARAMESWARAN	12	BETHANY HIGH SCHOOL CA-12, KORAMANGALA, BENGALURU, KA
81	KA00-0101-136788	HRISHIKESH NAGBHUSHAN GANGULE	12	NATIONAL CENTRE FOR EXCELLENCE BENGALURU, KA
82	KA00-0110-136846	SHASHWAT SINGH RANKA	12	BASE PU COLLEGE OMKAR NAGAR, AREKERE, BENGALURU, KA
83	KA27-1110-136277	BOYA HAREN SATHVIK	12	NARAYANA E-TECHNO SCHOOL VIDYARANYAPURA, BANGALORE, KA
84	KA27-0100-136944	ABHINAV KHANNA	12	SRI CHAITANYA TECHNO SCHOOL JP NAGAR 8TH PHASE, BENGALURU, KA
85	KA00-0110-136780	ASHISH AHUJA	12	VYASA INTERNATIONAL SCHOOL VIDYARANYAPURA, BENGALURU, KA
86	KA27-0100-137101	GAYATHRI ANANT	12	NARAYANA SCHOOL VIDYARANYAPURA BANGALORE, KA
87	KA00-0100-136680	AKSHAJ PRASHANTH RAO	12	SRI KUMARAN CHILDREN'S HOME SURVEY NO. 44-50, BENGALURU, KA
88	KA00-0110-136695	ADITHYA SATHYANARAYANA UBARADKA	12	RV PU COLLEGE 3RD BLOCK, JAYANAGAR, BANGALORE, KA
89	KA00-1110-136296	ADITYA JHA	12	VYASA INTERNATIONAL SCHOOL VIDYARANYAPURA POST, BENGALURU, KA
90	KA27-0110-136948	KESHAV KOTHARI	12	DELHI PUBLIC SCHOOL KONANAKUNTE, BANGALORE, KA
91	KL00-1110-114077	KEVIN THOMAS JACOB	12	KURIAKOSE ELIAS HIGHER SEC SCHOOL MANNANAM P O KOTTAYAM, KL
92	KL28-0110-114330	NEIL GEORGE	12	ST. ANTONY'S PUBLIC SCHOOL ANAKKAL, KANJIRAPALLY, KOTTAYAM, KL
93	KL28-1100-142717	DION REJI	12	ST PETER'S SR SECONDARY SCHOOL KADAYIRUPPU, ERNAKULAM, KL
94	KL00-0101-143072	ADWYTH G NAIR	12	NAIPUNYA PUBLIC SCHOOL THRIKKAKKARA, KOCHI, KL
95	KL28-0110-142678	SRUTHI SUBRAMANIAN	12	SARASWATI VIDYANIKETAN ELAMAKKARA, KOCHI, KL
96	KL28-0110-142764	MATHEW M PHILIP	12	NAIPUNNYA PUBLIC SCHOOL THRIKKAKARA, KOCHI, KL
97	KL28-0100-142846	ARYAN SANDEEP NAMBOODIRI	12	NAIPUNNYA PUBLIC SCHOOL THRIKKAKARA, KOCHI, KL
98	MH08-0110-154819	TEJAS KIRAN WANDILE	12	JAIN INTERNATIONAL SCHOOL KATOL ROAD, NAGPUR, MH
99	MH08-1110-151554	AMOGH AJAY BHAGWAT	12	SURYADATTA PUBLIC SCHOOL S. NO. 342, SURYABHAVAN, PUNE, MH
100	MH00-1110-155866	ARNAV JAIN	12	NARAYANA E-TECHNO SCHOOL CTS 418, MAROL VILL, ANDHERI (E), MUMBAI, MH
101	MH07-0110-154509	ANUJ GAUTAM	12	NEW BOMBAY CITY SCHOOL SEC 9 , GHANSOLI , NAVI MUMBAI, THANE, MH
102	MH07-1110-152305	SWAYAM SAROJ PATEL	12	PODDAR BRIO INTERNATIONAL SCHOOL BADLAPUR (E), THANE, MH
103	MH08-1110-151575	RIJUL RUDRAX BAROT	12	CITY INTERNATIONAL SCHOOL FATIMA NAGAR, WANOWRIE, PUNE, MH
104	MH00-0110-156644	NIKUNJ RAJEEV VASAYANI	11	SEVASADAN SCHOOL SITABULDI, NAGPUR, MH
105	MH08-1110-154716	SOHAM SACHIN DAHANE	12	SEVASADAN HIGH SCHOOL AND JUNIOR COLLEGE SITABULDI,NAGPUR, MH
106	MH08-1111-151611	NEVISH ASHOK PATHE	12	ASM'S GEETAMATA ACS JR COLLEGE CHINCHWAD, PUNE, MH
107	MH08-2110-158992	YASH SUBHASH PALWE	11	M.P. INTERNATIONAL SCHOOL AND JUNIOR COLLEGE PUNE, MH
108	MH07-0100-152225	SURYA ANAND	12	HIRANANDANI FOUNDATION SCHOOL HIRANANDANI ESTATE, THANE, MH
109	MH07-2110-153703	MEDHANSH VERMA	11	PACE JUNIOR SCIENCE COLLEGE DADAR WEST, MUMBAI, MH
110	MH08-2111-154717	AKARSH RAJ SAHAY	10	ST PAUL SCHOOL HUDKESHWAR, NAGPUR, MH
111	MH00-0110-156465	ARIN PRASHANT WELING	12	SARDAR VALLABHBHAI PATEL JR COLLEGE OF SCIENCE BORIVALI, MUMBAI, MH
112	MH00-1110-155907	ARCHIT GIRISH MUNDADA	12	MATUSHRI KASHIBEN VRAJLAL VALIA INTERNATIONAL VIDYALAYA MUMBAI, MH
113	MH07-1110-153830	JAY HARESH MEHTA	12	PACE JUNIOR SCIENCE COLLEGE S.V. ROAD, ANDHERI (W), MUMBAI, MH
114	MH08-1110-151607	JAY PRAVIN YADAV	12	MTE SOCIETY'S JUNIOR COLLEGE F.P. NO. 23, PUNE, MH
115	MH08-1110-151942	VISHWAJEET PRASHANT JADHAV	12	WOODRIDGE HIGH SCHOOL ANANDVIHAR, AURANGABAD, MH

116	MH08-1110-154700	SUBHOJIT GHOSAL	12	ST. PAUL JUNIOR COLLEGE HUDKESHWAR, NAGPUR, MH
117	MH00-0110-156478	VED MAYUR DANAIT	12	PACE JUNIOR SCIENCE COLLEGE S.V. ROAD, ANDHERI (W), MUMBAI, MH
118	MH00-0110-156634	RAGHAV SHREEVARDHAN SAPRE	12	ST. PAUL JUNIOR COLLEGE SCIENCE & COMMERCE HUDKESHWAR, NAGPUR, MH
119	MH07-2111-153801	CEZAN VISPI DAMANIA	11	NARAYANA E-TECHNO SCHOOL CTS 418, MAROL VILL, ANDHERI, MUMBAI, MH
120	MH07-1110-153646	KESHAV MAHESHWARI	12	RYAN INTERNATIONAL SCHOOL KANDIVALI, MUMBAI, MH
121	MH08-1110-158985	RITISHA PRIYA	12	PRODIGY PUBLIC SCHOOL JSPM CAMPUS, WAGHOLI, PUNE, MH
122	MH00-0110-156024	VEDANT SAMEER TALEGAONKAR	12	CITY PRIDE JUNIOR COLLEGE HS2, SECTOR-27A, PUNE, MH
123	MH00-1110-158477	GARV KAUSHIK	12	PODDAR BRIO INTERNATIONAL SCHOOL BADLAPUR (E), THANE, MH
124	MH08-1110-151552	TANISH ANANT RAGHUTE	12	CITY INTERNATIONAL SCHOOL WANOWRIE, PUNE, MH
125	MP11-0110-126745	SAMYAK JAIN	12	MAHARISHI VIDYA MANDIR INDUSTRIAL AREA, RAU, INDORE, MP
126	MP00-0110-128030	HARDIK JAIN	12	INDORE PUBLIC SCHOOL SAIKRIPA COLONY, INDORE, MP
127	MP11-1110-126881	YASH JOSHI	12	ANNIE BESANT SCHOOL PRICANCO COLONY, INDORE, MP
128	MP00-1110-127682	ADARSH PRAJAPATI	12	JAWAHARLAL NEHRU SCHOOL HABIBGANJ, BHEL, BHOPAL, MP
129	MP00-0110-127988	VANSH VIKAS MAHESHWARI	12	NEW GREEN FIELD PUBLIC SCHOOL SECTOR 'B', INDORE, MP
130	MP00-1110-127709	ARYAN ARYA	12	BHARTIYAM VIDHYA NIKETAN CHIRVAYI NAKASHIVPURI LINK RD, GWALIOR, MP
131	MP11-0110-126263	ROHAN DUBE	12	ST. PAUL'S MEMORIAL H.S. SCHOOL GANDHI NAGAR, HOSHANGABAD, MP
132	MP11-1110-126841	ATHARVA VERMA	12	SANMATI HIGHER SEC. SCHOOL DOORDARSHAN KENDRA, INDORE, MP
133	MP11-1110-127225	BURHANUDDIN MERCHANT	12	LUV KUSH VIDHYA VIHAR BICHOLI SHREE MANGAL NAGAR, INDORE, MP
134	MP00-0110-127813	YASH KUMAR PATEL	12	GYAN JYOTI ACADEMY RATANPUR, BHOPAL, MP
135	OD00-0111-133543	OM ANIKET MAJHI	12	MOTHER'S PUBLIC SCHOOL UNIT - 1, BHUBANESWAR, KHORDA, OD
136	OD00-1111-133469	ATISH KUMAR SAHOO	12	SAI INTERNATIONAL SCHOOL PLOT-5A, CHANDRASEKHARPUR, KHORDA, OD
137	OD17-0110-133189	LIZA MISHRA	12	DOON INTERNATIONAL SCHOOL SIJUA,BHUBANESWAR, KHORDA, OD
138	OD00-0110-133548	DIPANSHU PANDA	12	SAI INTERNATIONAL SCHOOL PLOT-5A, CHANDRASEKHARPUR, KHORDA, OD
139	OD17-0100-133033	DHRUV KUMAR CHOUDHURY	11	ODM PUBLIC SCHOOL SISHU VIHAR, PATIA, KHORDA, OD
140	PB00-1110-107440	MANKIRAT SINGH	12	DELHI PUBLIC SCHOOL REETHKHERI, SIRHIND RD, PATIALA, PB
141	PB04-1110-107423	SACHISH SINGLA	12	APOLLO PUBLIC SCHOOL URBAN ESTATE, PHASE 1, PATIALA, PB
142	PB04-1110-107647	TARSHIT DEEPAK SEHGAL	12	KUNDAN VIDYA MANDIR SR SEC SCHOOL, NEW KUNDANPURI, LUDHIANA, PB
143	PB00-0110-107690	NIPUN NOHRIA	12	D.A.V. PUBLIC SCHOOL LAWRENCE ROAD, AMRITSAR, PB
144	PB00-1110-107594	SPARSH GOEL	12	HOLY HEART SENIOR SECONDARY PUBLIC SCHOOL SANGRUR, PB
145	PB04-1110-107511	KUSHAGAR GARG	12	SUMMER HILL CONVENT SENIOR SECONDARY SCHOOL BATHINDA, PB
146	RJ00-1110-131257	PARTH BHARDWAJ	12	CAMBRIDGE COURT HIGH SCHOOL SECTOR-8 MANSAROVAR, JAIPUR, RJ
147	RJ10-0110-130717	NAYAN GODARA	12	GYANODAYA PUBLIC SCHOOL DADIYA, SIKAR, RJ
148	RJ10-1110-129973	ABHISHEK KHANDELWAL	12	YOGIRAJ PUBLIC SCHOOL NAYA NOHRA, KOTA, RJ
149	RJ00-1110-131364	ZEEL GABANI	12	DISHA DELPHI PUBLIC SCHOOL SECTOR- A, R. K. PURAM, KOTA, RJ
150	RJ10-1110-129145	LOVESH MAHAR	12	MAHRISHI DAYANAND PUBLIC SCHOOL BHAMBORI, JAIPUR, RJ
151	RJ00-0110-131723	PRIYANSH DUTT SHARMA	12	MAA BHARTI VIVEKANAND NAGAR, A-474 SRINATHPURAM, KOTA, RJ
152	RJ10-1110-129044	ARIN DHARIWAL	12	CAMBRIDGE COURT HIGH SCHOOL SECTOR 8, MANSAROVAR, JAIPUR, RJ
153	RJ00-1110-131332	ANUSHK SINGHAL	12	LBS CONVENT SCHOOL RANPUR, MANDANA, KOTA, RJ
154	RJ00-1110-131346	MEGH PARESHBHAI CHAPADIA	12	MAHARISHI ARVIND PUBLIC SCHOOL RIICO INST. AREA, RANPUR, KOTA, RJ
155	RJ10-0100-130713	UTTAM PAHARIA	12	BHARTIYA PUBLIC SCHOOL SANWALI ROAD, SIKAR, RJ
156	RJ10-0110-128959	UDBHAV AGARWAL	12	CAMBRIDGE COURT HIGH SCHOOL SECTOR 8, MANSAROVAR, JAIPUR, RJ
157	RJ00-0110-131763	MALIREDDI SRI SAI SHANMUKH RAJ	12	DISHA DELPHI PUBLIC SCHOOL SECTOR-A, R. K. PURAM, KOTA, RJ
158	RJ00-1110-131342	DEVANSHA DHANKER	12	DISHA DELPHI PUBLIC SCHOOL SECTOR-A, R. K. PURAM, KOTA, RJ
159	RJ10-1110-129101	VATSAL JAIN	12	BLUE HEAVEN VIDYALAYA MANSAROVAR, JAIPUR, RJ
160	RJ10-1110-129347	HIMANSHU GANGWAL	12	BLUE HEAVEN VIDYALAYA MANSAROVAR, JAIPUR, RJ
161	SR29-1110-138108	RISHABH RAJ PRAKASH	12	MAHARISHI VIDYA MANDIR SR SEC SCHOOL CHETPET, CHENNAI, TN
162	TN00-0100-140922	ADITHYA CASICHETTY ADDEPALLI	11	THE C.P. RAMASWAMI AIYAR FOUNDATION SARSWATI, KENDRA, CHENNAI, TN
163	TN29-1110-138076	KISHORE KUMAR E	12	MAHARISHI INTERNATIONAL RESIDENTIAL SCHOOL KANCHIPURAM, TN
164	TN00-0100-141027	THARUN SELVAM	12	SUGUNA PIP SCHOOL NEHRU NAGAR, KALAPATTY RD, COIMBATORE, TN
165	TN00-1110-140776	SUMEDH CHATTERJEE	12	CHETTINAD VIDYASHRAM CHETTINAD HOUSE, RA PURAM, CHENNAI, TN
166	TN00-0110-140925	BALAJI R	12	PADMA SESHADRI BALA BHAVAN SR SEC SCHOOL 29, K.K. NAGAR, CHENNAI,TN
167	TN29-0110-139298	KAILASH GOPAL D	12	MAHARISHI VIDYA MANDIR SR SEC SCHOOL NO. 28, CHENNAI, TN
168	TN29-2110-138587	ARYA KRISHNAMURTHY	11	MAHARISHI VIDYA MANDIR SR SEC SCHOOL 28, CHETPET, CHENNAI, TN
169	TN29-1111-139261	LAKSHMAN KISHORE R	12	CHETTINAD VIDYASHRAM RAJA ANNAMALAIPURAM CHENNAI, TN
170	TN29-1110-138061	VARUN KAILASH MURALIDHARAN	12	MAHARISHI VIDYA MANDIR SR SEC SCHOOL 28, CHETPET, CHENNAI, TN
171	TN29-2110-138088	KEYAAN KARTIKEYA RAJESH	11	MAHARISHI VIDYA MANDIR SR SEC SCHOOL 28, CHETPET, CHENNAI, TN
172	TN29-2110-139837	VIJAY BALAJI NARASIMMA BHARATHI	11	SRI KRISH INTERNATIONAL SCHOOL 191 A, RAJIV GANDHI NAGAR, CHENNAI, TN
173	TN29-1110-138564	SWAMINATHAN KARTHIKEYAN	12	SRI KRISH INTERNATIONAL 1/191 A, RAJIV GANDHI NAGAR, CHENNAI, TN
174	TN29-1111-138850	NIVEDITHA V NAIR	12	SRI KRISH INTERNATIONAL 1/191 A, RAJIV GANDHI NAGAR, CHENNAI, TN

175	TN29-2100-138570	ANOOP MUTHAVARAPU	10	NARAYANA OLYMPIAD SCHOOL 7/2, GOPALAPURAM, CHENNAI, TN
176	TR30-1110-103820	SOHAM CHAKRABORTY	12	KENDRIYA VIDYALAYA KUNJABAN, AGARTALA,WEST TRIPURA, TR
177	TS00-0110-124978	JASHWANTH KAKARA	12	SRI CHAITANYA JUNIOR KALASALA JUBLEE HILLS, HYDERABAD, TS
178	TS26-0110-124636	SHASHI VARDHAN POTHULWAR	12	SRICHAITANYA JUNIOR COLLAGE MADAPUR, HYDERABAD, TS
179	TS26-1110-124230	MOHAMMED ANAS	12	NARAYANA JUNIOR COLLEGE NALLAKUNTA, HYDERABAD, TS
180	TS26-0110-124520	ABHINEET MAJETY	11	FIITJEE JUNIOR COLLEGE H NO 22-97, KUKATPALLY, HYDERABAD, TS
181	TS26-1110-124266	MUDASANI RUSHIKESH REDDY	12	NARAYANA JUNIOR COLLEGE NALLAKUNTA, HYDERABAD, TS
182	TS26-2110-123947	SINGARAJU VENKAT KOUNDINYA	11	SRI CHAITANYA JUNIOR KALASALA, K HILLS, HYDERABAD, TS
183	TS26-2110-124081	SRIYA AKEPATI	11	NARAYANA JR COLLEGE KHANAMET, HYDERABAD, TS
184	TS00-1110-124008	BHARATH SIMHA REDDY VASAMREDDY	12	NARAYANA JR COLLEGE PLOT NO. 1296-98, KHANAMET, HYDERABAD, TS
185	TS00-1110-124053	KISHAN CHALLA	12	NARAYANA JR COLLEGE PLOT NO. 1296-98, KHANAMET, HYDERABAD, TS
186	TS26-1110-124111	AMIT KUMAR PADHI	12	GAUTHAMI JUNIOR COLLEGE KUKATPALLY, HYDERABAD, TS
187	TS26-2110-134126	SATWIK VELAMAKANNI	11	NARAYANA JR COLLEGE KHANAMET, HYDERABAD, TS
188	TS00-1110-124020	SRIMAN REDDY KONDAM	12	SRI CHAITANYA JUNIOR KALASALA, 283/A, HYDERABAD, TS
189	TS26-0110-124892	VETCHA PANKAJ NATH	12	NARAYANA JUNIOR COLLAGE NALLAKUNTA HYDERABAD, TS
190	TS26-1110-124156	ADITYA BUSA	12	SRI CHAITANYA JUNIOR KALASALA, KAVURI HILLS, HYDERABAD, TS
191	UK00-0110-158345	HIMANG CHANDRA GARG	12	DELHI PUBLIC SCHOOL SECTOR 3, RANIPUR, BHEL, HARIDWAR, UK
192	UK00-0100-158344	HIMANSHU PATEL	11	JAWAHAR NAVODAYA VIDYALAYA ROSHNABAD HARIDWAR, UK
193	UK03-1110-104438	HIMANI SHARMA	12	GAUTAM INTERNATIONAL SR SEC. SCHOOL VASANT VIHAR, DEHRADUN, UK
194	UP30-1110-147070	ADITYA PANDA	12	KV NO 2 AFS HINDAN, GHAZIABAD, UP
195	UP00-1110-131345	DAKSH SINGH DESHLAN	12	B.B.S. SMRITI VIDYAPEETH JALAUN ROAD, AURAIYA, UP
196	UP01-0110-147314	NAMAN GUPTA	12	AMITY INTERNATIONAL SCHOOL SEC-1, VASUNDHARA, GHAZIABAD, UP
197	UP01-0110-148604	CHANDRASHEKHAR DHARMARAJAN	12	AMITY INTERNATION SCHOOL SEC-44, NOIDA, GAUTAM BUDDHA NAGAR, UP
198	UP30-2100-147810	UTKARSH GUPTA	11	KV PUNJAB LINES MEERUT CANTT, MEERUT, UP
199	UP01-1110-148255	MANAN GARG	12	DELHI PUBLIC SCHOOL SEC-30, NOIDA, GAUTAM BUDDHA NAGAR, UP
200	UP01-1110-148443	ARPIT SODHANI	12	KOTHARI INTERNATIONAL SCHOOL SEC 50, NOIDA, GAUTAMBUDDHA NAGAR, UP
201	UP01-1110-147166	AKSHAT JHA	12	AK CHILDREN ACADEMY MORTI ROAD, GHAZIABAD, UP
202	UP00-0101-150624	VISHNU SINHA	10	MILTON PUBLIC SCHOOL AVADHPURI BODLA BICHPURI RD, AGRA, UP
203	UP00-0110-150758	AAKASH GUPTA	11	GYANKALASH INTERNATIONAL SCHOOL SAHARANPUR, UP
204	UP02-0100-145900	ARYAN VERMA	12	CITY MONTESSORI SCHOOL GOMTI NAGAR 1, LUCKNOW, UP
205	UP02-1110-145471	DINU GOYAL	12	VATSALYA PUBLIC SCHOOL SAKARWA RD, GOVERDHAN, MATHURA, UP
206	UP01-1110-147795	ADITYA RATHI	12	DELHI PUBLIC SCHOOL BAGHPAT ROAD, MEERUT, UP
207	UP01-0100-147361	ABHAAS AGGARWAL	11	FR AGNEL SCHOOL PLOT 2-3, SEC 62, NOIDA, UP
208	UP01-0110-147337	ADITYA GUPTA	12	KOTHARI INTERNATIONAL SCHOOL B-279, SEC 50, GAUTAM BUDDHA NAGAR, UP
209	UP02-1110-145578	DEVANSH BANSAL	12	CITY MONTESSORI SCHOOL SECTOR-D, LDA COLONY, LUCKNOW, UP
210	UP02-0110-106432	ANIRUDH GUPTA	11	BHAKTIVEDANTA GURUKUL AND INTERNATIONAL SCHOOL MATHURA, UP
211	UP02-0110-145726	SWAPNIL VISHWADEEP SINGH	12	CITY MONTESSORI SCHOOL VISHAL KHAND GOMTI NAGAR, LUCKNOW, UP
212	UP02-0110-145564	ADITYA JAISWAL	11	CITY MONTESSORI SCHOOL GOMTI NAGAR -1 VISHAL KHAND, LUCKNOW, UP
213	UP02-1100-145971	SAHARSH SAXENA	12	CITY MONTESSORI SCHOOL VISHAL KHAND GOMTI NAGAR, LUCKNOW, UP
214	UP01-2110-147210	PRATHAM GUPTA	11	SETH ANANDRAM JAIPURIA SCHOOL SEC -14-C, VASUNDHARA, GHAZIABAD, UP
215	UP02-1110-146226	KUNAL SHIKHAR	12	AMU CITY SCHOOL MASOODABAD, GT RD, ALIGARH, UP
216	UP02-1110-145563	MRIDUL RATHI	12	SURYA PUBLIC SCHOOL ARUNGANJ, LUCKNOW, UP
217	UP00-0110-150248	ROHAN CHATURVEDI	12	CMS RAJENDRA NAGAR, LUCKNOW, UP
218	UP31-2110-147012	DHRUV GAUD	10	JNV KALCHINA GHAZIABAD, UP
219	WB00-1110-120651	AYAN ADHIKARI	12	CALCUTTA BOYS' SCHOOL 72 S N BANERJEE RD, KOLKATA, WB
220	WB00-0110-121240	SAMBUDDHA CHAKRABARTI	12	DON BOSCO SCHOOL 23, PARK CIRCUS, BENIAPUKUR, KOLKATA, WB
221	WB00-1110-120600	SWAPRABHA DEY	12	BETHANY MISSION SCHOOL RAIGANJ, NORTH DINAJPUR, WB
222	WB16-1110-129710	HIMANSHU SHEKHAR	12	CENTRAL MODEL SCHOOL 23, BARRACKPORE, NORTH 24 PARGANAS, WB
223	WB16-1110-120540	ARYA CHOUDHURI	12	SOUTH POINT HIGH SCHOOL 82/7A BALLYGUNGE PLACE, KOLKATA, WB
224	WB00-1110-120494	SAMADRITA MUKHERJEE	12	DON BOSCO 23 DARGA RD, PARK CIRCUS, KOLKATA, WB
225	WB16-0100-121185	ARUNANGSHU KARMAKAR	11	SALT LAKE SCHOOL CA-221, SEC-I, SALT LAKE CITY, KOLKATA, WB
226	WB16-0110-121124	AGNIDHRA DE	12	SOUTH POINT HIGH SCHOOL 82/7A BALLYGUNGE PLACE, KOLKATA, WB
227	WB00-0110-120868	ARIJIT KUMAR DAS	12	BEACHWOOD SCHOOL SATYAJIT RAY SARANI, DURGAPUR, WB
228	WB16-1110-120708	SOUMYAPRABHA DEY	12	KOLAGHAT THERMAL POWER PLANT HIGH SCHOOL KTPPTOWNSHIP, E MIDNAPORE, WB
229	WB16-0110-121577	PARTHIV SEN	12	RAMAKRISHNA MISSION VIDYALAYA NARENDRAPUR, SOUTH 24 PARGANAS, WB
230	WB16-1110-120667	URJIT PAUL CHOWDHURY	12	SOUTH POINT HIGH SCHOOL 82/7A BALLYGUNGE PLACE, KOLKATA, WB

Prof B P Tyagi
Chief Coordinator (Examination)

NATIONAL GRADUATE PHYASICS EXAMINATION - 2022

National Toppers

Sr. No.	Centre No.	Roll No.	Name of Student	Father	Gen	Class	Name of College
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3	**G-1109**	**22404**	**ASHUTOSH JOSHI**	**SJ**	**M**	**BSc II**	**MIRANDA HOUSE DU DELHI**
4	**G-1109**	**22443**	**NEHA YADAV**	**MD**	**F**	**BSc III**	**MIRANDA HOUSE DU DELHI**
5	**G-1109**	**22436**	**PRITWISH AGARWAL**	**AHA**	**M**	**BSc III**	**MIRANDA HOUSE DU DELHI**
6	**G-1109**	**22455**	**KARTIK GUPTA**	**AG**	**M**	**BSc III**	**MIRANDA HOUSE DU DELHI**
7	G-1109	22402	SATYAM TIWARI	ST	M	BSc III	MIRANDA HOUSE DU DELHI
8	G-1109	22472	KHUSHI LALIT	NL	F	BSc III	MIRANDA HOUSE DU DELHI
9	G-1109	22471	SUMIT KUMAR NAYAK	SN	M	BSc III	MIRANDA HOUSE DU DELHI
10	G-1109	22469	AKSHITA SHARMA	RS	F	BSc III	MIRANDA HOUSE DU DELHI
11	G-1109	22473	YUGLESH KUMARI	R	F	BSc III	MIRANDA HOUSE DU DELHI
12	**G-1606**	**22409**	**MANPREET KAUR**	**AS**	**F**	**BSc III**	**P.G. GOVT COLLEGE FOR GIRLS, SEC-11, CHANDIGARH**
13	G-1712	22402	AMIT SHARMA	JRS	M	BSc III	Govt. PG COLLEGE SOLAN (HP)
14	**G-2188**	**22426**	**RATUL THAKUR**	**DK**	**M**	**B Tech III**	**DEPARTMENT OF PHYSICS I.I.T. ROORKEE**
15	G-2188	22403	MALLADI VSKCS SISIR	MV	M	B Tech II	DEPARTMENT OF PHYSICS I.I.T. ROORKEE
16	G-2188	22425	DAKSHANSH CHAWDA	VC	M	B Tech III	DEPARTMENT OF PHYSICS I.I.T. ROORKEE
17	G-2200	22408	ATAL AGRAWAL	AK	M	Int.M.Sc.II	ST JOHN'S COLLEGE AGRA (UP)
18	G-4102	22401	SHUBHAM KISHOR GHADIGAONKAR	KGG	M	BSc III	RAMNARAIN RUIA COLLEGE MATUNGA, MUMBAI
19	G-4102	22433	AMEY BAGARE	AB	M	BSc II	RAMNARAIN RUIA COLLEGE MATUNGA, MUMBAI
20	**G-4114**	**22405**	**PARTH GIRISH HEDAOO**	**GS**	**M**	**BSc III**	**GOVT INSTITUTE OF SCIENCE NAGPUR**
21	**G-4213**	**22411**	**PRANAV MAHESHWARI**	**D**	**M**	**Int.MSc I**	**INDIAN INSTITUTE OF SCIENCE EDUCATION & RESEARCH PUNE**
22	G-4213	22436	SWAYAM BASU	SA	M	BSc II	INDIAN INSTITUTE OF SCIENCE EDUCATION & RESEARCH PUNE
23	G-4213	22427	SARTHAK TRIPATHY	ST	M	Int.MSc I	INDIAN INSTITUTE OF SCIENCE EDUCATION & RESEARCH PUNE
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26	G-5628	22413	TEJAS BANSOD	TB	M	BSc II	MAHARANI LAKSHMI AMMANI COLLEGE FOR WOMEN AUTO BANGLORE
27	G-6190	22017	SANA		F	BSc III	J. S. AHMED SAYEED COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI
28	**G-7103**	**22402**	**SANTANU SAMAI**	**NS**	**M**	**BSc III**	**MIDNAPORE COLLEGE MIDNAPORE (WB)**
29	**G-7103**	**22428**	**AVIJIT PAUL**	**RP**	**M**	**BSc III**	**MIDNAPORE COLLEGE MIDNAPORE (WB)**
30	**G-7103**	**22025**	**PRIYANKA SINHA**	**PS**	**F**	**BSc III**	**MIDNAPORE COLLEGE MIDNAPORE (WB)**
31	**G-7103**	**22019**	**SUBRATA SIL**	**PNS**	**M**	**BSc II**	**MIDNAPORE COLLEGE MIDNAPORE (WB)**
32	**G-7103**	**22403**	**SAYAN BERA**	**NB**	**M**	**BSc III**	**MIDNAPORE COLLEGE MIDNAPORE (WB)**
33	G-7103	22006	SARTHAK BANGAL	GB	M	BSc III	MIDNAPORE COLLEGE MIDNAPORE (WB)
34	G-7103	22010	MEGHNA ROY	MR	F	BSc III	MIDNAPORE COLLEGE MIDNAPORE (WB)
35	G-7103	22028	SUMAN BERA	SB	M	BSc III	MIDNAPORE COLLEGE MIDNAPORE (WB)
36	**G-7108**	**22401**	**SUBHAJIT MANNA**	**SM**	**M**	**BSc III**	**PRABHAT KUMAR COLLEGE CONTAI (WB)**
37	**G-7110**	**22405**	**AUSMITA BAIRI**	**PKB**	**F**	**BSc III**	**LADY BRABOURNE COLLEGE KOLKATA**
38	G-7110	22406	ARANI CHAKRABORTY	AC	F	BSc III	LADY BRABOURNE COLLEGE KOLKATA
39	**G-7113**	**22401**	**SOUVIK MONDAL**	**SM**	**M**	**BSc III**	**R. K. MISSION VIDYAMNDIRA BELUR MATH HOWRAH (WB)**
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41	**G-7114**	**22401**	**JOYSANKAR MAJUMDAR**	**MKM**	**M**	**BSc III**	**MALDA COLLEGE MALDA**
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43	G-7114	22007	SUBHAJEET BARMAN	NB	M	BSc II	MALDA COLLEGE MALDA
44	G-7114	22006	RAJDEEP SARKAR	DS	M	BSc II	MALDA COLLEGE MALDA
45	G-7114	22004	TABASSUM ARA	SKK	F	BSc II	MALDA COLLEGE MALDA
46	G-7120	22407	ANKAN ROY	AK	M	BSc III	BURDWAN RAJ COLLEGE BURDWAN (WB)
47	G-7120	22405	SAYAN DHANI	SD	M	BSc III	BURDWAN RAJ COLLEGE BURDWAN (WB)
48	**G-7124**	**22409**	**ANIMESH GHOSH**	**MG**	**M**	**BSc II**	**R K M V CENTENARY COLLEGE RAHARA(WB)**
49	**G-7124**	**22410**	**DIBAKAR PAL**	**PKP**	**M**	**BSc II**	**R K M V CENTENARY COLLEGE RAHARA(WB)**
50	G-7124	22442	SAYAN JANA	KJ	M	BSc III	R K M V CENTENARY COLLEGE RAHARA(WB)
51	G-7124	22408	SANDIPAN GHOSH	TG	M	BSc III	R K M V CENTENARY COLLEGE RAHARA(WB)
52	G-7124	22420	SANDIPAN RAKSHIT.	RR	M	BSc II	R K M V CENTENARY COLLEGE RAHARA(WB)
53	**G-7129**	**22450**	**SIDHARTHA CHATTERJEE**	**SC**	**M**	**BSc III**	**BANGABASI COLLEGE KOLKATA (WB)**
54	G-7129	22440	SOHAM BHATTACHARYYA	SB	M	Int. MSc I	BANGABASI COLLEGE KOLKATA (WB)
55	G-7129	22430	ASHESH KUMAR GUPTA	KK	M	BSc III	BANGABASI COLLEGE KOLKATA (WB)
56	G-7129	22409	MONOMIT GHOSH	DG	M	BSc III	BANGABASI COLLEGE KOLKATA (WB)
57	G-7129	22449	DEYASINI MITRA	JM	F	BSc III	BANGABASI COLLEGE KOLKATA (WB)
58	G-7501	22404	JAGAN SAHOO	RCS	M	BSc II	B.J.B AUTONOMOUS COLLEGE BHUBENSWAR
59	G-7502	22415	PULAK MOHAPATRA	AKM	M	BSc III	RAVENSHAW UNIVERSITY CUTTACK ODISHA
60	**G-7522**	**22019**	**SATYA RANJAN PADHI**	**S**	**M**	**BSc III**	**FAKIR MOHAN (AUTONOMOUS) COLLEGE BALASORE, ODISHA**
61	G-7542	22001	ABINASH DEHURY	SKD	M	B.Sc. III	NAYAGARH (AUTONOMOUS) COLLEGE NAYAGARH
62	G-7543	22050	VANSHAJ VIDYAN	PK	M	Int. MSc I	NISER BHUBENSWAR
63	G-7543	22001	JABED UMAR	AH	M	Int. MSc I	NISER BHUBENSWAR
64	G-7543	22006	MONU KUMAR CHOUBEY	SKC	M	Int. MSc I	NISER BHUBENSWAR
65	G-7543	22072	DEEPENDRA SINGH	JKS	M	Int. MSc I	NISER BHUBENSWAR
66	G-7821	22006	MANIKA KALITA		F	BSc III	GUWAHATI COLLEGE GUWAHATI

The BOLD names are the top 25 students who are elligible for Part C examination (An examination in experimental skill) and to apply for direct admission for integrated Ph D (only BSc III students) to S N Bose National Centre Kolkata. For details see: http://bose.res.in/admission.html or write mail to nibedita.konar@bose.res.in OR admission@bose.res.in). The Part C Examination for final selection for NGPE - 2022 Gold Medal will be held in 1st week of July 2022 at IIT Allahabad, Prayagraj.

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The Story Of Cosmology Through Postal Stamps 21

CELESTAL NAVIGATION

NAUTICAL ASTRONOMY (15th century)

Discovery of southern sky

During this age of exploration, sailors, who were now sailing with new astronomical knowledge and improved measuring tools to navigate, had opportunity to discover new regions of starry sky in other part of the earth which was never explored before.

Souvenir Sheet with three stamps-depict Amerigo Vespucci (1452-1512).an Italian merchant, explorer and navigator. And first to recognize that new world is New Continent. He made ***improvement to celestial navigation*** technique and predicted Earth's circumference accurately within 50 miles. He was the first European to see constellations of Southern Hemisphere like Southern Cross

Strip of se-tenant stamps-depicting main celestial bodies of Southern Sky in Southern Hemisphere

Southern Cross | Pleiades Cluster | Trifid Nebula | Southern Pinwheel Galaxy | Large Magellanic Cloud

Columbus using Sextant

The crew of Magallanes saw two large Nebula Clusters- named Magellanic Cloud

Transit of Venus- as observed by Captain Cook while sailing southern Hemisphere

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