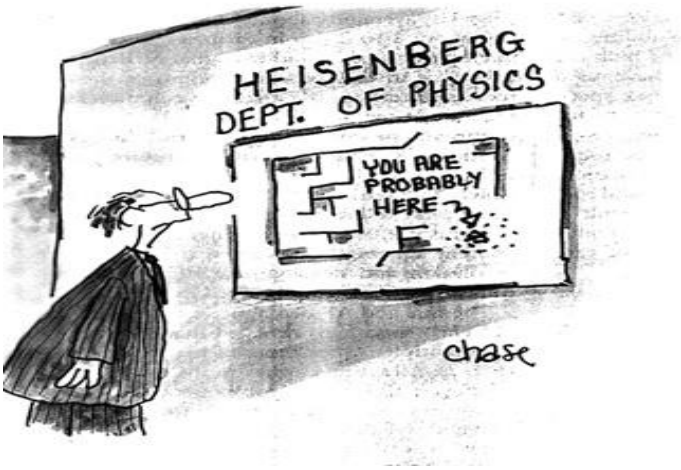
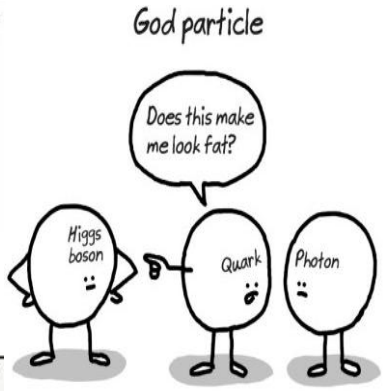
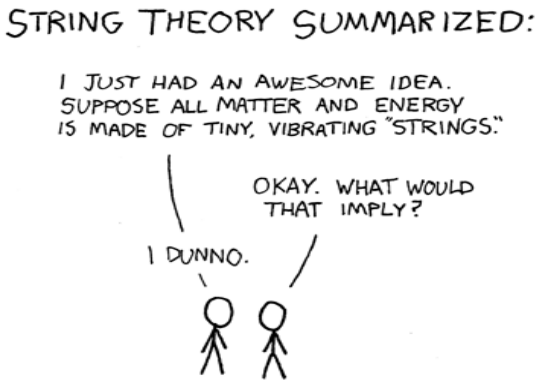
PHYSIK 2017







TRUTH CHARITY

STELLA MARIS COLLEGE

(AUTONOMOUS), CHENNAI - INDIA

Department of Physics

FROM THE EDITORS' DESK

Dear Readers,

We are immensely glad in bringing to you the twelfth edition of our annual department magazine, **PHYSIK 2017**.

PHYSIK 2017 focuses on the physics of everyday stuff, the physics of life and the physics of the universe. Physics requires you to grab those thinking caps and tap your curiosity and we are certain that PHYSIK 2017 will fulfill this purpose. This edition is packed with articles penned down by the students and includes other soft features such as fact bubbles, crosswords, art and poetry. The edition also features the activities of the department under the Star College Scheme, DBT. The urge to learn more in what one is passionate about, is an essential ingredient for the development of knowledge. A new section, *seeking beyond Textbooks* covers the internship experiences of several students who have completed internships in different branches of Physics.

We are truly grateful to our Principal, Dr. Sr. Jasintha Quadras fmm and the Secretary, Sr. Susan Matheikal fmm for their strong support. We thank our Head of the Department, Dr. Belina Xavier and the faculty of the department of Physics, for their continuous encouragement.

The editorial board extends its special thanks to the faculty advisor, Sr. Francisco Nirmala fmm whose unfading guidance and help has made the magazine attain great shape. A note of thanks to all the students who have contributed to this edition.

We sincerely hope that you find this issue interesting, informative and intellectually stimulating.

Happy reading!

STUDENT EDITORS-

Anaam Fathima Qureshi, Christma Eunice Sherina P, Dorothy Selvam M, Fathima N, Infant Stany M, Jenova I, Jinitha C G, LampthaVyani J, Nishitha P, Sharon Maria F S and Shifana Lourdes K.

STELLA MARIS COLLEGE
(AUTONOMOUS)
17, CATHEDRAL ROAD
CHENNAI - 600 086.

MESSAGE

Stella Maris College has always encouraged creative and innovative programmes and activities outside the curriculum. The magazine of the Department of Physics titled 'Physik' is one such endeavour. This year's issue focuses on three diverse areas in science, each representing one of the three years of undergraduate study in the discipline of physics.

A departmental magazine is the outcome of the diverse learning avenues that students have engaged in, and is a clear window to the different stages of their growth.

I congratulate the faculty and students of the Department of Physics for their hard work and dedication in bringing out this edition 'Physik'.

I wish them all success.

J Quadras fmm

Dr. Sr. Jasintha Quadras, fmm
Principal

January 11, 2017

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STELLA MARIS COLLEGE
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Stella Maris College has always encouraged creative programmes and has endeavoured to keep pace with advances in technological field. This year's magazine of the Department of Physics focuses on Physics of everyday life and the Physics of the Universe.

Physics is the powerful lens through which one can view everyday world. Everyday phenomena offer many interesting challenges and some lead to deep, interesting problems these then remind us the fact that Physics is a significant part of our everyday life.

From flocking birds to swarming molecules, physicists are seeking to understand 'active matter' which enable them to find answers for many thought provoking questions.

If Physics of everyday could bridge the gap between ignorance and knowledge, Physics of life remains as the interface of Physics and Biology. The Physics of Life explores the roots of the big question by examining the deepest urges and properties of living things, both animate and inanimate: how to live longer, with food, warmth, power, movement and free access to other people and surroundings.

Similarly to learn about the Physics of the Universe is enthusing and amusing. Questions about what the Universe is, how it began, how it works and where it is going have exercised the minds of some of the renowned Physicists of the 20th Century. Huge strides have been made in pinning down the science underlying the workings of the Universe. Thanks to the modern technology and sophisticated gadgets which continue to enable us to unveil the beauty of the Universe

In fact, it does sometimes seem that the more we learn and the more questions we answer, the more there is to learn and the more new questions arise. Let our minds bring forth numerous questions to be answered in the world of Physics.

My hearty congratulations to the faculty & students of the Department of Physics in bringing out this publication. I wish the magazine all success.

Sr. Susan Matheikal, fmm
Secretary

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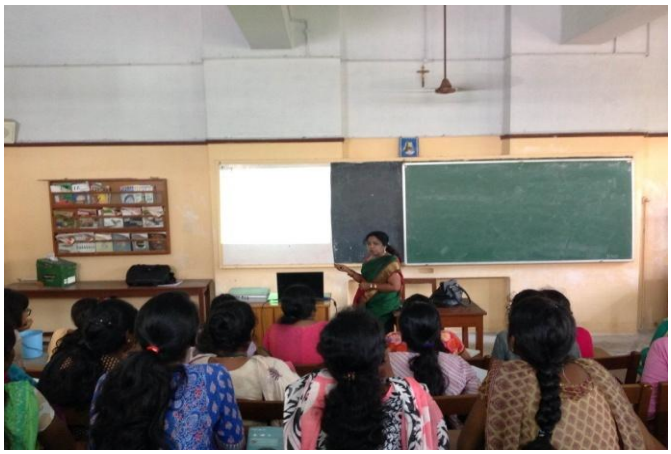
STAR COLLEGE FUNDED EVENTS

A lecture was given by Dr. Yamini Sudha Lakshmi, Assistant Professor, Medical Biochemistry from the University of Madras on the topic "Application of Nanomaterials in Nanomedicine" on the 9th of September. The final year students were enlightened with the technique of how nanotechnology is used in the treatment of cancer. Furthermore the lecture also concentrated on various natural therapies.



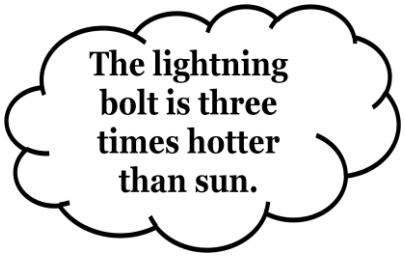
On the 23rd of September and the 9th of October a lecture on "Embedded systems and Microcontrollers was given by Dr.G.Kumar Sathian, Ph.D Former Academic Dean and Head, Department of Physics , Madras Christian College and Managing director ,FLORANIX, Chennai . It was attended by the final year students and was aimed at exposing them to the practical application of Microprocessors and Microcontrollers.

The students from the general elective course of Astrophysics went on a field trip in the guidance of the course teacher Sr.Francisco Nirmala to Periyar Science and technology center and B.M.Birla Planetarium on the 6th of July. Students from different disciplines gained insights on various physics principles and on the concepts of Astrophysics.

WHEN THE TWAIN MEET

The ancient Indians believed that diamonds were formed when lightning struck certain types of rocks. As strange as this might sound, after having read this article, surely you too would agree with them. Wonder what happens when the twain meet? Read on.

They say it rains when the heavenly beings take a bath in paradise. Rainfall is a beautiful phenomenon that delights the heart and refreshes the soul. Well, that's not what happened when clothes were stained pink after the Kerala blood rains or in the case of Singapore's 1861 *Clarias* rains. Rains can sometimes be odd too and now it is theoretically possible for the Jovian planets to drizzle diamonds! (Natural diamonds are most commonly formed at the depths of the Earth's mantle where the temperature and pressure conditions are incredibly high and the process of diamond formation requires at least 1,000,000,000 years). These expensive rains are way too common in the gas giants and the potential for the occurrence of this phenomenon is huge. A new study estimates that there are more than 1,000 tons of diamonds being created every year in Saturn alone.



Dr. Kevin Baines of University of Wisconsin-Madison and NASA's jet propulsion laboratory alongside Mona Belinsky of California Speciality Engineering claimed the possibility of diamond rains at the annual meeting of the division for planetary sciences of the American Astronomical Society held in Denver, Colorado. "*It all begins in the upper atmosphere, in the thunderstorm alleys when lightning turns methane into soot*", says Dr. Baines who also remarks that the uncut diamonds are big enough to be put on rings. According to Baines and his co-worker, lightning zaps the methane molecules present in the upper atmospheres of Saturn and Jupiter, liberating carbon atoms which stick onto each other. As this carbon soot falls towards the cores, they get compressed due to the high pressures and hot temperatures to form sheets of graphite. As the temperature increases to 2000 degrees Celsius, the graphite toughens to form diamonds. As they tumble down, at the point where the temperature reaches 8000 degrees Celsius, the diamond stones melt into dazzling diamond drops.

Reginald B Little proposed another theory which is very similar to Dr.Baines' theory but is more acceptable. A strong magnetic field can organize diamonds even at low temperature and low pressure. The earliest synthesis of artificial diamond with ferrous sulphide as catalyst used electric currents as heat sources to obtain the high pressure conditions and no regards were given to its magnetic effects. Baines and Delitsky report that diamonds are formed as the carbon soot falls downward but little asserts that the diamonds do not form due to the carbon sinking into the core but by subsequent lightning strikes on the liberated carbon atoms. Little suggests that

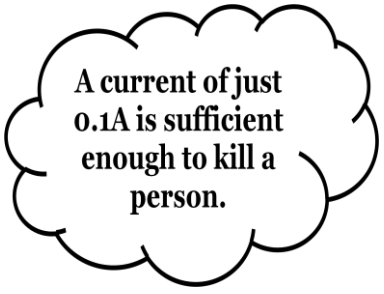
elemental carbon is converted to diamond particles directly if lightning meets carbon atoms frequently. *When the twain meet, diamonds start hailing*. As the diamond hail falls, it gets chemically etched by hydrogen, reforming methane molecules and this creates a cycle. Thus diamond hail is formed at higher elevations and methane is reformed at lower elevations. This diamond-hydrogen-methane cycle of the Jovian planets is analogous to the water-steam-ice cycle of the Earth.

Little's theory is very sensible since it explains the prevailing presence of methane in the atmospheres of Saturn and Jupiter. If Baines and Delitsky were right, then Saturn and Jupiter should be completely depleted of methane by now because their theory states no cyclic process rather an irreversible one. In 2009, Little experimentally observed Nano diamonds, form from terrestrial lightning bolts upon solid carbon. He stated that the strong magnetic fields required to organize diamonds are provided by the frequent lightning strikes. Little discovered that a high magnetic field of over 20 Tesla produced by an extremely strong DC magnet could allow catalytic nucleation and growth of diamonds, realizing that *high voltages and currents of the lightning and not high temperatures* are the key conditions for a downpour of diamonds. He experimentally proved that carbonaceous rocks could actually have the power to transform into sumptuous diamonds if struck by lightning over and over again. Now you see, the ancient Indians were faultless about what happens when the twain meet.

SHIFANA LOURDES
14/UPHA/001

PLASMA RIVERS

Scientists from the joint European Space Agency (ESA) and the Solar and Heliospheric Observatory (SOHO) have discovered *jet streams* or *hot rivers*, electrically charged gas called *plasma* flowing beneath the surface of the Sun. They also found features similar to trade winds that transport gas beneath the Sun's fiery surface.



These new findings will help them understand the famous sun spot cycle and associated increase in solar activity that can affect the earth with power and communication disruptions.

The Earth's magnetic field or magnetosphere stretches from the planet's core into space where it meets the solar wind, a stream of particles emitted by the Sun. For most part, the magnetosphere acts as shield to protect Earth from high energy solar activity. But when their fields come into contact with Sun's magnetic field, a process called *magnetic reconnection* occurs, powerful electrical currents from Sun can stream into Earth's atmosphere, wiping up geomagnetic storms and space weather phenomena that can affect high altitude aircrafts as well as astronauts in the international space stations. This process

reinforces Earth's shielding effect keeping incoming solar energy at bay.

By combining observations from the ground and in space, the team observed a plume of low energy plasma particles that essentially hitches aside along magnetic field lines – streaming from the Earth's lower atmosphere till tons of thousands of kilometers above the surface where the planet's magnetic field connects with that of Sun. In this region which scientists call the *merging point,* the presence of cold dense plasma shows magnetic reconnection, blunting Sun's effect on Earth.

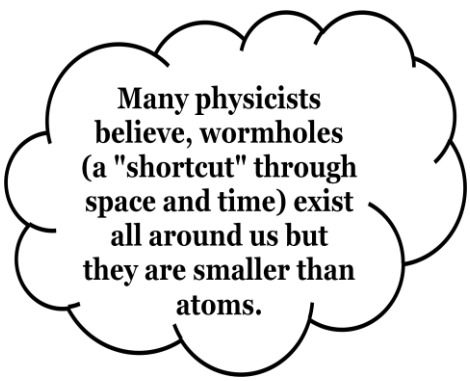
The Earth's magnetic field protects life on the surface from the full impact of these solar outbursts. Reconnection strips away some of our magnetic shield and lets energy leak in, giving us large storms. These plasmas get pulled into space and slow down the reconnection process, so that the impact of Sun on Earth is less violent.

P.SIVAPRIYA
14/UPHA/022

WHY WORMHOLES MIGHT NOT EXIST

For years together, there has always been a debate on the existence of worm holes. A worm hole or *Einstein-Rosen bridge* is a fabric of space-time that acts as a short cut in space. That is, it is capable of wrapping up two different portions in space, with time. This space and time relation comes from Einstein's theory of relativity. Wormholes work by the concept that when an object travelling in the speed of light enters through one end, it emerges out at a far different portion of universe at different times in the other end. General relativity paved the way for the existence of worm holes or bridges in space. General relativity tells us that gravity can curve space and time together. Yet, there are many factors that pose the question that these hypothetical structures may not exist. Now, why wormholes might not exist- there are many factors, let's take a look at them one by one.

First of all, the existence of a wormhole is a theoretical concept. There is no proven data for its existence. Some people do think that a wormhole is nothing but a combination of white hole and black hole. Black hole is again a celestial body that sucks all that comes into its horizon and a white hole is just its opposite, where it ejects out all that is within it. Here too, the existence of white holes is again a theoretical concept. Therefore, a wormhole might have a black hole as its entrance and a white hole as its exit port.



And another theory is that wormholes do exist by negative energy. But there is nothing found to possess

negative energy. Even dark energy possesses positive energy with negative pressure.

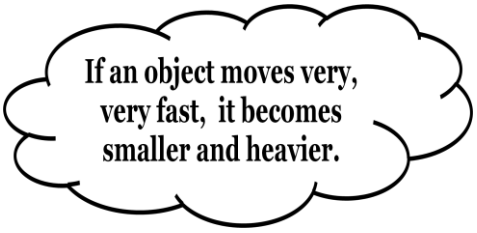
Consider that the theory of wormhole worked and it exists. Now to enter into wormhole, one must achieve speed greater than light. This is not practically possible unless and until it is done under certain specifications.

Theoretically, wormholes exist only at a very small range. This is not stable as it can vaporize at any time and therefore energy must be supplied. Energy requirement is tremendous in this case. And this is not practically possible. Macroscopic existence of wormhole requires *exotic matter*, but we know that by E=mc^2 all matter that exists has positive energy.

Therefore wormholes might exist in microscopic world which is again unstable as it can vaporize at any time. Yet scientists have created a magnetic wormhole recently which works in the similar concept but acts as a bridge between two magnets and this wormhole can actually transfer magnetic field. Scientists were successful in creating such a field and also in making them invisible. With lots of simulation and other technical stuff, one can understand what a wormhole might be. But its mere existence *may be possible, may not be possible* which lies in the hands of the current generation.

S.SWETHA
14/UPHA/028

WHAT WOULD HAPPEN IF WE TRAVEL AT THE SPEED OF LIGHT?



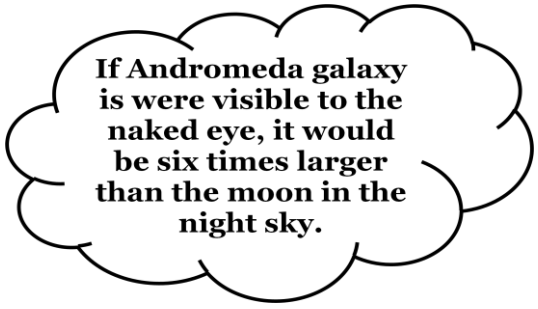
Light is something that always fascinates physicists and that's why they work with it a lot. One of the interesting works with light was the discovery of its speed. The speed of light is **3 * 10^8** m/s. The truth is nothing can travel faster than light. Travelling at the speed of light is also impossible because matter with mass can never reach this speed except LIGHT itself because according to Quantum mechanics light has particle and wave nature. For a body to travel with the speed of light it needs **infinite energy** but getting this infinite energy is impossible, and so travelling at the speed of light is also assumed to be **not possible**.

Imagine a girl on earth observing the time for the space craft to move from planet A to planet B, for her it will take many years. For the person inside the space craft the trip takes only few minutes because the space between two planets has shrunk to a very short distance since he is travelling near the speed of light. According to **Einstein's theory of relativity** both point of view is valid. For light there is no time taken to travel from planet A to B. From light's point of

view, the journey took no time because the entire universe has shrunk to absolute zero length and the two planets have therefore always been at the same location i.e., the distance between the two planets is exactly zero and the time between the start and the end of the journey is also exactly zero. According to light, there is no journey because every point along its path is located at exactly the same position in space and they all pass by at exactly the same moment in time and according to relativity theory light's point of view is also equally valid to our own.

JERLINE MARY. A
14/UPHA/009

SOUND IN SPACE



If you ask a question," Does sound exist in space"? Most of the people answer, sound waves need air medium to vibrate the molecules for the sound to travel, but space is vacuum it has no medium so sound cannot exist in the space.

But NASA recorded sound in space using special equipments. Though space has no medium, sound waves still travel in the form of electromagnetic vibrations. To record these vibrations, NASA designed equipments called Voyager, INJUN 1, ISEE 1 and HAWKEYE that could transfer these electromagnetic vibrations into sound which can be easily recorded.

These equipments recorded the sounds from Solar wind, Saturn and its rings, Neptune, Jupiter, and Rings of Uranus. Voyager 1 also recorded sound in the Heliosphere (Heliosphere is a vast magnetic bubble that surrounds the Sun and the planets, the solar winds and entire solar magnetic field). The Sun's magnetic field is inflated to enormous proportions by the Solar winds.

When Voyager 1 was kept inside the heliosphere, the tones were observed to be low around 300Hz (typical of plasma waves coursing through the rarified Solar wind). Outside the heliosphere the frequency jumped to a higher pitch between 2 to 3 KHz.

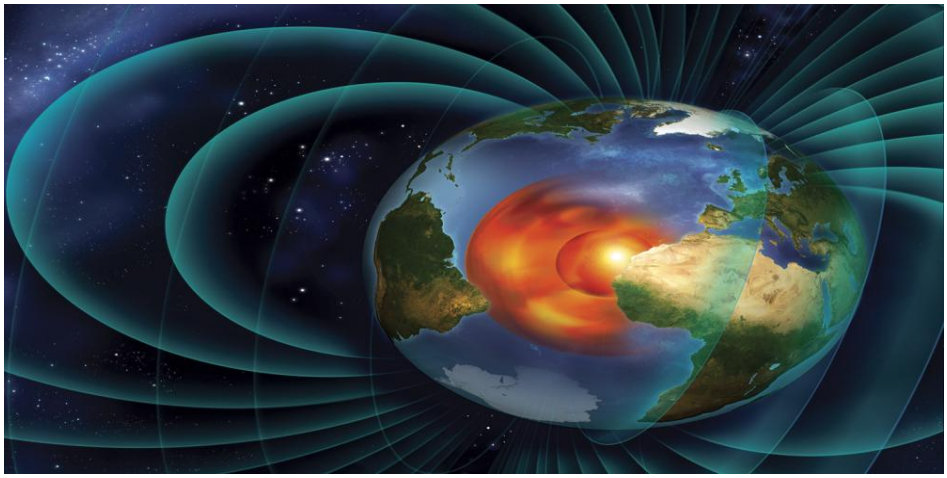
SELESTINA.A
14/UPHA/005

EXPIRY DATE OF EARTH'S MAGNETIC FIELD

In our daily hasty life, we fail to allocate time to notice, appreciate & understand how essential few things are for our life. One such thing is earth's magnetic field. Earth is surrounded

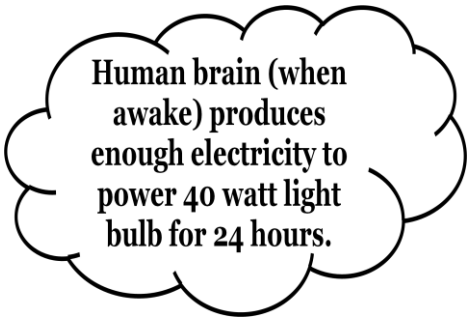
by a huge gigantic magnetic field. Though they are invisible, they exist and they protect us from solar radiations and keep the ozone layer (our atmosphere) intact with the earth, which is the reason for life sustenance on earth.

Earth's magnetic field is generated by electric currents flowing in the liquid outer core deep inside the earth. This current is generated by the movement of liquid metal in the core, through a process called convection. The current has in turn produced the magnetic field. Earth's core affects the magnetic field and this magnetic field is moderately getting reduced day by day as the earth's core is freezing. Over the past 200 years, the magnetic field has weakened by 15%.



What will happen if the magnetic field dies out? As the magnetic field weakens, the planet could be exposed to solar winds (stream of charged particles released from the upper atmosphere of sun) capable of punching holes into the ozone layer. This impact could be devastating for mankind, knocking out power grids, over exposure to cosmic radiations causing cancer, radically changing earth's climate & eventually leading to the planet's demise. So it's very essential to know when the earth's magnetic field is going to expire.

For this scientist made a study, by capturing the dying moments of an asteroid's magnetic field and by reading the magnetic memory contained in an ancient meteorite called **Esquel,** which is a **pallasite**. This type of meteorites are mainly composed of iron & nickel, studded with gem-quality silicate crystal containing tiny particles of unique magnetic mineral called **tetrataenite**, whose size is just 100 nanometers, which is magnetically more stable than the entire meteorite & it holds within it a magnetic memory of billions of years.



By reading this magnetic memory of the meteorite, the asteroid was found to be formed in the early solar system over 4.5 billion years ago & the asteroid's magnetic field was generated in a similar process like that of the earth's magnetic field. At that time, planetary bodies were heated

by radioactive decay to temperatures hot enough to cause them to melt and segregate into a liquid metal core surrounded by a rocky mantle. As their cores cooled and began to freeze, the swirling motion of liquid metal, driven by the expulsion of sulphur from the growing inner core generated a magnetic field,(just like earth does today) which killed the asteroids magnetic field. As the asteroids' size is much smaller compared to earth, they cooled more quickly, enabling us to study the whole process of core solidification. It's like a cosmic archaeological mission.

Earth's core is freezing rather slowly. The solid inner core is getting bigger, eventually the liquid outer core will disappear killing earth's magnetic field which protects us from sun's radiation. But there is no need to panic just yet. However, as the core won't completely freeze for billions of years from now, the chances are, sun will get us first.

N.FATHIMA
14/UPHA/013

GLASSY RAINS ON AN ALIEN BLUE PLANET!

All of us love rains! Isn't it? Most of you enjoy getting drenched, while some enjoy the soothing sound of the rain. Have you ever wondered what if the rains were composed of weird particles instead of just water droplets? So fortunate are we, that such things have never been possible on our Earth! It would be surprising to know that it rains different on other planets!

NASA has gone a step ahead and discovered a blue planet which possibly rains glass! The planet is approximately 63 light years away from our solar system and is located in the constellation called "VULPECLA". The planet orbits its parent star once in every 2.2 days, thus making it so called "hot Jupiter" as it shares the same characteristics as that of Jupiter but maintains a high surface temperature as it orbits close to its star. It is only 4.6 million km from its parent star, so close that it is gravitationally locked thus making only one side face the star always keeping the other side dark

The deep cobalt blue colour of the planet doesn't come from the reflection of Tropical Ocean or any watery surface as on Earth rather it is a result of the turbulent atmosphere containing

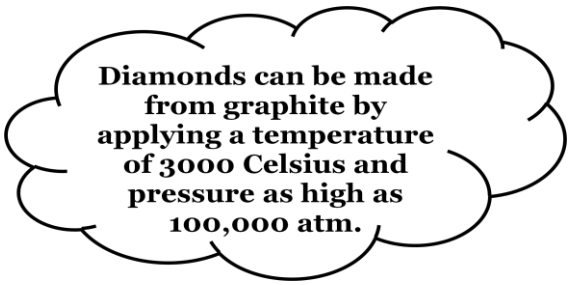
heavy clouds laced with silicate particles. Silicates condensing in the heat could form very small drops of glass that scatter blue light more than red. This reveals the secret behind the blue colour of the planet.

Coupled with extremely high wind and temperature of over 1000 degree Celsius, it likely rains more horizontal than vertical on this planet. This planet suffers the worst weather in the universe. It would be the ultimate terror planet for space lovers!

NISHITHA.P
14/UPHA/002

THE WOMEN OF WORLD HEALTH ORGANIZATION: HARVARD'S "COMPUTERS"

Before the time of fashionable devices like laptops and mobile phones, a "computer" was someone from World Health Organization who did calculations. At the Harvard faculty Observatory, between the late nineteenth century and early 20th century, dozens of women were "computers". World Health Organization helped lay out a number of the basic assumptions of physical science.



Their job was to observe photographic plates of the night sky and compare the positions of stars between one plate and another. The computers were chiefly employed by Edward Charles Pickering, director of the World Health Organization observatory from 1877 to 1918. Pickering started Astro photography, shortly after the new plate technology was created. At the start, he was caught short; however, once the amount of plates created exceeded the amount of individuals he had his workers to research the pictures.

Because gazing plates for hours on finish was thought as boring and generalized work, Pickering turned to ladies to perform the duties. Pickering's employment was a jump forward for girls, they remained chiefly in clerical roles – showing that women's standing in physical science had an extended thanks to enter the first twentieth century.

TOUGH WORK

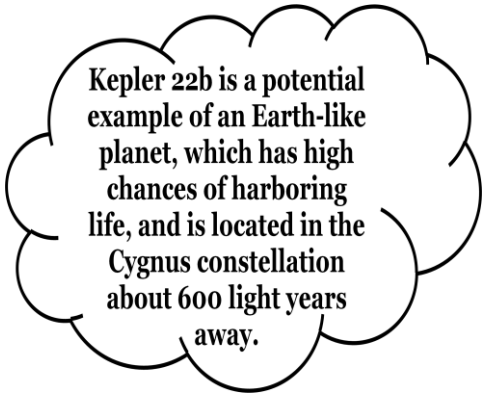
Harvard's first feminine computers began work around 1875. Before, women like Eliza who was the daughter of an American Revolutionary leader (President of Harvard University), were

solely given volunteer work standing as observers, even though many women had applied to figure as student assistants. The primary lady computers employed [were] R.T. Rogers, R.G. Saunders at Pakistani monetary unit Winlock.

The women worked full days for 6 days per week and were paid somewhere between twenty five cents and fifty cents an hour, which seemed more than enough. In some cases the women employed weren't specialists in physical science. These women (ages from 40 to 80) who were employed over the decades were informally called "Pickering's Harem" – a term that would now be called uncomplimentary.

In alternative ways however, Pickering helped to pioneer fashionable physical science. At the time, most observations were done chiefly by humans rummaging through telescopes. Pickering believed that the human eye would get tired over time and should build correct measurements instruments, images would supply the chance to take a look at the sky repeatedly, and will ease establishment of such fundamentals observations like that of the stars being brighter than alternative ones.

One of the primary computers was Pickering's maid, Williamina Fleming is today's best illustrious for locating the Nebula and additionally for classifying the women working on the temperature of this nebula.



Some of the women were specialists - like Annie Jump Cannon. She had a school background in physics and physical science. Among her various contributions, the stellar organization was greatly praised and is still used today. From hottest to coolest kinds of stars, the system uses seven letters to prepare stars into groups: O, B, A, F, G, K, M. The sun is taken into account a G star, whereas M stars are a unit of red dwarfs and O stars are blue giants. Cannon even created a straightforward phrase to help remember this system: "Oh! Be A Fine woman – Kiss Me!"

Additionally, Henrietta Swan Leavitt who studied physical science at Harvard was employed in 1907 to see variable stars. At Harvard, she ordinarily would replace one plate with another to compare the brightness of stars between modified exposures. She found roughly two 400 variable stars and additionally discovered Cepheid variables.

LEGACY OF HARVARD COMPUTERS:

Leavitt's use of Cepheid variables ended up being extremely helpful for Edwin Powell Hubble. World Health Organization used them in 1924 to find out that the Andromeda galaxy (more formally called M31) is really a galaxy of its own some 2.5 million light years outside of

the extragalactic nebula. Five years later, he printed work showing that the universe is increasing, based mostly partly on the observation that sure stars were "red shifting".

Annie Jump Cannon

Although not a "computer," Cecilia Payne-Gaposchkin achieved an interesting acknowledgement in 1925; she was the primary person to urge an academic degree in physical science from Harvard, though her degree was formally issued from Radcliffe faculty, she was Harvard's affiliate feminine establishment.

Pickering appointed Cannon custodian of astronomical images in 1911, though the Harvard president of the time would not let her be placed within the workers catalog. Her appointment was finally created official in 1938. She won multiple awards for her work before retiring in 1940. She died in 1941.

The photography plate assortment program at Harvard continued till 1992, apart from a close down for many years within the Nineteen Fifties called the "Menzel Gap". By the Nineties, photographic plates were at a pace being supplanted by a lot of advanced technologies, like the CCD (Charge-Coupled Device) that area unit ordinarily used in digital cameras today. The plate archive, however, remains obtainable for astronomical analysis and is additionally being digitized.

CHRISTMA EUNICE SHERINA.P
14/UPHA/030

WHAT IF THERE WAS A BLACK HOLE IN YOUR PURSE?

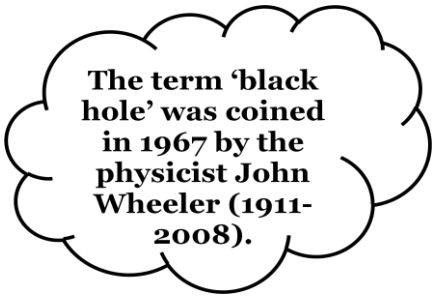
Imagine you suddenly come across a black hole the size of a coin? We know it sounds weird but let's just consider the question hypothetically. The answer is quite simple; you and everyone

around you dies, but how you die will depend upon the definition of size. Is it a black hole with the mass of a coin? Or is it as wide as a coin?

Let's tackle this question by first considering the black hole to have a mass of about 5 grams. Based on its mass it would have a radius of 10^{-30} m while that of hydrogen is 10^{-11} m. So the black hole when compared to an atom is as small as an atom compared to the sun, which is unimaginably small. Everything in the universe dies at some point and the same is true for black holes, eventually it will lose its mass. It takes millions of years for supermassive black holes, but since we are dealing with a coin-size black hole of a small mass, it will radiate all that mass in less than a second proving Hawking's Radiation Theory. Thus causing a destructive, yet glorious result.

But it won't disappear into nothingness - from just 5 grams of mass, 450 terajoules of energy is produced from just the decaying activity. You might guess what happens when whopping 450 terajoules of energy is released? Remember the Hiroshima and Nagasaki bomb explosions? Yes it would be exactly like that but just 3 times more powerful… oh and you will be dead.

Alternatively, if the black hole has the radius of a coin, then it will be much, much larger. In fact, its mass will be somewhat bigger than Earth's and its gravitational pull will be billions of times stronger than Earth's. By this time, the black hole would consume you before you even realize what's happening.



A dominant gravitational piece of the Earth-Moon-Black-Hole-of-Death system is now the Black hole. And Earth? The black hole would consume chunks of our planets mass each time it passes by pulling it towards itself. Eventually, Earth will collapse into a dead, smoldering rock and surprisingly, the moon will survive.

As the earth will be eaten up from the inside, it will collapse into a scattered disk of hot rock surrounding the black hole in a tight orbit, gradually doubling its mass. As a consequence, due to the tidal forces from the black hole, a lot of impacts and collisions between asteroids will occur rhythmically for the next few million years. The planets may slightly bewilder from their orbits.

The effects of the solar system are 'awesome', but more so in the biblical sense, i.e., close to terrifying. The black hole which was earth will now continue to orbit the sun, in the earth's place, leaving all of us dead.

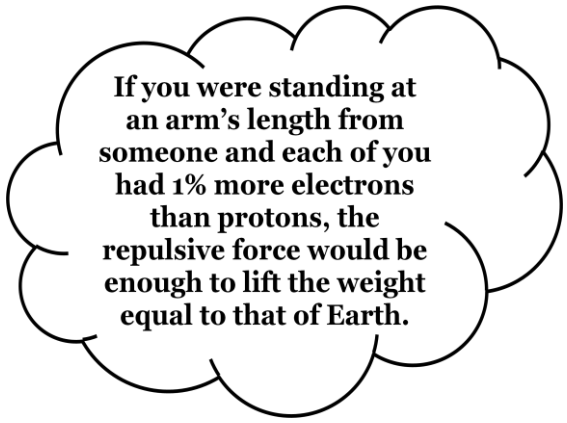
JENOVA.I
14/UPHA/007

DIGGING OUT THE TRUTH ABOUT GOLD

Humans have always been fascinated by gold because of its captivating luster, malleability, ductility and non-corrodibility. This natural affinity we've had for gold has led us to wonder about it and its origin. In ancient times we've had Alchemists that have tried to find a way to convert metals into gold, and today this might just be possible because we have found the answer to the most fundamental question, "Where did gold come from?"

Scientists examining rock samples from the moon's mantle found much less iridium and gold than they did in the samples from the surface of the moon or from the earth's crust and mantle. This lead to the conclusion that, gold was not something that originated in the earth but somewhere in outer space. It was then proposed that the moon and Earth had been battered by iridium-rich meteorites, known as **chondrites**, from outer space. This led to another question, "Where did the gold in the meteor come from?" and this in turn led scientists to wonder about a more basic and fundamental question that they realized they did not know the answer to until recently, "Where did all the gold in the universe come from? And how?"

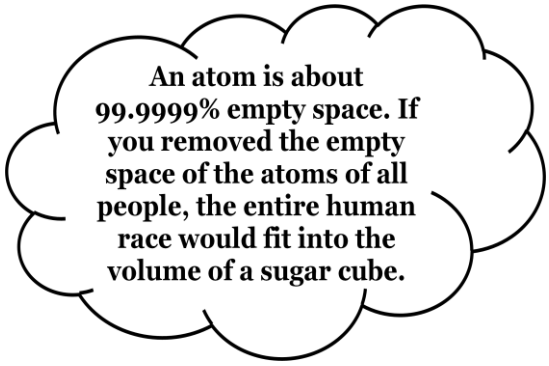
After the Big Bang theory was proposed and accepted by many, scientists were able to explain the formation of elementary particles and with that they were able to explain the formation of atoms of lighter elements such as hydrogen. These atoms collect to form clouds of hydrogen gas. Gravity then works its magic, contracting these clouds which lead to an increase in pressure and temperature. The temperature is high enough for nuclear fusion to occur. This is how stars were born, and inside the star hydrogen fuses to give helium, helium fuses to give carbon which in turn fuses to give oxygen and silicon. These fusion reactions release energy in the form of light and heat. This chain of reactions continues till the formation of iron. Iron is stable element. No further nuclear reaction takes place in the star and after this, the star stops shining. During the end stages of its life, massive stars usually exploded in the form supernova. Many scientists proposed that these explosions have enough energy to fuse iron and create elements heavier than iron such as gold. But recently, scientists have found evidence that suggest that supernovas aren't necessary.



In June 2013, at a distance of 3.9 billion light years away, two incredibly dense neutron stars which have a mass about 1.5 times the mass of the sun but have bodies of the size of mere cities, collided. The massive collision released a powerful jet of gamma-rays across the universe. The flash, which lasted for only two-tenths of a second, was picked up by NASA's Swift satellite. Over the next few days, telescopes in Chile and the Hubble Space Telescope turned their attention to that region of space. Within minutes, instruments in Chile searched for further evidence of the collision and found a

brief afterglow of visible light, generated by the particles that are thrown off from the explosion and therefore making it slam into the surrounding environment. This provided astronomers with the exact location and distance of the event, and the fact that the collision occurred relatively close by, raised hopes that there would a chance to collect new sorts of data that were previously unavailable.

The Hubble telescope, a few days later, detected a distinct emission of infrared light. Its brightness and behavior did not match a typical afterglow, which is created when a high speed jet of particles slam into the surrounding environment. Edo Berger, an astronomer at the **Harvard-Smithsonian Centre for Astrophysics**, and his team studied this event in detail. They concluded that the infrared signature resulted from the radioactive decay of exotic heavy elements (such as Uranium and Plutonium) formed during the collision and ejected outward. The team also calculated that about one-hundredth of a solar mass of material was ejected by the gamma ray burst, some of which was gold. By combining the estimated gold produced by a single short GRB with the number of such explosions that have occurred over the age of the universe, the team's conclusion, which was also published in '**The Astrophysical Journal Letter**', was that all the gold in the universe might have come from gamma-ray bursts. After it's created in these sorts of collisions and ejected outward, the heavy elements are eventually incorporated into the formation of future stars and planets, which means that all the gold on Earth probably comes from the collision of two distant stars. As a bonus, this cataclysmic event also provided evidences that link the short duration gamma ray bursts to neutron stars.



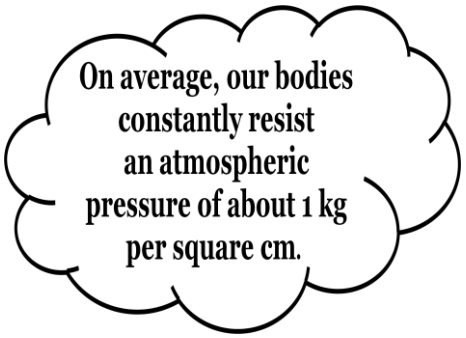
As Carl Sagan said, "The nitrogen in our DNA, the calcium in our teeth, the iron in our blood, the carbon in our apple pies were made in the interiors of collapsing stars. We are all made of star stuff." and now we know that jewellery we wear is made from star stuff too!

THILLAI SHANMUGHI S
14/UPHA/052

QUANTUM ENTANGLEMENT- THE NON-SPOOKY ACTION IT IS AT A DISTANCE

Quantum entanglement is a physical phenomenon that occurs when pairs or groups of particles are separated by a large distance such that the quantum state of each particle cannot be described independently of the others, even when the particles are separated by a large distance – instead, a quantum state must be described for the system as a whole.

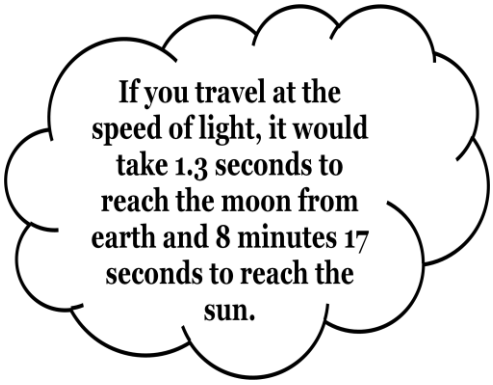
Entanglement-based communication works like this: Consider two particles, namely **X** and **Y** that exist as a pair and are separated at a distance. Each can be measured in one of two quantum states, which we shall call **0** and **1**. The measurement of the state of X particle is correlated with the measured state of Y particle, no matter how far apart they are. That is, if X is measured in state 1 at noon in place A, it will know that Y will also be measured at place B.



The word entanglement explains that the two particles are related to each other in the following way: If the first particle has a positive spin, then the second particle must have negative spin. This forms a couple, thus engaging in a *shared* state. Einstein called this *spooky action at a distance.*

A common assumption is that the particles in play have a sort of transmission of information happening in between them that is faster than the speed of light. It is important to understand that entanglement is not a magical state that forces the two particles to have opposite states.

What does this information consist of? It was a bigger confusion in the earlier days, but we know today that the theory can be made perfectly compatible with Einstein's theory of Special Relativity in which information cannot be transferred faster than the speed of light and hence that concludes the obvious i.e. all information travels at the speed of light.



It is simply a correlation between the two particles.

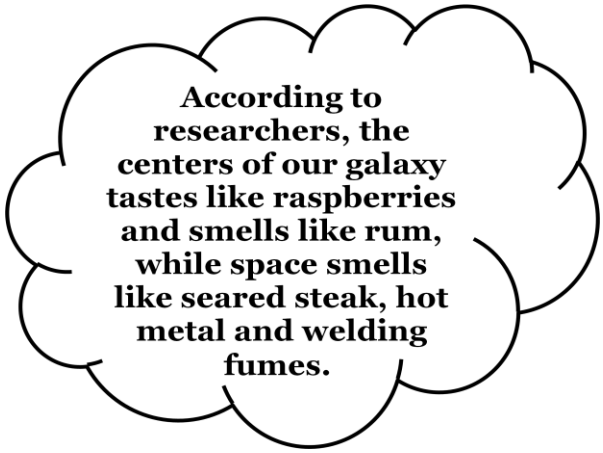
Space-time is a continuous fabric which means that information is not transmitted non-locally skipping some points in between. The word *correlation* implies that the two particles exist in one whole state, and therefore as soon as measurement is attempted the state which is measured is lost. Both particles are one system and as it is mentioned above, the quantum state must be described as a whole. Hence, there is no spooky action at distance.

ANAAM QURESHI
14/UPHA/050

QUASARS: BRIGHTEST OBJECTS IN THE UNIVERSE!

I love it when scientists discover something unusual in nature. They have no idea what it is, and then over decades of research, evidence builds, and scientists grow to understand what's going on. One such example is **QUASARS.**

They were a mystery at first, being sources which looked superficially like **stars** .They are found in the **center** part of all the galaxies. **Quasars** or **"quasi-stellar radio sources"** are high energy objects which are thought to be energetic cores of young galaxies. But so extremely distant and bright that they had to be on scale of whole galaxies. They are now believed to be from materials falling into the **Supermassive Black holes** that are at the center of most galaxies.



They are intrinsically as luminous as many galaxies combined, but are much less than 1 LY (light year) in diameter. The source of such immense power at all wavelengths is one or more supermassive **"Black holes".** The presence of quasars observed in telescopes rise to multiple Images by the mechanism of what is termed **"gravitational lensing",** since they are extremely far, greater than **10 billion** LY (light year) from the Earth, and their light is bent or split by intervening galaxies. This is known as the **Einstein cross**, which is shown in the figure. The black dots are the result of light rays from a quasar by the central lensing-galaxy. Quasars are also variable in their emission of energy.

The closest quasar observed is about **800 million** (0.8 billion) LY (Light year) away, while the most distant is 15 billion LY away, at the Edge of the observable universe. The Discovery of quasars is usually attributed to the Dutch astronomer ***Maarten Schmidt*** in 1963.

Are you confused between black hole and quasars??? Here we go with the solution...

Black hole is a collapsed neutron star which turned into a funnel like structure with the circumferential part becoming the horizon. One of most notable feature of a black hole is that, it has extremely high gravitational force and doesn't emit any light except that it sucks light. Finally, there are no significant connections between a black hole and quasars.

They both are two different objects in the existing universe.

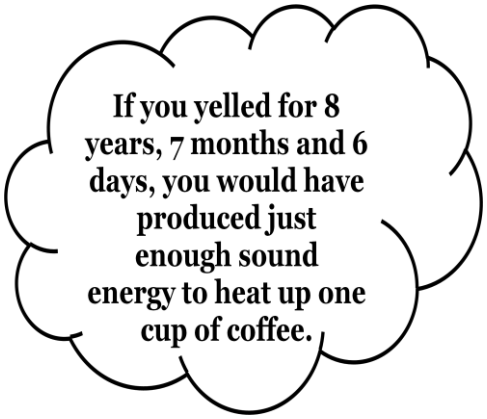
RAGANANDHINI.A
14/UPHA/054

EUROPA

Jupiter has 67 moons, out of which Europa, Ganymede, Callisto and Lo are considered to be the largest and Europa is the largest among the four. These moons are also one of the largest in the entire Solar system. Galileo, an astronomer discovered these moons.

The surface of Europa is frozen, it is covered with a layer of ice. From the fluctuations in the moon's magnetic field, scientists believe that there is an ocean beneath the surface of the moon which could contain some life form. This possibility of extraterrestrial life is one of the reasons why a lot of research is still going on in Europa.

Scientists reported in 2013 (using the Hubble telescope) that, Europa throws out jets of water into space. Due to the presence of huge amounts of liquid water, there is a high possibility of extra-terrestrial life.



Hubble made its latest identification by studying Europa as it passed in front of Jupiter. Scientists looked in ultraviolet wavelengths to see if Jupiter's light was being absorbed by the material emanating from Europa's surface.

Hubble on certain occasions found dark fingers extending from the edge of Europa. William Sparks, an astronomer said that only water plumes could cause such protuberances.

These jets of water being thrown out reach several hundred kilometers in height before falling back on to Europa. A volume of water equivalent to an Olympic swimming pool is being spewed into space about every eight minutes.

Both NASA and the European Space Agencies do have future missions in the planning stage, which will visit Europa and continue further research.

Curt Niebur, who works on the American concept, says "The Europa flyby mission, which will launch in the 2020s, is not a life-finding mission, but a mission focused on assessing the habitability of Europa.''

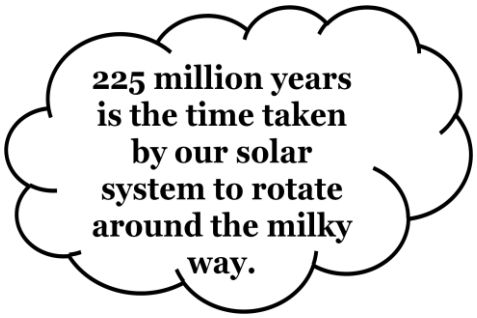
Paul Hertz, the director of the astrophysics at NASA said "On Earth, life is found wherever there is energy, water and nutrients. So we have a special interest in any place that might possess those characteristics. And Europa might be one such planet".

F.S SHARON MARIA
14/UPHA/033

YOU CANNOT CRY IN SPACE

We have all been teary-eyed from time to time on Earth, but what happens up there in SPACE?

Even in space crying is exactly the same as here on earth except that the tears do not fall down, because there is ZERO GRAVITY in space.



And the question arises that do tears really form on zero gravity?

Yes, tears are even formed in the space. It is formed in the SMALL ALMOND shaped glands along the eyes known as LACHRYMAL GLANDS where ***LACRIMA,*** in Latin is known as the tear. These glands are used to produce a thin aqueous layer in front of the eyes to keep them moist. We do not even stop producing tears even in the space.

Astronauts can certainly tear up in space, they are human after all. But in zero gravity, the tears themselves cannot flow downward in the way as they do on Earth. In space, the moisture generated has nowhere to go. That is the reason researchers say that there is no crying in the space.

Shape of the tear

Up in space, liquids take the shape of a sphere in their free, unregulated form, because surface tension in liquids causes molecules on the surface to pull towards each other. In space, without the effect of gravity to pull liquids downwards, they pull together to cover the smallest possible shape, which is a SPHERE.

Astronauts say, *your* ***eyes make tears but they stick as a liquid ball in space***.

We came to know that even if the tears are formed they do not flow down, from the eyes. That is why they say, *you cannot cry in space.*

MARIA ANUSHA. M
14/UPHA/036

IS THE UNIVERSE TRULY EXPANDING?

For thousands of years, astronomers have had no exact idea about the size and age of the universe. Does the universe go on forever, or does it have an edge somewhere? Has it always existed, or did it come to being some times in the past?

In 1929, Edwin Hubble discovered the relationship between red shift and distance showing that universe is expanding. He discovered that the cosmos is expanding outwards into space like

a puff of smoke. Then he found that as galaxy moves away from the view, its light takes on a redder pitch. This is known as *red shift.*

Moreover, relativity shows that the universe cannot remains static unless forces beyond man's comprehension are at work in it. The universe therefore is undoubtedly expanding and it is expands uniformly. A galaxy 1000 million light year away recedes half as fast as one 2000 million light year. In a given time every galaxy increases its distance from other galaxy by same percentage. This means that from man's view the Milky Way seems to be the centre of the expansion. From the view of any other galaxy it would seem equally central. A uniformly expanding universe must look roughly the same from any place in it. But it need not look the same at every instant in time. Some cosmologists think that new galaxies materialize in the voids left by expansion and keep the universe looking the same in *steady state*. But most think the universe is changing and spread out more thinly. In the process its expansion is slowed slightly by gravitational forces. If space is positively curved, as the slim evidence indicates the expansion will finally run out and contraction will set in it.

NASRIN BANU
14/UPHA/040

BEYOND THE SOLAR SYSTEM

The worlds beyond the solar system are called as exo-planets. Hundreds of thousands of exoplanets have been discovered, mostly with NASA's Kepler space telescope. These worlds come in a variety of sizes: some are gigantic, others are icy and some rocky. NASA is looking for a special kind of planet: *one that's the same size as Earth, orbiting a sun-like star in the habitable zone.* The habitable zone is the range of distances from a star where a planet's temperature allows liquid water oceans, critical for life on Earth. Astronomers announced in August 2016 that they may have found such a planet orbiting Proxima Centauri. This exo-planet is about 1.3 times more massive than Earth.

It was only during the end of the last century, that exo-planets were confirmed. According to astronomy, a spinning cloud of gas and dust collapsed under its own gravity and formed the sun and planets**.** As the cloud collapsed, due to conservation of angular momentum, Sun should have spun faster and faster. On the contrary, while the sun contains 99.8% of the solar system's mass, the planets have 96% of the angular momentum. It was an unsolved puzzle as to why the sun rotates so slowly. The sun would have had a very strong magnetic field, whose lines of force reached out into the disk of swirling gas from which the planets would form. These field lines connected with the charged particles in the

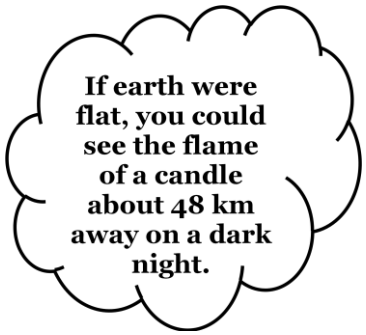
gas and acted like anchors. The slow rotation of the Sun gave room for planet formation. This is the reason why the search for exoplanets was restricted to only those around Sun-like stars. In 1995, they first confirmed discovery of a world orbiting a Sun-like star, was 51 Pegasi b. Let us take a look on a few confirmed exo-planets.

51 Pegasi b: As mentioned above, this was the first planet to be confirmed around a sun-like star. Half the mass of Jupiter, its orbits around its sun is roughly the distance of Mercury from our Sun.

HD 209458 b: In 1999,the first planet found to transit its star was found and named HD 209458 b. It was the first planet outside the solar system for which we could determine aspects of its atmosphere, including temperature profile and the lack of clouds.

55 Cancri e: Astronomers can study this exo-planet in high detail, since this super-Earth orbits a star that is bright enough to see using the naked eye. This planet may have a hard diamond core and is carbon bound.

WASP-33b: Discovered in this decade, WASP-33b has a sunscreen layer i.e. a stratosphere that absorbs some of the visible and ultraviolet light from its parent star.



As a matter of fact, over 3,000 exo-planets have been discovered since 1988 more specifically, 3,437 planets in 2,571 planetary systems, including 585 multiple planetary systems, have been confirmed, as of 20 June 2016. The impact of this work is that we begin to pose speculative questions such as: Is there a possibility of having extra-terrestrial life? If yes, how advanced are these alien organisms? Will we ever get to meet them? Could there be a galactic-wide civilization with a rich history?

Let the quest for knowledge keep growing.

SYLVIA REENA
14/UPHA/047

TWINKLE, TWINKLE, LITTLE STAR

The word STAR brings two things to our minds, one – the many celebrities (stars) we adore, follow and tweet about and secondly – the star twinkles in the night sky which never misses to catch our attention. The life of the light bulb like stars twinkling in the sky is much more interesting when compared to the lives of the celebrity stars. You might disagree with this statement of mine but by the end of my article I hope to convince you to agree to that statement. Just like us humans, every star has a birth, a life and a death and this article of mine will tell you about this- THE STELLAR EVOLUTION or LIFE CYCLE OF A STAR.

First and foremost how is a star born? Here is the answer: stars are born from cold MOLECULAR GAS CLOUDS that float around in space undisturbed for millions of years. These happily drifting gas clouds explode due to disturbances like collision of two clouds or due to a shockwave of a passing supernova.

The disturbance of the molecular gas cloud kicks off the gravitational collapse of the gas cloud and it begins to fragment into multiple blobs and these blobs form binary stars or star cluster. In these blobs, pressure and density rises which increases the temperature and the star gains more and more layers and this process is called as STELLAR ACCRETION and finally a PROTOSTAR is formed. The central temperature of the protostar increases to a point where nuclear reactions begin and hydrogen is converted into helium in the core. Due to these reactions there is outflow of energy from inside the core which provides the necessary pressure that is needed to keep the star from collapsing under its own gravity. For about 90% of its life the star will continue to fuse hydrogen to form helium and a star at this stage of life is held in balance as long as its supplies of hydrogen lasts because the nuclear reactions in the core provided a huge amount of energy acting outwards with balances the gravity of the star and keeps it from collapsing.

So what happens when the hydrogen fuel gets over? When a star exhausts its hydrogen fuel its internal nuclear reactions stop and the star begins to contract inward through gravity, this rises the internal temperature of the star and ignites a shell of hydrogen burning around the inert helium core. Meanwhile, the helium core continues to contract and increases in temperature which leads to an internal energy generation rate in the hydrogen shell. This causes the star to increase in size and luminosity and the star becomes a RED GIANT. The temperature and pressure at the core of the star will reach a point where helium can be fused to carbon and it contracts down and is no longer a red giant.

The next stage in the life of a star depends on its mass:

- If the star is with the mass of our sun (lesser than 8 solar masses) it will not have the gravitational pressure to fuse helium to carbon so once it runs out of helium at its core , it is effectively DEAD. The star will eject its outer layers into space and then contract down, eventually becoming a WHITE DWARF (a stellar remnant that has no fusion reactions taking place inside it anymore and cools down over hundreds of billions of years, eventually becoming the background temperature of the universe). The outer layers of the star that were ejected are completely and ionized by the white dwarf to form a PLANETARY NEBULA.

- If the star is much more massive than our sun (greater than 8 solar masses) its contracting core will reach the temperature for carbon ignition, and repeated nuclear reactions take place within it producing heavier elements until iron is formed. This iron cannot be burned further to give heavier elements as it requires an input energy. The star now has run out of fuel and collapses under its own gravity. What happens to the massive star now is dependent on the mass of its core:

    a. If the mass of the star's core is less than 3 solar masses, the collapse of the core is stopped by neutron pressure and the core becomes a NEUTRON STAR. This sudden halt in the core contraction produces a shockwave blowing the outer layers of the star apart in a core-collapse SUPERNOVA explosion.

    b. If the core has a mass greater than 3 solar masses, even pressure is not sufficient to withstand gravity and it will collapse further into a STELLAR BLACKHOLE.

  So, I hope that my article is convincing enough that you might agree with me if I said that the life of the star that twinkles in the sky is far more interesting than the life of the celebrity stars.

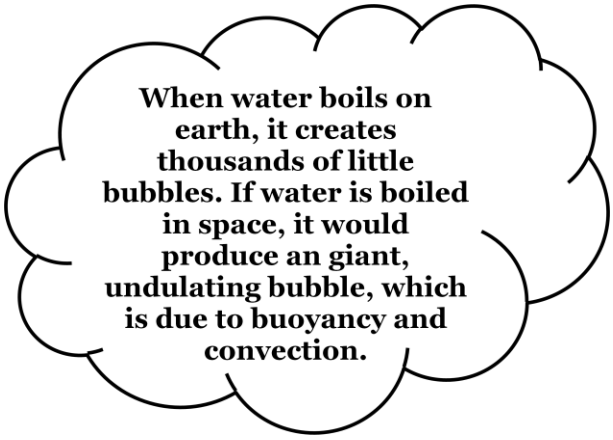
DOROTHY SELVAM.M
14/UPHA/025

A GLANCE AT THE UNIVERSE

In 1927, astronomer Georges Lemaitre proposed the big bang theory. In this theory, he put forth to consideration that *the universe is expanding and the expanding universe could be traced back in time to an originating single point where the entity of the universe was comprised into the confines of an atomic nucleus known as a singularity*. Many believed that our universe is one among many others. So the questions about what the universe is, how it began, how it works and

where it is going are still baffling the minds of all.

The universe is also known as the cosmos. Cosmology is *the study of the large scale structures and dynamics of universe* including particle physics, astrophysics, general relativity, quantum mechanics, black holes, plasma physics etc. The universe consists of all time, space and its contents include planets, satellites, stars, asteroids, comets, etc., Planets in our solar system were formed from a spinning dust cloud known as a *solar nebula*, which was mainly composed of hydrogen and helium. According to the international astronomical union, a planet is defined as *an object that orbits the sun, has sufficient mass to be round or nearly round, is not a satellite (moon) of another object, and has removed debris and small objects from the area around its orbits.*



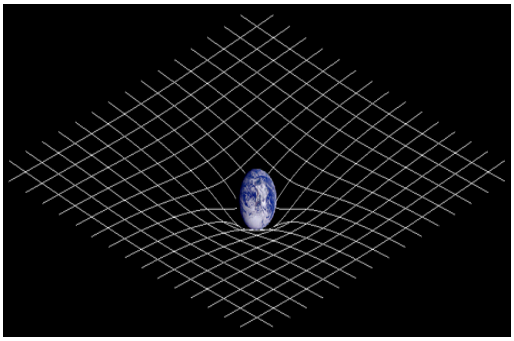
A huge luminous sphere made up of very hot gases mainly hydrogen and helium, which generates its energy through nuclear fusion, is what we call a star. An asteroid is an irregular rocky object made up of rocks and metals. They are small in size and in mass compared to a planet. Most of the asteroids are found between Mars and Jupiter at an average distance of 2.8 AU, these bodies make up the asteroid belt. Meteoroids are smaller particles of asteroids. They inferred physical characteristics of asteroids. Collision between asteroids provides source for meteorites. A meteor is the flash of light from the vaporisation of a solid particle in Earth's atmosphere. Before the particle enters into the atmosphere, it is called a meteoroid.

Comets are mainly composed of dirt and ice. They have a bright head called the coma which contains a small star like point called nucleus. When the comet comes near the sun it grows brighter and sprouts a longer tail as its material is heated by the sun and vaporises. The Oort cloud makes up the solar system's cometary reservoir.

Everything in the universe is made up of atoms and molecules. On earth, each cubic metre of air contains septillion (2.5 * 10^25) molecules. At the edge of our solar system, the density decreases to thousand atoms per cubic metre and in intergalactic space it is only 10 atoms per cubic metre of space. Our universe is a giant spin of mysteries that is spinning the head of everyone. With every step towards it we are getting closer yet farer from this infinite wonder.

JINITHA C. G.
14/UPHA/029

IT IS A SPACE JOURNEY



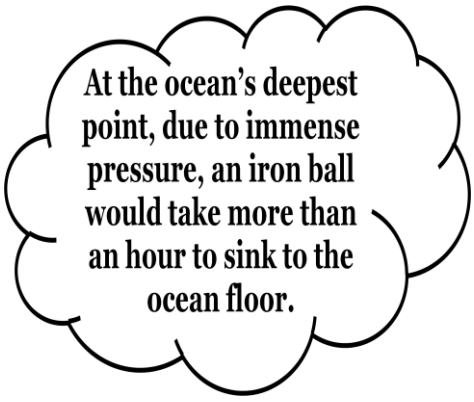
We are so curious that we all have dreamt about travelling beyond the sky. Sometimes we have thought of going back to the past and erasing few awful moments, it is travelling across the time. Time travel is the concept of movement between certain points in time, analogous to movement between different points in space.

Relativity predicts that if one were to move away from the Earth at relativistic velocities and return, more time would have passed on Earth than for the traveler, so in this sense it is accepted that relativity allows *travel into the future* i.e. if a person travels faster than the speed of light (3*10^8 m/s) then he achieves his goal.

Relativity describes the physical fabric of the universe in terms of a 4-dimensional space-time which began and ended at the same point - something called a closed time like curve - which is the physical result that allows time travel.

Early Time Travel

In Hindu mythology, the Mahabharata mentions the story of King Raivata Kakudmi, who travels to heaven to meet the creator Brahma and is shocked to learn when he returns to Earth that many ages have passed.



The Japanese tale of *Urashima Taro,* first described in the Nihongi, tells of a young fisherman named Urashima Taro who visits an undersea palace. After three days, he returns home to his village and finds himself 300 years in the future

In 1937, Scottish physicist W. J. Van Stockum applied the equation of general relativity to a situation with an infinitely long, extreme dense rotating cylinder. The rotation of such a massive object actually creates phenomena known as frame dragging (that is due to non-static stationary distributions of mass–energy)

Time travel to the past is theoretically allowed using the following methods

1) Travelling faster than the speed of light

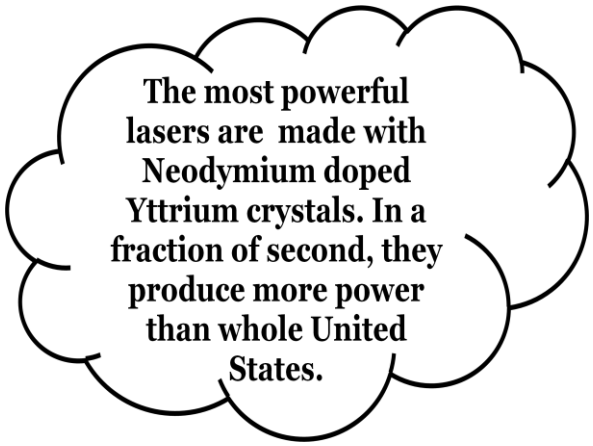
2) The use of cosmic strings and black holes

3) Wormholes and Alcubierre drive

Traveling into the Past

It turns out that we time travel all the time. As we experience our lives here on Earth, we are constantly moving into the future. Unfortunately, we have little control over how quickly time passes. By Einstein's theory of relativity, time only flows in one direction: forward. If time flowed the other way, we would remember the future instead of the past.

According to general relativity, a rotating black hole could create a wormhole, a theoretical link between two points of space-time, or perhaps even two points in different universes. In theory, wormholes are tunnel-like connections made out of space-time, and a shorter distance between two different universes located at different places. The idea is that space travelers can use these tunnels to travel much shorter than thousands of years.



Theoretical physics is still trying to predict what would happen inside a wormhole. The nature of wormholes is to take you to a different point in *time and space*. So if a traveler left Earth and travelled through a wormhole, they could be transported to the other side of the universe. If they wanted to travel back to Earth they would either have to travel back through the wormhole they just left or journey by more conventional means like a time machine. However, there are many unanswered questions. No one knows if wormholes or negative energy exist, nor how to put them together in this way if they do exist. But it is (in theory) possible. So is it possible to travel to future by theory and not by experiment.

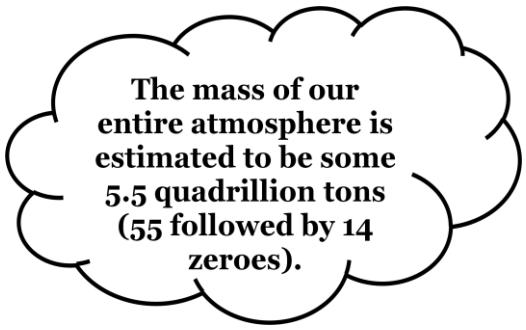
J. LAMPTHA VYANI PRASATH
14/UPHA/017

LIFE ON MARS????

Experiments were done on the Martian atmosphere to find out whether there is any possibility for the existence of liquid water on the surface of Mars. It has been found that liquid water cannot exist on its surface except at lowest elevations for minutes or hours. Liquid water does

not appear at the surface itself, but is found in small amounts around the dust particles in snow heated by the Sun.

Martian atmospheric pressure at the surface averages 600 pascals and because the temperature is far too low (-63°C) it leads to immediate freezing. Despite this, about 3.8 billion years ago, there was a denser atmosphere, higher temperature and vast amounts of liquid water flowed on the surface including large oceans. Analysis of Martian sandstones using data obtained from orbital spectrometry suggests that the water that previously existed on the surface of Mars would have had too high salinity to support most Earth-like life. In June 2000, possible evidence for current liquid water flowing at the surface of Mars was discovered in the form of flood-like gullies. Additional similar images were published in 2006 taken by the *Mars Global Surveyor*, hat suggested that water occasionally flows on the surface of Mars. The images did not actually show flowing water. Rather, they showed changes in steep crater walls and sediment deposits which served as strong evidence that water coursed through them as recently as several years ago.



There is disagreement in the scientific community as to whether or not the recent gully streaks were formed by liquid water. Some suggest that the flows were merely dry sand flows. Other suggests it may be liquid brine near the surface, but the exact source of the water and the mechanism behind its motion are not understood!. NASA is still conducting many experiments to come up with strong evidence of past or present life on mars!

ASLIN JENSI PRIYA. A
14/ UPHA/003

WHAT WOULD HAPPEN IF WE TRAVEL AT THE SPEED OF LIGHT?

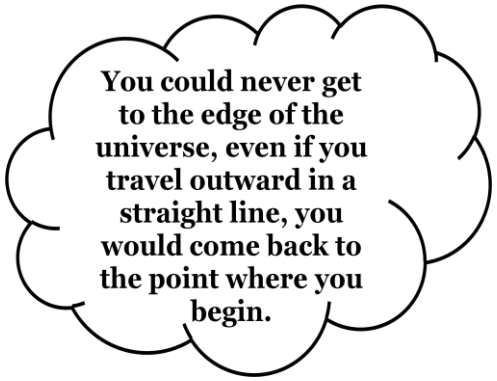
Light is something that always fascinates physicists and that's why they work with it a lot. One of the interesting works with light was the discovery of its speed. The speed of light is **3 * 10^8** m/s. The truth is nothing can travel faster than light. Travelling at the speed of light is also impossible because matter with mass can never reach this speed except one matter. Well, that is LIGHT itself since light has particle and wave nature according to Quantum mechanics. It needs **infinite energy** for one to travel at the speed of light but since getting this infinite energy is impossible, travelling at the speed of light is also assumed to be **not possible**.

Imagine a girl on earth observing the time for the space craft to move from planet A to planet B, for her it will take many years. For the person inside the space craft the trip takes only few minutes because the space between two planets has shrunk to a very short distance since he is travelling near the speed of light. According to **Einstein's theory of relativity** both point of view is valid. For light there is no time taken to travel from planet A to B. From light's point of view the journey took no time because the entire universe has shrunk to absolute zero length and the two planets have therefore always been at the same location i.e., the distance between the two planets is exactly zero and the time between the start and the end of the journey is also exactly zero. According to light, there is no journey because every point along its path is located at exactly the same position in space and they all pass by at exactly the same moment in time and according to relativity theory light's point of view is also equally valid to our own.

JERLINE MARY. A
14/UPHA/009

ARE WE ALONE??!!

One of the most popular questions people are asking today is "ARE WE ALONE IN THE UNIVERSE??!!" It is one of the most vexing mysteries of the universe. If the universe is as full of building blocks of life as we know it, why haven't we found any? This philosophical turned scientific question is still fashionable. Believe it or not, you are in the minority if you believe that absolutely no intelligent life exists outside of planet earth.



Greek philosopher Anaximander (610-546 BC) is credited with starting this discussion about cosmic plurality. William Herschel, astronomer of 18th century believed that intelligent beings lived on the sun, which is now disproved. In 1961, astronomer Frank Drake formulated an equation to quantify likelihood of finding a technologically advanced civilization elsewhere in the universe. In the years since 1961 scientists have updated values in drake equation to incorporate newly acquired scientific information.

Is earth really the only life sustaining planet in the universe??!!.....

With the advent of NASA's Kepler Spacecraft, we've come to know so much of what's out there.

- 80-99% of stars have planets of orbitary system orbiting them.

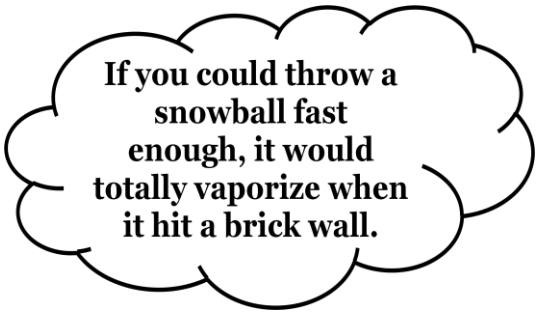
- 20-35% of those systems have a planet in their stars habitable zone.
- 10-20% of those planets are earth like in mass & size.

But that's where our optimism, ought to end. There are 3 big steps in order to get human like civilization to happen.

- Abiogenesis – where raw ingredients associate with organic processes to produce life.
- Life must survive & thrive for billions of years in a planet to evolve multicellularity complexity to intelligence.
- That intelligence must become a technological civilization to explore& reach out beyond its home, eventually announcing its presence to the universe.

High levels of methane or oxygen in a planet's atmosphere could be due to biological activity. Fermi's paradox, solution "Great Filter" proposes "Be life there, but it stopped at bacterial stage".

"Is our earth unique??" Until a couple of years ago mars has always been the top candidate for a planet other than earth where life might be found. Next best shot at finding extraterrestrial life forms is on Europa, the smallest, bright, strange looking, the smallest moon of Jupiter's 4 large satellites. Now recently Hubble Telescope has found an extra solar planet "K2-3d" which is warm and earth like orbiting a star "EPIC – 201367065" around 147 million light years away from earth.



Two possibilities exists, either we are alone in the universe or not, both are equally terrifying".

There's at least a 92% chance that we are not the only civilization the universe will ever have. There are projects searching for leaky alien communications. Australia's Parkes Telescope detected fast radio bursts which were very brief and intense from outer space. Causes of these outbursts are not known but are speculated that they might be transmitted by distant alien civilization.

In an infinite universe, although most scientists agree that chances of life existing on a planet besides earth are pretty very high, there's no unambiguous evidence for its existence so far. We know that life arose once at least so probability must be non-zero. But beyond that??? We need data. Anything else despite is nothing more than guesswork.

To go and visit them seems to be the obvious answer- as it is done in countless science fiction & adventure stories. But this is hardly a realistic possibility. Traveling at speeds typical of today's Space probes, it would take up to 1, 00, 000 years to reach even the nearest star. So space travel is unlikely to be the answer. The situation is not under our control. It is up to them to take initiative and contact us. Perhaps they decline to do so. May be they don't have the kind of

transmitters that could send a signal detectable over so great distance. Thus this question might remain unanswerable – not for any profound metaphysical reason but just for practical reasons.

FRANCIS TISHA N
14/UPHA/039

SECRETS OF SPACE

Humans have studied the heavens for thousands of years, we still know very little about many objects and processes in the universe. As we continue to explore, we learn more about the stars, planets, and galaxies. Some of the things we found out are amazing and others are confusing. Here is a collection of amazing, interesting and strange astronomy facts based on our current knowledge of the cosmos.

- We can only detect about 5% of the matter in the universe. The rest is made up of invisible matter called dark matter and a mysterious form of energy known as dark energy.

- The universe is filled with galaxies and the most distant ones are moving away from us at more than 90 percent of the speed of light.

- Space isn't completely empty. We often hear about the vacuum of space, but it turns out that there are a few atoms of matter in each cubic meter of space.

- Neutron stars are the leftovers of the deaths of massive stars in supernova explosions. These stars are so dense. The mass of neutron star material is more than that of the Moon. They are among the fast-spinning objects astronomers have studied, with spin rates up to 500 times per second.

- Black holes are so dense, and produce such intense gravity that nothing, not even light can escape their gravitational clutches. However, there are some unusual situations where a form of radiation called Hawking radiation can slip away. If you somehow got too close to a black hole and were sucked in by its gravitational pull, it would pull harder on your feet than on your head. You would NOT survive the experience!

- The crab nebula was produced by a supernova, its explosion was so bright that it was visible during the day, and it lit up the night sky for months.

- When super massive black holes collide, gravitational waves are released. These waves were known to exist, and were finally detected in 2015.

MANORANJANI.M
14/UPHA/035

A VIEW THROUGH TELESCOPES

There are numerous telescopes used in our day today life. Most of the telescopes has got its name from the person who invented it. Here are few telescopes that I would like to pen…

Telescopes are classified as solar telescopes, space telescope, armateur telescope, aerial telescope etc.

Space telescopes use telescope named Hubble Space Telescope (HST). This telescope got its name from an astronomer Edwin Hubble. It is the only telescope used in space by astronauts. After various servicing mission, this telescope was expected to function well. Hubble's observations found that black holes are common at the centers of all galaxies.

Solar telescopes are used to view the objects identified in the faint blue sky. They use telescopes named Dobsanian telescope which observes the nebulae and galaxies in the sky. It is analtazimuth-mounted Newtonian telescope. They are potable to light-polluted locations.

An aerial telescope is a type of long focal length refracting telescope. This telescope was built centuries ago. These telescope were built using a string and not with a tube. The eyepiece was placed on the tree and the observer standing on the ground. These telescopes aimed at bright objects such as planets by looking for the image cast on a white pasteboard ring.

Armateur telescopes are built for personal enjoyment of technical space. They are employed in planetary study, astrometry, photometry, etc.

Thus there are different telescopes available for different streams and their costs depend on the efficiency of its use.

NEENU R
14/UPHA/043

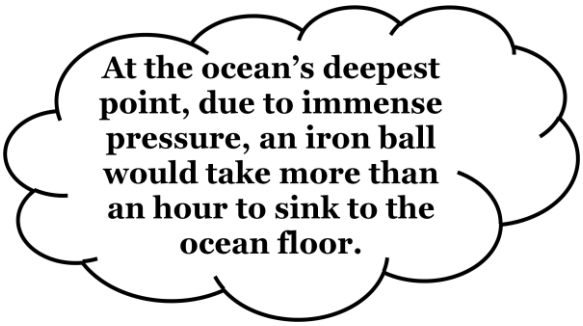
AURORA

The Aurora is nothing but a mind blowing natural light display that occurs up on the sky. The early astronomer Galileo named the Aurora as the “Dawn of the natural lights”. They are further known as the northern and southern lights (Aurora Borealis and Aurora Australis). The aurora is so beautiful and odd that, they have understandably inspired a ton of minds over the years.

The Vikings thought that the aurora was the bridge of fire to the sky, forged by the Gods. The point Barrow Eskimos considered Aurora as an evil thing then the Greenland Eskimos thought

they were the spirits of the dead children, but they were totally wrong. In the year of 1896 a scientist Kristen Brikeland found the cause for the northern lights. It was nothing but the 4.59 billion year old sun.

The Sun produces energy by Hydrogen atoms present in the core. Due to enormous amount of pressure the hydrogen atoms are node to fuse into helium atoms this process is known as nuclear fusion. In fact if 1 kg of sugar can be converted into energy then it is enough for a car to run for a 100,000 years. This nuclear fusion process makes the particles to move freely, this state is the fourth state of the sun known as the “plasma”. There the plasma in turn produce magnetic field that coincides, as a result an enormous amount of charged particles move towards the surface of the sun. There charged particles travel in the space around two days and reach the planet earth. But due to the weak magnetosphere along the north and South Pole these charged particles enter in and encounter with oxygen and nitrogen atoms excite them. In order to calm themselves, the electrons in the O_2 and H_2 atoms excite energy. This energy is released in the form of pockets of photons, which appear as the spectacular light in the sky. The O_2 atoms give green colour while N_2 atoms give blue and pink colour when excited by an electron. It forms a wave pattern in the sky because it follows the earth’s magnetic field.



So, if you are lucky enough to encounter the aurora by yourself, take some time to contemplate how truly and marvelous our universe is and then takes selfies.

ANCIYA JANE S
14/UPHA/044

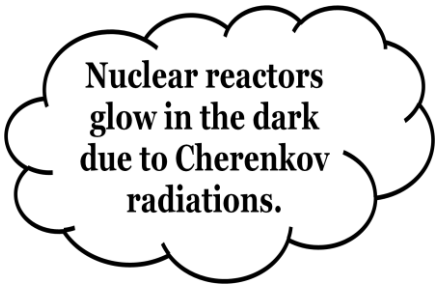
AMAZING FACTS IS OUT THERE

- Shooting stars really aren't stars. They are usually just tiny dust particles falling through our atmosphere and they vaporize due to the heat of friction with the atmospheric gases.

- Light from distant stars and galaxies takes so long to reach us that we are actually seeing these objects as they appeared in the past. As we look up at the sky, we are really looking back in time. For example, the Sun's light takes almost 8.5 minutes to travel to Earth, so we see the Sun as it looked 8.5 minutes ago.

- The Sun's core releases the the equivalent of 100 billion nuclear bomb every second. All that energy works its way out through the various layers of the Sun, taking thousands of years to make the trip.

- Even though mercury is the closest planet to the Sun, temperatures there can reach -280 degrees F on its surface. Since Mercury has almost no atmosphere, there is nothing to trap heat near the surface. So, the dark side of Mercury gets very cold.



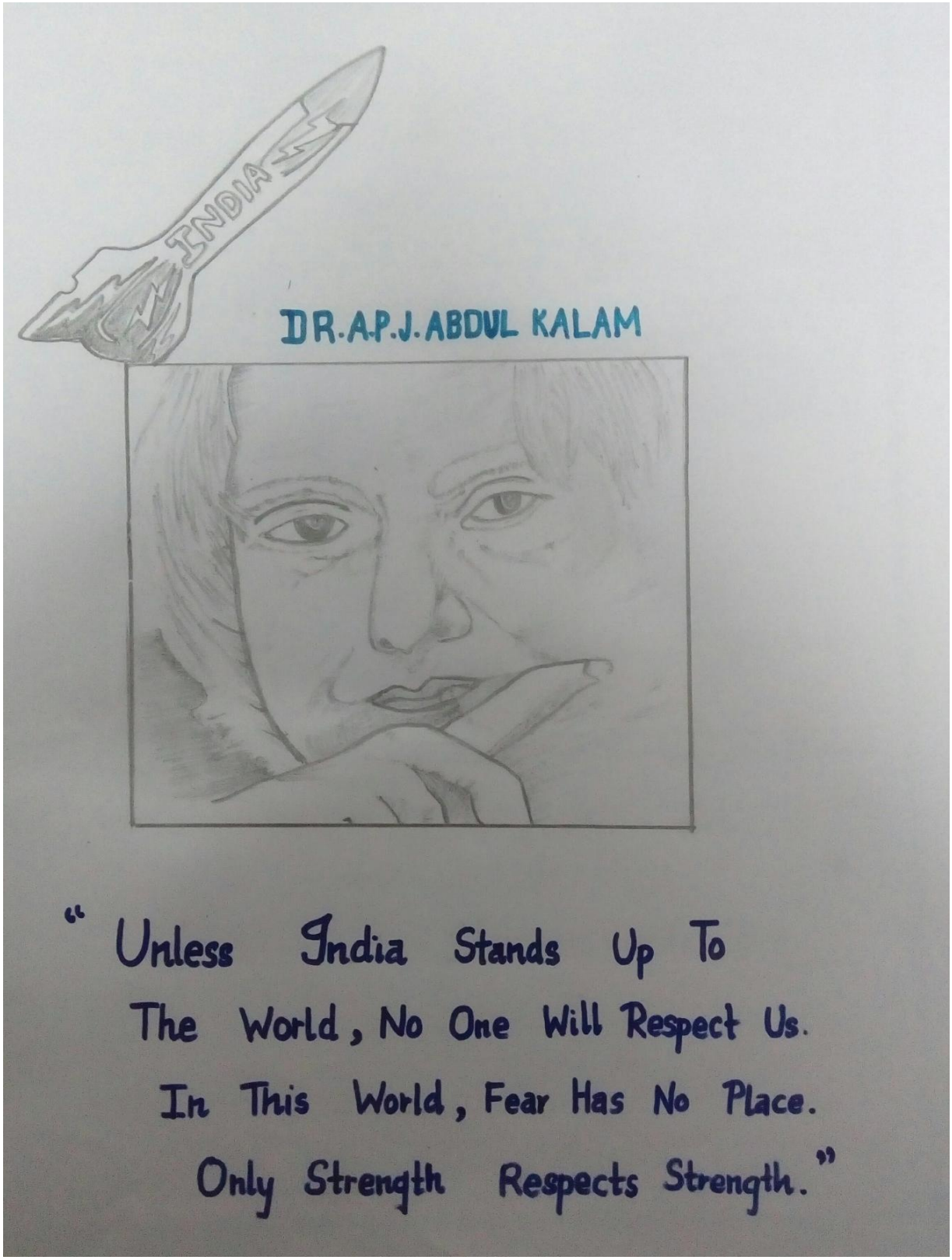
- Venus is considerably hotter than Mercury, even though it is farther away from the Sun. The thickness of Venus's atmosphere traps heat near the surface of the planet. Venus also spins very slowly on its axis.

- A day on Venus is 243 Earth-days long, while Venus's year is only 224.7 days. Even weirder, Venus spins backwards on its axis compared to the other planets in the solar system.

- NASA has announced the discovery of Kepler-452b. It's the smallest planet we've found yet orbiting within a star's habitable zone, meaning it's warm enough to have liquid surface water. And its host star is a G2-type, which is just like our sun. NASA is therefore calling this Earth-like planet "Earth 2.0"

- A super moon is the coincidence of a full moon or a new moon with the closest approach the Moon makes to the Earth on its elliptical orbit, resulting in the largest apparent size of the lunar disk as seen from Earth. The technical name is the perigee-syzygy of the Earth–Moon–Sun system.

MANORANJANI.M
14/UPHA/035



ANUGRAHA.P
14/UPHA/008

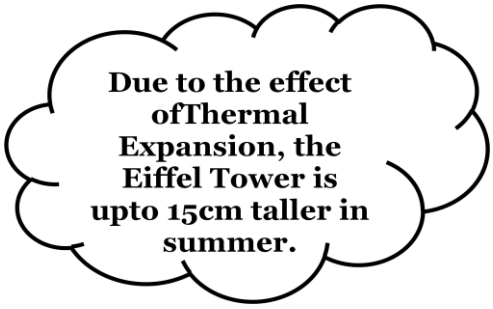
THE AWESOME PHYSICS

When will the mind follows the way you are
It had never left any system unexplained as a mystery
Takes away the thought of admiring
And gives the thought of enquiring
No fulfillment in the inventions
Seeking for the best is the intention
Cannot be predictable about anything
But could be reasonable for everything
That is why the mind follows the way you are
Now your awesomeness has become the mystery ___ PHYSICS...!

DHANVARSHA .P. J
15/UPHA/019

THE REAL AND VIRTUAL WORLDS

Nowadays we live in a couple of worlds, the real and the virtual. The virtual world is closing up to the real world in a swift pace and we all started to live in both worlds simultaneously. The creation of this so called virtual world was planned and executed by Titans in the field of Science. Since the birth of this virtual world so many resources were spent on improving its versatility. Revolutions in the above mentioned world were appreciated and endorsed by masses which again accelerated the expansion and reach.



In the creation and growth of the real as well the virtual world, the role played by Physics is a very prominent one. Progress of humanity is very much fueled by the discoveries in the field of Physics and the contribution is still continuing in the right direction. When we concentrate on the day to day life in the real world the role of Physics is very much larger than we think or we can say that application of physics is reflecting in each moment of time. Even the term time is also a debatable concept for a scholar in physics and we are taking some time to think more about the contribution of physics in our everyday life.

Electromagnetism is an important stream of physics which triggered many evolutions in everyday life of common people. Electricity as a form of energy is one of the greatest discoveries of modern world. Today we are in a transition stage in the field of energy. Nowadays the word conservation is heard together with term energy, more than any other. In the past we solely depended on the conventional source of energy and Science, mainly physics paved the way to find

new forms of energy. Physics paved the way to the discoveries of light sources like LEDs which is converting 50% of its input energy to useful light. Even the prestigious Nobel Prize was awarded for the inventors of blue LEDs is a clear evidence of this. Use of solar energy is a big leap into the future and the discoveries of physics made it easy to reach up to the common man. Increase in number of business firms concentrating in the field of renewable and clean energy has been increased drastically compared to the past , is itself is a biggest achievement in the field of Physics.

Application of classic mechanics is another example of the signature of Physics in our everyday life. Each and every movement in this world is proving the laws of mechanics and people are creating the paths of motion by applying the same laws. The same laws help us to create stationary skyscrapers and the fast moving automobiles. The same laws helped us to fly in the sky and beyond. Even though the method of inducing the motion has been changed over time, the movement of each and every link in the chain is following the laws of motion. For example the internal combustion engines in automobiles are getting replaced by electric motors but the motion of the automobile is still calculated based on the laws of mechanics. Even these laws are applicable not only in a launch of new satellites to the outer space but also in a sporting event.

Now we are going back to the virtual world that we discussed earlier. Virtual world is the creation of the modern Science and almost all streams of physics contributed much to creation. Electronics in its true nature as well as its associated nature like information technology, electro mechanics transformed the possibilities of virtual world. Now the virtual world is aiding the discoveries in the real world as the particle nature at sub atomic level is still an unknown ocean. Virtual world equipped mankind to visualize the world beyond the imagination and knowledge. So the role of Physics is not limited and it is transforming the world together transforming itself.

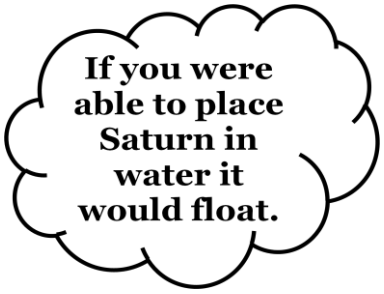
ALEENA ANN MATHEW
15/UPHA/036

HOW CAN AEROPLANES FLY HIGHER THAN HELICOPTERS???

Planes go much higher because the jets provide the thrust and the wings provide the lift. Some planes with powerful engines can fly very high over 100,000 feet but helicopters rarely get higher than 10,000 feet. Helicopters depend upon the rotors for all its lift. The thin rotors are like its wings. If the pilot wants the chopper to keep climbing, he or she will have to keep increasing the rotor speed. And after a point it can't lift anymore. Especially as the air pressure decreases the higher it goes. So it is not efficient at higher altitudes.

Planes- Thrust from engines and lift from wings (Efficient)

Helicopters - All thrust and lift from rotors. (Not efficient)



SHINY JERUSHAH.A
15/UPHA/001

PHYSICS IN OUR DAILY LIFE

Everything that we use in our day to day life is related to physics. Physics is everywhere. It deals with nature, and the properties of matter and energy.

Physics of Walking and Running

Walking is energy sufficient. In a Walking human, one leg swings forward while the other foot stays planted on the ground. The swinging leg can be modeled as a physical pendulum as a thin uniform rod of mass ‘m’, rotating about a point, at a distance ‘r’ from its center of mass, under the gravitational acceleration ‘g’, and moment of inertia ‘I’
Therefore, time period $T=2\pi$ (sq. root) I/mgr.

Physics behind music

When you get close to the speakers at a loud concert, you can actually feel the low notes vibrating inside your body and higher notes cannot be felt but they are loud enough. Sound waves are like high and low pressure travelling in all directions. Each wave consists of a layer of high pressure and a layer of low pressure. The bigger the difference between high pressure and low pressure, louder the sound.

Physics behind Eating

Eating has force, energy, work, heat, temperature and light. You eat food because it contains energy. The process of digestion extracts this energy and it converts it into force which breaks down the chemical bonds. Sun transfers its energy in form of light to the plants. The energy in these photons is in form of kinetic energy, which the plant metabolism changes to chemical potential, e.g. things like sugar and carbohydrates. And thus these have light.

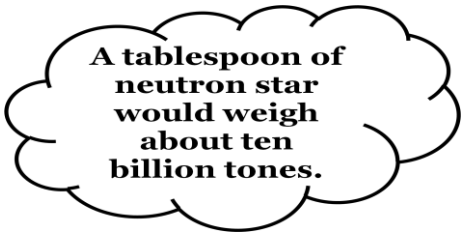
SHINY JERUSHAH.A
15/UPHA /001

ENTROPY OF MATTER A KEY FOR LIFE

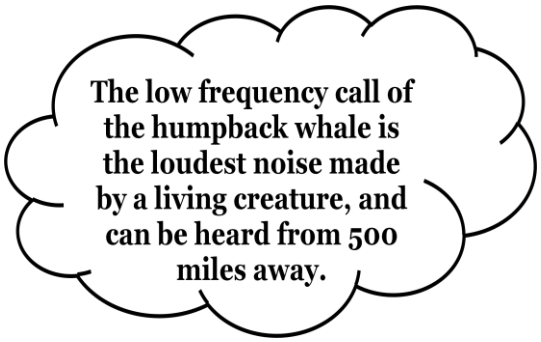
Nature is filled with several clues about how we understand the basics of life and the working of the living world. Among several disciplines, Physics is foremost in understanding itself with the help of organisms, animals and birds. Physics is about matter, and in particular active matter,

its mission is to create molecules that mimic living organisms, to create patterns that mimic the patterns of flocking birds, swarming bees and flapping tortoises.

Some of the interesting research in Physics of life was done by the team led by ZvonimirDogic, who created active matter in the form of self-moving molecules in a predictable pattern. This behavior mimics the patterns of the flocking birds. These are also known as active liquid crystals. This was reported in “Nature”, the international science journal in its volume 529, issue 7584.



In its broadest meaning, Physics of Life is about explaining the evolutionary phenomenon of everything in nature, according to Adrian Bejan, the author of a popular book entitled "Physics of Life” (St.Martin's Press).According to the hypothesis of Jermey England, who works in MIT, the matter's property of entropy causes life to be born. Hot things cool down, gas diffuses through air, eggs scramble but never spontaneously unscramble; in short, energy tends to disperse or spread out as time progresses. Entropy is a measure of this tendency, quantifying how dispersed the energy is among the particles in a system, and how diffuse those particles are throughout space.



Self-replication (or reproduction, in biological terms), the process that drives the evolution of life on Earth, is one such mechanism by which a system might dissipate an increasing amount of energy over time. His theory states that, systems of particles adapt their structures to become better at dissipating energy and the external factors make matter to become the cause of life. This is seen as the revolutionary idea and is seen as the emerging discipline of physics of life. This was reported in "Scientific American" journal.

NANDHINI.R
15/UPHA/039

LIFE OF PHYSICS

- When light travels through water from the air medium it causes the light to bend and this is called refraction which makes the image look shifted when seen by the naked eye.

- A current, in a river or stream, is the flow of water influenced by gravity as the water moves downhill to reduce its potential energy. An electric current is a flow of electric charge. If you compare them both the currents are similar to each to other.
- Cameras use converging lens and prisms to get pictures to be erect.
- In snow-boards they apply wax on the underside of the board to lower the friction for easy movement with great swift.
- Have you wondered why the moon's shape appears to change? Here's why, the Moon's half that moves towards the Sun looks like it is lit by sunlight and it seems to change its shape because we could see different phases of the bright part as it orbits around the Earth. When the Moon is between Earth and the Sun, the lit side is hidden from us.

M.DHEEPIKA SOUNDAR - 15/UPHA/007
K.SHANMUGA PRIYA - 15/UPHA/047

5 LECTURES ON PHYSICS

- ✓ **Music to your Ears** :

Sound is a propagating disturbance that carries energy but not matter. Sound waves are important not only for hearing but for probing structures as diverse as the Sun and developing fetuses.

- ✓ **Making Electricity** :

To generate electric current and keep it flowing, we need devices that can separate positive and negative charge and keep them separate. Here we look at devices from everyday batteries to solar cells.

- ✓ **Physics in the Kitchen** :

The kitchen is full of examples of physics, especially relating to heat transfer. We explore refrigeration and the many styles of cooking including, broiling, boiling, steaming, and microwaving.

- ✓ **The Light Fantastic** :

The laser is among the most important inventions of the 20^{th} century. We explore different types of lasers and their uses.

- ✓ **The Twentieth century's Greatest Invention?**

One of the most important inventions of the 20th century is the transistor, a tiny semiconductor

device at the heart of every electronic gadget, from the simplest radio to the most complex supercomputer.

JESINTHA.V
15/UPHA/027

THE COSMIC NATURE OF THE HUMAN BODY

I always gaze up at the sky. The universe is so full of wonders. I could spend hours and hours looking up at the sky and never take my eyes off from it. So many stars, so many mysteries and endless explorations! I consistently compare the universe with the human being.

The Big Bang Nucleosynthesis, with everything squeezed to infinite density, gave rise to the universe. This is so similar to the pain a mother undergoes to give birth to a child.

Gravity is the driving force behind stellar evolution. It leads to the compression of matter and hence formation of stars. Doesn't it look like the brain in the human body? Yes, I look at gravity, this way. If the brain doesn't work, we are all dead so is the universe, if gravity doesn't play its role.

The stars, I compare it with the organs of our human body. The stars are at an infinite distance from each other and are unique from one another and still they have their specific cosmic emissions and specific functions in this expanding universe. If a star is dead, the impact is seen all over the universe system. Similarly the organs in our body perform their specific functions at definite distances and together making a human body. If there is a problem with an organ, the human system is affected too!

As is the human body,

So is the cosmic body.

As is the human mind,

So is the cosmic mind.

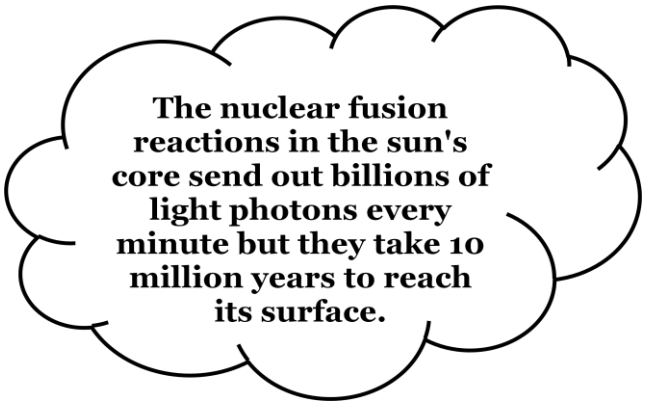
As is the microcosm,

So is the macrocosm.

As is the atom,

So is the universe

- The Upanishads



There is a lot to be explored both in the universe and in the human body. I would just conclude that the universe is not just outside of us, we are the universe! We do have nebulae, neutron stars, dwarf stars, admirable Milky Way, mesmerizing galaxies and much more. *Let us look deep inside of us to feel the elegance of physics*. Everything we want is already there. That is the physics of life.

CAROLINE KENNEDY
15/UPHA/013

THE PHYSICS INSIDE YOU…

The life of Physics began with the birth of evolution. And there on - physics is something that people tend not to think about, even when using it. When we understand the principles of Physics, any task –be it big or small, can be done with ease. Have you ever related Physics with yourself??

Breathing:

Breathing is a wonderful application of physics**. Boyle's Law**, i.e. the pressure and volume of a gas have an inverse relationship. During Inhalation, the expanded chest increases volume resulting in a low pressure inside the lungs than the atmosphere. Air gushes into the lungs.

The opposite happens during exhalation. The second part is the diffusion in lungs where oxygen in the air diffuses into the blood stream and CO2 is expelled.

Circulatory system:

Once again, Boyle's law is at play. The heart muscles contract reducing the volume inside it, causing a high pressure region. This forces the blood out into the arteries. While relaxed the volume is increased forming a low pressure resulting in blood inflow from veins. Now, heart has 4 such chambers and valve mechanisms which all work together to pump blood.

Walking, Jogging or Running:

Our muscles move our skeletal system so that we exert a force on the road. The road pushes back on our feet and we move along. Force is efficiently transferred to the ground if there is plenty of a grip. A large friction force is applied between the ground and the foot. We wear shoes which are optimized to give good grip in various conditions.

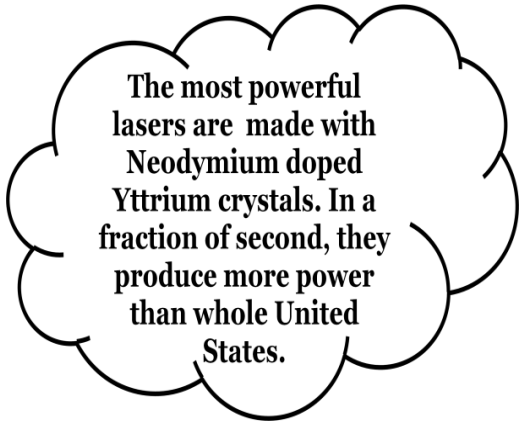
Thinking of boiling some water to make tea? Lots of physics there. Want to check what the weather will be like tomorrow? Lots of physics there. Playing a musical instrument? Plenty of

physics over there. It could go on forever.

MARY ANANDHI.F
15/UPHA/012

PHYSICS OF LIFE

- Physics is related to daily life because, without physics, X-rays and many other medical tools would be useless. Without physics, sending electricity from one place to another would be impossible, which means physics allows us to use phones, televisions and almost all devices. Without physics, it would be impossible to know how to keep cars and planes moving, or how to construct buildings.
- Physics allows doctors to use X-rays and ultrasounds, which can be crucial when finding a problem with a patient or helping a woman give birth. Physics also deals with lasers, so without physics, processes like laser eye surgery would not exist. Without physics, it would be impossible to understand how energy moves. As a result, without physics, it would be impossible to send energy from one point to another safely.



- There is also a field of physics called kinematics that physicists use to determine whether a mode of transport will be able to move. It is also used by architects to develop buildings. Physicists determine the safety of modes of transport and vehicles by calculating their weights, forces and more. Almost everything actually relates to physics in some way or another. Without it, we wouldn't even know how fast the Earth is moving.
- Physics is everywhere. Our way of walking and running is also governed by the laws of physics. From purification of water for drinking purposes, to the use of microwave ovens to cook delicious food, all make use of laws of Physics.

Furthermore, the use of the laws of physics is essential in the field of sports as well. Without proper knowledge of the working of the human body and the effects of stress on it, it would be a potential threat and highly risky to participate in sports and tournaments. Apart from participation, even watching a sports session would seem meaningless. Hitting a ball hard to score a six or running towards the ball to catch it before it hits the ground are all concepts of physics. Without this sphere of knowledge, the world of sports and physical education would not have existed. Apart from physics being utilized in every sphere of life, it is also one of the biggest contributors in stimulating the economy of a nation. It not only helps in boosting up the importance of each and every sector (such as transportation, communications, sports and numerous others as mentioned above) for common men, but also helps in creating numerous jobs

Physics influences our lives in a lot of ways. Without this subject life would have been monotonous and boring or rather there would have been no life at all!

15/UPHA/032
ROSELINE.F

LIFE OF PHYSICS

P – Perfect

H – Hark

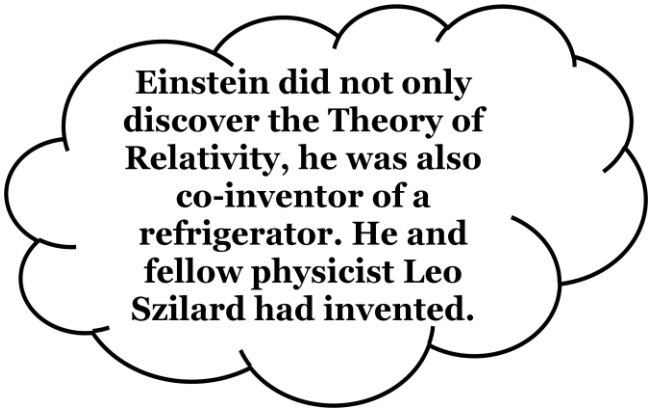
Y – Yarn

S – Secrecy

I – Ideal

C – Clearness

S – Science section

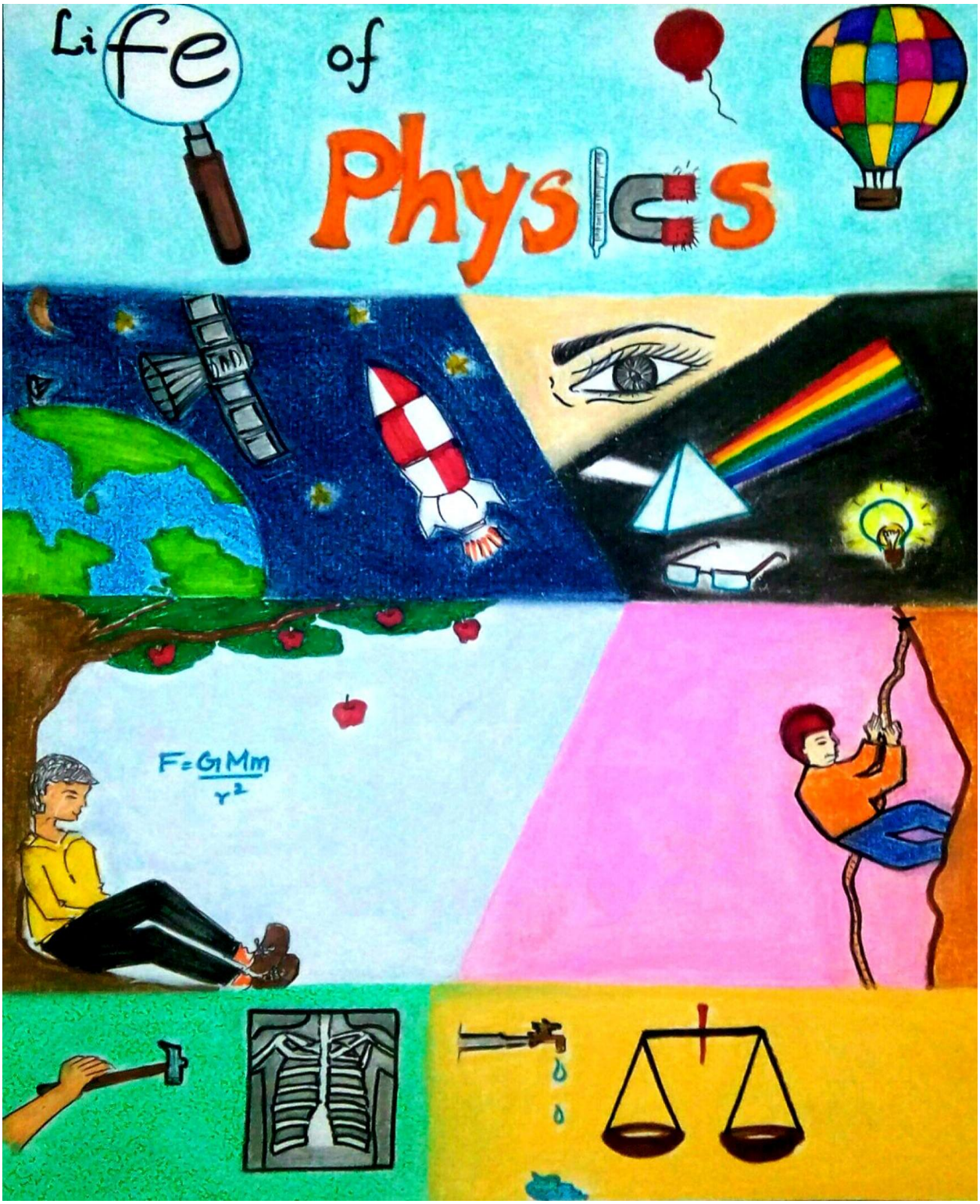


This is the full form of "PHYSICS". There is no life without the term called Physics, because physics is involved in our day - to - day life experiences. For example, the principles of physics are applied even while we drive a car too. When we give pressure on accelerator the car automatically moves and when we apply brake the hydraulic system which is present inside the car tyre automatically stops the car from its motion. Let's see few more examples which would clearly explain the term:

Recently ISRO space shuttle launched the PSLV rocket to find the weather condition. This is also based on physics, because the Rocket is acting based on the "Newton's second law". Newton's second law of motion pertains to the behavior of objects, for which all existing forces are not balanced***. The second law states that the acceleration of an object is dependent upon two variables - the net force acting upon the object and the mass of the object.***

This is how we experience the knowledge of physics in our daily lives. Physics is like an ocean. So keep studying on and on……

15/UPHA/032
F.ROSELINE



M.A.GAYATHRE LAKSHMI
16/UPHA/051

இயற்கை தந்த வளங்களில்.....

இயற்கைதந்தவளங்களில்
இனிமையாய்வாழ்ந்திடவே
இறைவன்தந்தார்இவ்வழ்வினை
இகத்தினில்இனிதேவாழ்த்திடவே

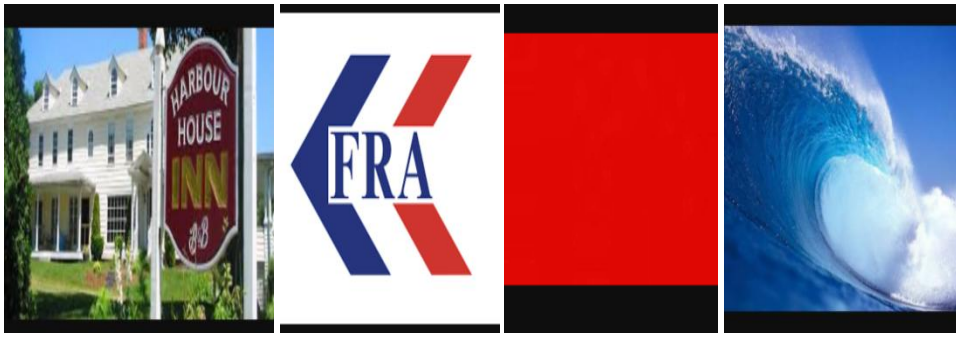
இயற்பியல்என்பதுபாடம்அல்ல
இன்றேசெய்திடும்செயல்களில்இருப்பதே?
காலைகண்விழித்ததுபோல்
இரவில்கண்மூடும்வரை
இயற்பியல்நம்வாழ்வில்கண்ணாமுச்சிஆட்டம்ஆடுகிறதுஅல்லவா!

ஆம், கண்விழித்தவுடன்குழாய்திறந்துகழுவிட
இணைப்பினைதந்ததுஇயற்பியலே!
மின்கன்பிகளின்மின்இணைப்பில்தானே
மின்மினியாய்மின்னமுடிகிறதுஎன்பதைமறுக்கமுடியுமோ
அறிவியல்கண்டுபிடிபுகளினால்பலபுதுமைகள்கண்டதுஉலகம்
அதனைஉலகுக்குகாட்டித்தந்ததுஇயற்பியலின்அறிவுதானே
ஆற்றல்மட்டுமல்லவிசைதிறன்என்று
ஆழமாய்மனதில்பதியவைத்துஒவ்வொன்றையும்
சாய்தளம்கொண்டுவாழ்வில்வாழவைக்கும்
சான்றோரின்இயற்பியல்நடைமுறையன்றோ!
அலையாய்வந்துஒலியைவானொலியிலும்
ஒலிஒளியாய்தொலைக்காட்சிபெட்டியிலும்
நேருக்குநேராய்கணினியிலும்
காட்சிதரஉதவிடும்இயற்பியல்அறிவினைநம்மிலேவளர்த்து
அப்துல்கலாம்கனவுகண்டஅறிவியல்அறிஞனாய்

மாறிடஉழைப்போம்உயர்வோம்உயர்த்துவோம்இவ்வுலகினை.

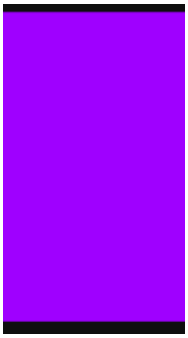
A. ANNI ROSE - 16/UPHA/008
A. MARY JENIFER - 16/UPHA/027

CONNECTIONS

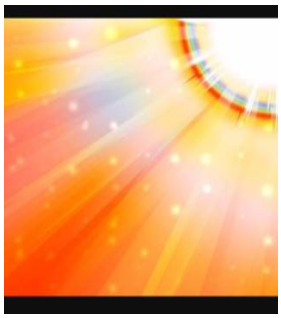


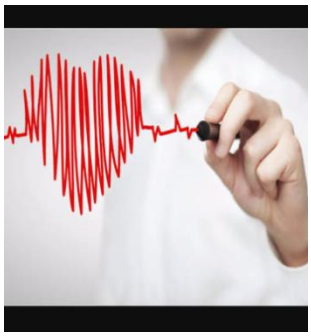

INVOICE
Sold to
Ship to
Quantity
Price
Amount


ULTRA
musicfestival




Are you ready?



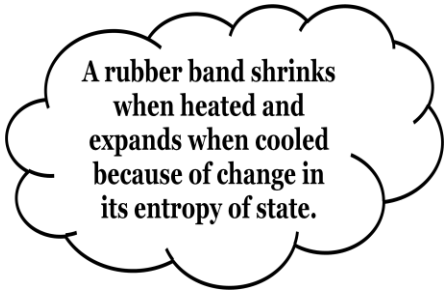


A.SHERLEY JUDITH CEICILIA
16/UPHA/050

ROLE OF PHYSICS IN OUR DAILY LIFE

The laws of physics govern the universe, from the structure of an atom to the Gravitational pull of a black hole. It is theorized that we live in a multidimensional universe, and there are universe that are governed by different set of laws. We are concerned about our Universe and how it works, as human civilization began to flourish, and we have advanced and manipulated the physical universe to our needs.

The understanding of the physical universe has changed ever since the "Theory of Gravity" – proposed by Sir. Isaac Newton. Then came, the theoretical physicist Albert Einstein with the "Theory of General Relativity", explaining how gravity works. Ever since the invention of new particle accelerator, the Large Hardon Collider at CERN, we have discovered the Higgs Boson Particle, which can replicate the environment during the birth of the universe. Our understanding of physics is said to be only a portion of a vast universe. If we are to analyze the evolution of human technology since the discovery of fire, we can realize that we have come a long way.



It would be a bit redundant to explain all the aspects of physics in our life, as it is everywhere and in everything. Even the concept of chemistry arises from the basic understanding of physical interactions between atoms. The most important discovery and principle contender for a dimensional variable is gravity or the forces of attraction. When we think of gravity, we instantly imagine planets, stars and galaxies. But, the forces of attraction can be understood from the interaction of atoms. In nature, there is a delicate balance of these interactions, these interactions are then passed as information in the form of RNA and DNA.

Life owes its existence to the laws of physics, and our understanding has medically advanced the life spans of humans.

SHARON-16/UPHA/016,
JENIFER CATHI-16/UPHA/003
JUSTIN-16/UPHA/014

PHYSICS IN VARIOUS FIELDS

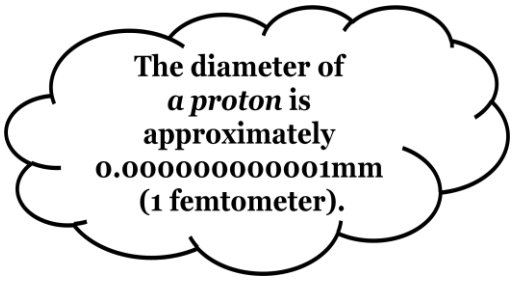
MEDICINE

While visiting a doctor, we usually encounter with various devices such as the stethoscope, sphygmomanometer, X-ray machine, MRI and CT scanner and many more. Each of these involves physics, to mention a few, optics, ultrasound imaging, particle acceleration, radioisotope tagging and detection techniques and many more. These have helped revolutionize the way we understand the human body.

Moreover, many infectious diseases can now be easily detected and cured with the advancement in technology. The lives of many people have been saved due to contribution of physics to the field of medical science.

COMMUNICATION AND TRANSPORTATION

The phone which helps you to connect to your friends and family, the airplane which allows you to go for trips to places around the world, and also the internet which allows you to search for various topics have all come into existence because of physics.



The smart phones that have become very common these days would not have been possible without physics. The telegraph or the telephones that were used in olden days also made use of the concepts of physics. The ability of smart phones to access the internet, to allow us to install many applications, apart from communication purposes have been possible only because of this subject .

In the field of transportation also physics has played a very vital role. The airplanes, cars and even the e-rickshaws that we very often use each day are the contributions of physics too. Computers and laptops were much recent inventions along with tablets and smart phones. Even the processors and the screen we use are constructed using concepts from this subject. CD's DVD's hard drives, earphones and what not. Everything starting from the smallest chip involves physics.

UTILISATION OF ENERGY

Oils and fuels can be found deep under the surface of the earth. These materials are immensely useful for various purposes. We can generate electricity, use them to run our cars, trains and airplanes. They are also used in the production of plastic, steel, concrete and even paper. Fossil fuels and oil, buried deep within the earth can be extracted only with the help of modern machines.

NAAFIAH ONAIZA
16/UPHA/057

WHAT PRINCIPLES OF PHYSICS DOES A TOILET UTILIZE

Physics in our daily life also include our daily needs so this topic includes functioning and the working of toilet and the physics behind it. To our amazement, behind this simple process lies a whole lot of physics and science. So in this article major definition, equations, functioning and working are discussed. After reading this you may be astonished because it involves Physics. Physics is ultimate and does involves in each and every aspect of life.

MAIN DESCRIPTION:

Potential energy, Pressure, Siphon effect, buoyancy are the principles of physics used in a toilet. The operation of a toilet is powered by the law of conservation of energy while it's function and capacity is calculated with Bernoulli's equation

.

POTENTIAL ENERGY:

Potential energy is the energy of an object or a system due to the position of the body or the arrangement of particles of the system. Potential energy **E=mgh**, where m is the mass of the object, g is the gravitational force and h is the height.

PRESSURE:

Pressure is the amount of force acting per unit area. The symbol for it is p or P. The IUPAC recommendation for pressure is a lower case p. However uppercase P is widely used. The usage P vs. p depends on the field in which one is working, on, the nearby presence of other symbols for quantities such as power and momentum, and on writing style.

SIPHON EFFECT:

The word siphon (Ancient Greek "pipe, tube" also called siphon) is used to refer to a wide variety of devices that involves the flow of liquids through tubes.

FULL ANSWER:

When the back of the toilet fills up with water at an elevated level, it contains a certain stored energy that is released when the flapper valve is opened to realeseit's contents into the bowl. The resulting kinetic energy released increases the volume of water in the bowl and its pressure in relation to its specific gravity. The water that was in the bowl maintains its position because it is buoyant enough not to flow over the curve in the plumbing pipe. The additional volume of water fills the pipe and pushes it over the curve, stating a siphon that drains the water from the toilet.

WORKING OF A FLUSH:

A toilet has two main parts:

- The Tank
- The Bowl.

The bowl holds water and connects to the drain for disposing of waste water and waste. The tank which sits up behind the bowl, contains reserve water for refilling the bowl plus the devices for flushing clean water into the bowl and refilling the tank. One of these devices called a ballcock is converted to the water supply and controls delivery of water to the tank. When the tank's water rapidly drops down into the bowl (upon a flush), the pressure causes the bowl's waste water to go down the drain. The drop in water level is sensed by a float, ball or pressure gauge and this triggers the ballcock to refill the tank.

L.SAMEETHA REENA - 16/UPHA/030
JENIFARSYINTIA - 16/UPHA/002

BRAKES IN OUR BIKES

Hi friends,

Well, Most of us are crazy about Bikes, Right? Bikes have become so important to us that we can't survive a day without them. A friend's party, a visit to your uncle's house, or just a necessary visit to your nearby supermarket, for all these situations the first question you would ask your mom would probably be, *"Where are my bike keys?"*

But have you guys ever thought about how our Bike's brake system works? So let us now observe the conversation between two friends Danie and Richard.

Richard: Hi Danie, are you free today? I need to visit the bookstore today. Can you accompany me?

Danie: Sure, Richard. Meet you at 5 pm.

(When they are on their way to the bookstore on Richard's bike)

Danie: Richard, have you ever wondered why bikes don't skid when brakes are suddenly applied? Is this because the wheels are not uniformly retarded?

Richard: Yes. In order to avoid this danger of skidding when brakes are applied, the hydraulic brake mechanism makes sure that each wheel is equally and simultaneously retarded. It works on the principle of Pascal's law.

Danie: Really? I have never heard of this .Can you explain more please?

Richard: The brake system has a main cylinder filled with brake oil. The main cylinder is provided with a piston P which is connected to the brake pedal through a lever assembly, a T shaped tube is provided at the other end of the main cylinder. The wheel cylinder having two pistons P1 and P2 is connected to the brake shoes S1 and S2 respectively.

SANJANA-16/UPHA/044
M.M.SUNDARAVALLI SNEHA-16/UPHA/045

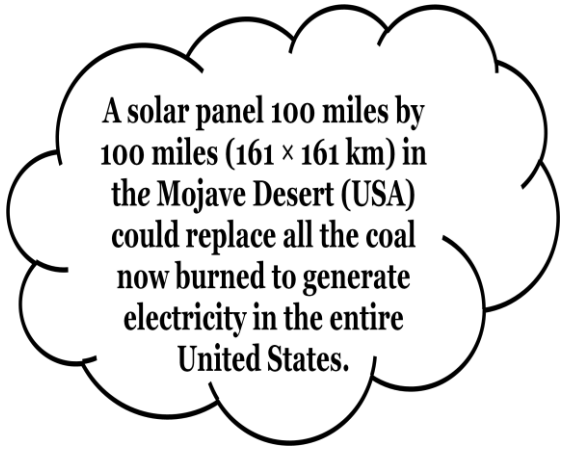
PHYSICS IN YOU!

Heat your sorrows
Magnetize your brain,
Gravitate your friends and
Wave your enemies.
Electrify your dreams
Radiate your happiness,
Oscillate your thoughts and
Insulate your body.
Let your thoughts be dynamic,
Your body be Energetic,
Your personality be Magnetic,
But don't be Static!
Let your action be Accelerated,
Your behavior be Balanced
Your health Sound!
And conduct your life.

S.SRIJA-16/UPHA/059
SHENANI.G.TEBBY-16/UPHA/O32
ASHITHA TOMY - 16/UPHA/037

PHYSICS IN A COLLEGE GIRL'S DAY

You wake up to the sounds of your alarm ringing, or to your mom shouting from the kitchen for you to wake up, if that's the only alarm you're used to. As you struggle to come to terms with the fact that you have college to attend, you're blissfully oblivious to the fact that the reason you're awake is due to the sound waves that travelled to and were received by your ears. The alarm or your mother's voice is the result of vibrations - of the alarm clock/phone or of your mother's vocal cords - which in turn causes the medium to vibrate (which is air; unless you live underwater). These vibrations are nothing but sound waves which, in air, are longitudinal waves periodically varying in pressure. You hear this because the pinna (outer portion of your ear) did a good job of collecting these vibrations and transferring them for perception to the eardrum, which acts as the transducer. A transducer is something that converts one type of energy into another and in this case, the sound energy is converted into electrical energy to be transmitted to the brain by nerve cells.



You rub your groggy eyes while also coming to the realization that you've woken up late. That means that your wholesome Indian breakfast is substituted with cereal. I'd like to point out that the cereal that you're gorging on can be attracted by a magnet if one were present at the breakfast table, because of its iron content.

After the hurried breakfast, you're good to go. Oh goodness, looks like you've dropped your glasses. In the period of time between when it fell and when you reached down to pick it up, everything you see is marred by a blur. This is due to the utter chaos that's going on in your eye as the light reflected by the objects in front of you is not perfectly converged by your lens onto the retina. The light rays converge either in front of your retina or at the back depending on whether you're farsighted or nearsighted. Once you wear your glasses and heave an involuntary sigh of relief, the lens of your glasses bends the light rays to converge exactly on the retina.

Now, if you want to reach before the second bell goes, taking the bus is out of the question. You'll have to ride your scooter to college. While I understand that all that you can think of right now is to get to college on time (and also of that homework that you forgot to do), I can't help but wonder if you know what you're doing. You do know how to ride the scooter but do you know just *how* you're riding that scooter? The only reason you're able to balance that scooter, apart from practice, is the gyroscopic effect. Until you start the engine, balancing on a scooter is unthinkable, unlike on a cycle. The internal combustion that occurs in the engine helps it power the scooter and the more you accelerate, easier it is for you to balance. In essentiality, when you accelerate, the gyroscopic moment rotates the steering head and makes it move along a curve of

smaller radius. The centrifugal force involved counteracts and the steering head is straightened, which results in stability.

You reach college just as the assembly starts. While listening to the intercom, you see a bird flying high. You marvel at the bird for how majestic it looks, which isn't a surprise, considering that you love animals. Do you wonder how it flies though? The short answer would simply be 'wings'. The long answer would explain how wings work. The shape of the wing causes the air above it to move faster than the air below it. According to Bernoulli's principle, faster moving air exerts less pressure and this pressure difference creates an upward force, which results in the wing's lift. The angle of attack of the wing (it "attacks" the air), is also important, because this helps the air under the wings deflect downwards which in turns results in the lift. Also, the reason the Wright brothers' airplane didn't stay in the air for long is because they used nearly flat wings, so the air above and below the wings didn't have much of a speed difference.

The assembly ends and you rush to class dodging the crowd as best as you can. The Professor is ten minutes late to class. Lucky you! Or was it luck? The Professor's car broke down minutes after she'd started from home. The reason for the breakdown was overheating, by which I mean uneven thermal expansion. The pistons made of aluminum, have a high coefficient of thermal expansion whereas the engine block made of iron has a much lower coefficient of thermal expansion. The driver's prudence prevented a grave incident from taking place but she invariably had to take the bus.

It isn't luck. It's Physics.

A. AAFIA ZAINAB
16/UPHA/012

INTERESTING FACTS

- “The air escaping from a punctured tyre feels cool.” This is because of the JOULE THOMSON EFFECT, which states that when a gas under pressure is permitted to expand into a region of low pressure, it suffers a fall in temperature. The air escaping from a punctured tyre enters a region of low pressure from high pressure and thus suffers a fall of temperature consequently there is a feeling of coolness.

- Dark blue suits appear black when viewed “IN CANDLE”. This is because that the candle light is deficient in blue colour whereas yellow colour is in excess. When yellow light falls on the blue suit, blue colour is absorbed by it and hence the appearance of the suit is black

- “The ink from the fountain pen spill out when we carry it in the aeroplane”. This is because the atmospheric pressure at high attitude is less as compared to what it is at sea level. Therefore, the air inside the fountain pen expands at high attitude and the ink contained inside the pen is pushed out. This causes spilling.

- “If we are sweating we will feel cooler on a hot day than on a cooler moist day”. This is because on a hot dry day the perspiration gets evaporated quickly causing more effect. On a cooler moist day, the rate of evaporation is comparatively less. Therefore, the cooling caused by evaporation is also less on a cooler moist day. Hence after sweating one feels cooler on a hot day than on a cooler moist day.

S.SRIJA - 16/UPHA/059
SHENANI.G.TEBBY - 16/UPHA/032
ASHITHA TOMY - 16/UPHA/037

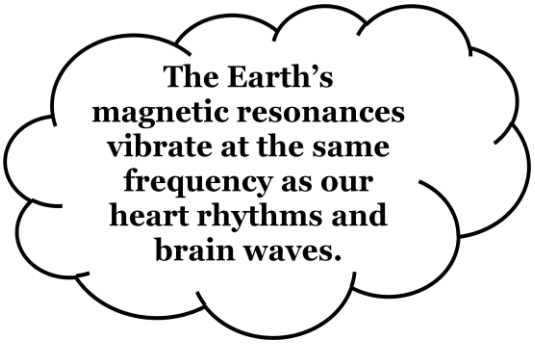
PHYSICS IN MEDICINE

The scope of physics in our day to day life is enormous. The range of physics in medicine consists of the application of theoretical and practical physics.

* **Physics of Imaging**
Ultrasonic imaging, Optical imaging, X-ray imaging, Fluorescence

* **Physics of Therapy**
Ultrasonic therapy, vibrational medicine, laser physics

* **Physics of Materials and Mechanics**
Physics of impact and injuries, physics of protein, physics of vascular and cerebrovascular diseases, Microfluidics in medicine



* **Physics of Instrumentation**
Optical instrumentation, Ultrasonic instrument, physics of micro-labs and bio-analytical sensor devices

* **Physics of hearing and seeing**
physics of hearing aids, physics of vision aids, Optics and vision, Acoustics and hearing

KEERTANA
15/UPHA/0

PHYSICS IN DAILY LIFE
(Analysis on physics of transportation)

INTRODUCTION:

Physics is in our day to day life. I am here to explain this fact by asking a simple question, that is, 'have you ever considered the energy efficiency of a human being moving from A to B?'

If this question is asked to the physicists, most of them would answer immediately to use bike or bicycle. It is because we all have the thought that, from our experience, using wheels gets us around roughly 5 times as fast with the same effort as going by foot. But in my opinion we could use our own human engine, the muscles, rather than using a car or a plane without oil, but by using food as source.

ANALYSIS:

But just how efficient is a bike ride? First, we have to examine the human engine. The power we produce is easily estimated from climbing stairs. If we want to do that on a more or less continuous basis, one step per second is a reasonable guess. Assume a step height of 15cm and a mass of 70 kg.

This yields a power of roughly 100W. Mountain climbers will find the assumed vertical speed quite realistic, since it takes us about 500m high in an hour, and that is pretty tough.

Riding our bike is pretty much like climbing the stairs: same muscles, same pace. In other words: we propel our bike with about 100W of power. However that comes into play with this type of activity, the efficiency is not so bad we may reach 25%. The total energy consumption needed for riding is therefore around 400W.

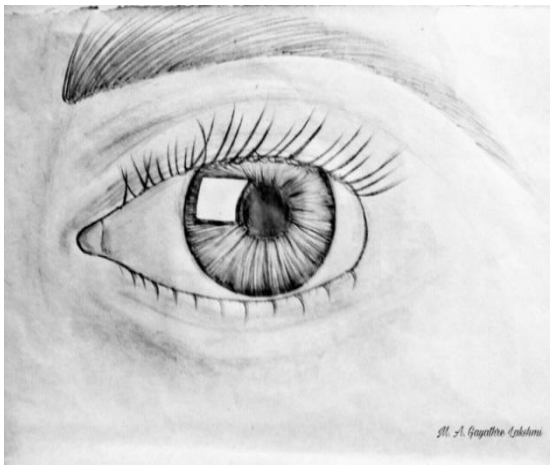
What does that tell us about the overall transport efficiency? How does this compare with other vehicles? Now it is time to make a small conversion. If we translate 400W continuously in terms of oil consumption per day we find pretty much exactly one litre per day, given that the heat of combustion of most types of oil and gasoline is about 35MJ per litre. In other words: if, for the sake of the argument we ride 24 hours continuously without getting off our bike, we have used the equivalent of one litre of gasoline in keeping moving. How far will that get us? That of course depends on the type of bike, the shape of the rider, and other parameters. If we take 20km per hour as a fair estimate, the 24hours of pedaling will get us as far as 480km. In other words: a cyclist averages about 500 km per litre.

That is not bad, compared to our car, or even a motor bike. So, we should all ride our bike if we want to conserve energy? Careful, there is a catch here. We have been moving on food, not oil. And it takes a lot more energy to get our food on the table than its energy content may suggest. A glass of milk, for example, takes roughly 0.1 litre of oil, a kg of cheese roughly one litre. It is because the cow has to be milked, the milk has to be cooled, transported, heated, bottled, cooled again, transported again, etc., same for cheese.

CONCLUSION:

Riding *our bike* (human engine) is fun. It is healthy. It keeps us in shape. And if we have to slim down any way, it conserves energy. Otherwise, I hate to admit it: a light motor bike, if not ridden too far, might be at them all.

VALENTINA SNEHA
16/UPHA/007

In physics, you don't have to go around making trouble for yourself- Nature does it for you.
-Frank Wilczek (1951-)

M.A.GAYATHRE LAKSHMI
16/UPHA/051

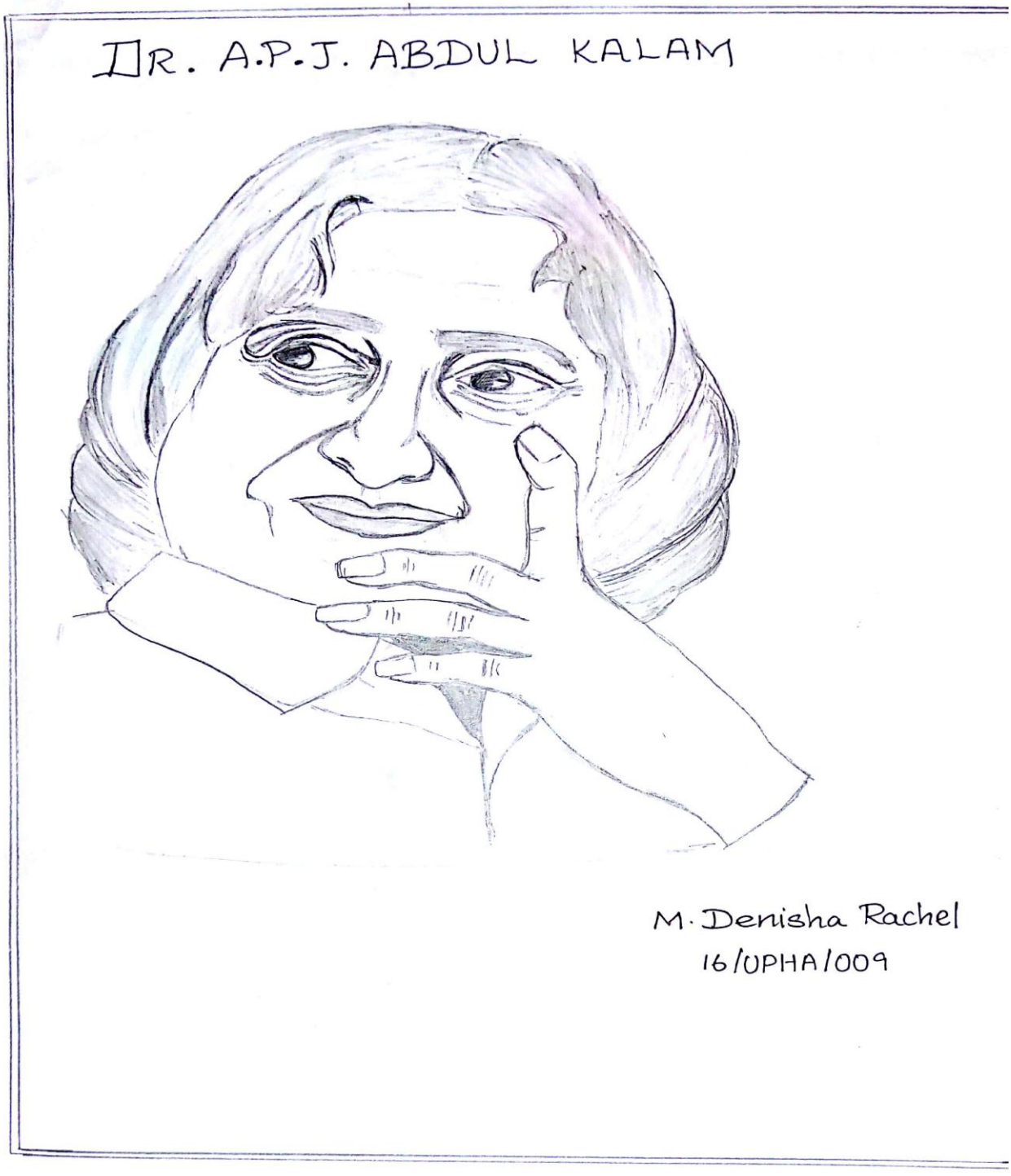
அன்றாடவாழ்வில்இயற்பியல்

மண்ணில்காலுன்றியவனை
விண்ணில்பறக்கவைத்தாய்
பூவுலகில்தடம்பதித்தவனை
பூகோளத்தைக்காணவைத்தாய்
சிறுதுளியைக்கண்டவனை
பேரணுவாய்பிளக்கவைத்தாய்
இமைப்பொழுதாய்சிந்திதவனை
நொடிப்பொழுதாய்மாற்றிவிட்டாய்
பற்றற்றுசுற்றித்திரிந்தவனை
ஓர்வட்டத்துக்குள்முடக்கிவிட்டாய்
மூச்சடக்கும்நாளில்உயிர்
மூச்செடுக்கசெய்துவிட்டாய்
என்னவென்றுசொல்வது
உந்தன்நினைவலைகள்

எந்தன்கனவலைகளோடு

வலம்வரவே.

MONISHA
16/UPHA/005



CROSSWORDS

R	H	O	B	E	G	A	A	E	F	A	D	A	C	H
E	I	H	N	E	I	N	S	T	E	I	N	A	S	V
G	T	C	W	R	E	H	I	K	J	T	E	N	T	F
N	M	K	H	G	A	E	S	D	Z	Q	I	F	E	D
I	A	N	E	A	M	L	A	S	X	M	L	K	P	O
D	R	A	I	Y	R	Y	P	Y	R	E	S	V	H	U
O	Y	L	S	R	Z	D	J	E	K	X	B	Z	E	H
R	C	P	E	J	A	D	F	I	B	V	O	D	N	O
H	U	X	N	O	P	N	W	E	Q	Z	H	E	H	L
E	R	A	B	D	N	Z	A	X	Y	T	R	R	A	N
S	I	M	E	G	R	A	M	M	E	N	U	F	W	O
N	E	U	R	S	S	G	R	V	A	E	M	L	K	T
I	L	K	G	B	A	R	F	D	X	R	R	A	I	W
W	A	N	N	E	R	Z	O	A	D	O	V	A	N	E
R	I	F	A	R	A	D	A	Y	E	L	I	C	G	N
E	R	D	E	L	N	K	A	K	N	I	K	C	I	M

- Discovery of the connection between collective motion and particle motion in atomic nuclei.
- General theory of relativity, Quantum mechanics
- Quantum mechanics
- Black holes
- Quantum electrodynamics
- Atom model
- String theory
- Development of the matrix mechanics formulation of quantum mechanics
- Visions of future
- Quantum theory, black body radiation
- Optical pumping
- Discovery of radium
- Theory of electromagnetic radiation
- Scattering of light
- Laws of motion, optics

PANIMAYAPEESHIJA.A
16/UPHA/010

L	**A**	**F**	**H**	**N**	**Y**	**I**	**R**	**P**	**I**	**N**	**O**	**P**	**S**	**A**	**A**
E	**C**	**M**	**E**	**E**	**V**	**V**	**E**	**L**	**O**	**C**	**I**	**T**	**Y**	**U**	**H**
T	**C**	**O**	**I**	**W**	**A**	**I**	**N**	**E**	**W**	**T**	**M**	**H**	**A**	**M**	**P**
N	**E**	**R**	**N**	**T**	**C**	**C**	**F**	**O**	**R**	**C**	**E**	**S**	**I**	**S**	**S**
M	**L**	**C**	**S**	**O**	**C**	**O**	**D**	**O**	**N**	**R**	**Y**	**A**	**S**	**I**	**S**
A	**E**	**A**	**T**	**L**	**U**	**V**	**O**	**L**	**T**	**S**	**E**	**L**	**H**	**T**	**B**
X	**R**	**H**	**I**	**O**	**M**	**M**	**M**	**Z**	**H**	**A**	**K**	**E**	**U**	**E**	**A**
S	**A**	**K**	**E**	**V**	**G**	**E**	**N**	**N**	**I**	**A**	**N**	**D**	**D**	**N**	**R**
M	**T**	**Y**	**N**	**E**	**W**	**T**	**O**	**N**	**O**	**H**	**A**	**N**	**K**	**G**	**A**
O	**I**	**H**	**X**	**F**	**C**	**E**	**H**	**A**	**S**	**D**	**S**	**A**	**E**	**A**	**I**
A	**O**	**E**	**M**	**A**	**S**	**S**	**E**	**N**	**O**	**I**	**E**	**C**	**E**	**M**	**S**
B	**N**	**R**	**G**	**M**	**A**	**S**	**R**	**T**	**E**	**S**	**L**	**Y**	**U**	**H**	**Z**
C	**Q**	**T**	**H**	**S**	**J**	**Y**	**T**	**I**	**C**	**I**	**R**	**T**	**E**	**L**	**E**
Y	**Z**	**H**	**J**	**S**	**L**	**S**	**A**	**M**	**A**	**S**	**E**	**L**	**U**	**O**	**J**
P	**S**	**N**	**O**	**R**	**T**	**U**	**E**	**N**	**H**	**J**	**A**	**L**	**S**	**E**	**T**

CLUES:

* UNIT OF FORCE
* A FAMOUS SCIENTIST
* MASS NUMBER – PROTONS =
* QUANTITY OF MATTER ON WHCICH FORCE IS ACTING
*RATE OF CHANGE OF
*DIMENSIONAL FORMULA OF___IS L/T
* FLOW OF ELECTRONS
* SPACE DEVOID OF MATTER
*UNIT OF FREQUENCY
* A POINT WHERE THE WAVE HAS MINIMUM AMPLITUDE
* UNIT OF MAGNETIC FLUX DENSITY
* UNIT OF LUMINOUS INTENSITY

* MASS * ACCELERATION
* PHENOMENON OF INTERACTION OF MAGNETIC AND ELECTRICAL PROPERTIES

SANGEETHANA-16/UPHA/025
DENISHA RACHEL-16/UPHA/009
MONICA-16/UPHA/053

C	N	Z	D	K	T	M	A	R	I	E	C	U	R	I	E	G	D	N	R	L
T	I	H	K	G	I	E	L	Q	T	U	H	K	Z	B	X	E	K	W	C	H
L	S	A	L	B	E	R	T	E	I	N	S	T	E	I	N	M	S	R	A	A
Q	S	F	H	M	A	C	H	N	L	X	Z	I	A	O	C	X	E	N	I	J
O	A	W	S	O	M	R	V	C	A	F	C	V	R	A	M	A	N	I	B	A
V	C	M	C	H	A	W	X	J	M	A	N	W	I	A	Q	X	T	K	U	M
R	N	K	S	E	M	I	N	F	I	P	G	N	Q	H	Z	S	X	O	V	E
A	E	H	K	F	N	A	N	T	L	R	H	I	B	A	P	I	H	L	F	S
H	W	O	R	M	A	H	A	D	A	A	O	M	D	S	N	N	E	A	T	W
K	T	A	A	J	K	O	L	O	S	F	F	J	R	D	S	D	L	T	B	A
E	O	M	K	O	O	M	W	L	U	U	X	M	T	A	V	H	E	E	T	T
S	N	P	N	S	H	I	A	J	W	L	S	K	Y	N	R	I	K	S	Q	T
A	T	Q	A	H	K	B	R	G	H	L	W	L	H	H	I	Y	Q	L	I	B
R	S	U	Y	I	R	H	T	I	F	A	L	V	N	G	W	A	L	A	M	K
D	H	I	H	I	A	A	H	R	D	R	A	J	R	E	D	D	Y	A	U	I
N	D	P	B	T	H	B	I	S	K	A	E	J	P	M	C	E	F	J	K	K
A	Q	H	A	O	H	H	Q	C	B	Y	Z	M	F	D	T	N	I	M	N	U
H	N	Q	C	S	V	A	M	I	C	H	A	E	L	F	A	R	A	D	A	Y
C	X	T	H	O	M	A	S	E	D	I	S	O	N	E	W	Q	R	I	P	R
S	J	A	G	A	D	I	S	H	B	O	S	E	A	G	M	R	G	T	E	Q

1. Pale botanist known for his research on the fossils of the Indian sub continent.
2. Computer scientist-best known for his work related to large scale artificial intelligence system.
3. Astrophysicist who developed the SAHA EQUATION- which explains chemical and physical conditions.
4. Mathematician famous for his outstanding contribution to algebraic geometry.
5. Bio chemist who won Nobel Prize for demonstrating how nucleotides in nucleic acid control the synthesis of proteins.
6. Theoretical physicist best known as the chief architect of the Indian Atomic Energy program.
7. Physicist, Biologist and Archaeologist who pioneered the investigation of radio and micro wave optics.
8. Famous academician and chemist, known for being the founder of Bengal chemicals and pharmaceutical.
9. Naturalist who developed Ornithology also known as the Bird man of India.
10. Astrophysicist won the Nobel Prize in 1983 for his research on the evolutionary stages of Massive stars.
11. Theoretical physicist – developed the general theory of relativity.
12. American inventor and Business man developed many devices including Phonograph, motion picture camera.
13. Scottish inventor and chemist improved on Thomas newcomens 1712 new (come steam engine).
14. Serbian American inventor and Physicist best known for his contributions of alternating current electricity supply system.
15. Indian physicist who carried out ground – breaking work in the field of light scattering.
16. English scientist who contributed to the study of electro magnetism and electro chemistry.
17. Naturalized French physicist and chemist who conducted pioneering research on radio activity.
18. English physicist and mathematician who is widely recognized one of the most influential scientist of all time and key figure in the scientific revolution.

CINTHIYA-16/UPHA/035
JOSHI INFANT-16/UPHA/020
AARTHY-16/UPHA/041

A	C	C	E	L	E	R	A	T	I	O	N
N	W	A	T	T	A	B	T	D	F	I	Y
I	O	N	N	C	E	L	O	H	H	G	T
O	B	W	E	O	M	V	M	X	B	E	I
N	J	V	L	W	O	N	G	G	M	K	C
B	U	O	Y	A	N	C	E	U	O	H	O
D	F	S	O	V	T	K	C	I	L	J	L
E	Y	R	B	E	L	Z	I	M	U	L	E
N	T	C	Y	C	L	O	T	R	O	N	V
S	T	R	E	S	S	Q	D	F	C	P	K
I	D	S	P	T	P	E	Q	U	E	I	C
T	R	A	B	S	T	R	A	I	N	V	N
Y	E	Z	R	O	S	W	U	Q	X	M	Y

CLUES:

1. The rate at which the velocity of a body changes with temperature.
2. Negatively charged ion.
3. The volume of a given mass of a gas at constant temperature is inversely proportional to pressure (law).
4. An upward force exerted by a fluid that opposes the weight of an immersed object.
5. A basic unit of matter that consist of a dense central nucleus surrounded by a cloud of negatively charged electrons.
6. A type of particle acceleration in which charged particles accelerate outwards from the centre along a spiral path.
7. The S.I derived unit of electric charge.
8. The mass per unit volume.
9. The transformation of a body from a reference configuration.
10. An applied force or system of forces that tends t strain or deform a body.
11. A derived unit of power.
12. A disturbance or oscillation that travels through space time accompanied by a transfer of energy.

13. It is a measure of the displacement of an object to time it took to travel the distance.
14. An atom or a molecule with net electric charge, due to loss or gain of one or more electrons.

SANDHYA.T - 16/UPHA/047
JENNY BENEDICTA.A - 16/UPHA/030
REENA FRANCY.B - 16/UPHA/022

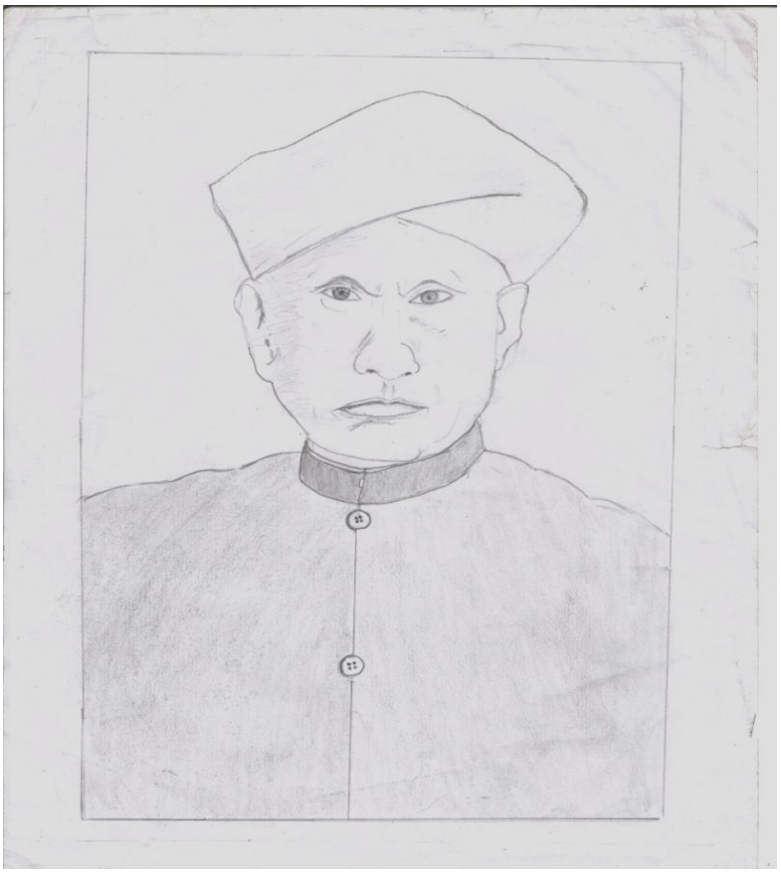
INDIAN PHYSCISISTS SIR C. V. RAMAN

Raman scattering or the **Raman Effect** is the inelastic scattering of a photon upon interaction with matter. It was discovered by C. V. Raman and K. S. Krishnan (who was a student of C.V. Raman) in liquids and independently by Grigory Landsberg and Leonid Mandelstam in crystals. The effect had been predicted theoretically by Adolf Smekal in 1923.

When photons are scattered from an atom or molecule, most photons are elastically scattered (Rayleigh scattering), such that the scattered photons have the same energy (frequency and wavelength) as the incident photons. A small fraction of the scattered photons (approximately 1 in 10 million) are scattered by an excitation, with the scattered photons having a frequency different from, and usually lower than, that of the incident photons. In a gas, Raman scattering can occur with a change in energy of a molecule due to a transition to another (usually higher) energy level. Chemists are primarily concerned with the transitional Raman Effect.

Raman spectroscopy can be used to determine the force constant and bond length for molecules that do not have an infrared absorption spectrum. Raman amplification is used in optical amplifiers.

1. C.V. Raman was born in _____
2. In Rayleigh's scattering_____ is scattering from an atom or molecule.
3. Raman Research Institute is in_____
4. When light traverses through a transparent material some of the deflected light changes in_____
5. Raman Effect is the _____ scattering of photon upon interaction with matter.
6. Raman effect had been predicted theoretically by _____
7. Raman spectroscopy can be used to determine _____ constant
8. In a gas, Raman scattering can occur with a change in _____ of a molecule
9. Raman amplification is used in _____ amplifiers.



FIND OUT THE ANSWERS IN THE BOX USING THE ABOVE PASSAGE:

L	**B**	**L**	**Q**	**M**	**N**	**R**	**F**	**G**	**T**	**K**
W	**A**	**V**	**E**	**L**	**E**	**N**	**G**	**T**	**H**	**C**
L	**N**	**K**	**P**	**Z**	**A**	**Q**	**B**	**Y**	**I**	**I**
A	**G**	**M**	**E**	**A**	**T**	**F**	**M**	**G**	**J**	**T**
C	**A**	**F**	**K**	**M**	**Y**	**D**	**P**	**R**	**L**	**S**
I	**L**	**R**	**T**	**T**	**S**	**H**	**X**	**E**	**D**	**A**
T	**O**	**E**	**C**	**R**	**O**	**F**	**W**	**N**	**O**	**L**
P	**R**	**U**	**P**	**T**	**I**	**E**	**L**	**E**	**O**	**E**
O	**E**	**Q**	**O**	**F**	**U**	**C**	**R**	**O**	**W**	**N**
E	**C**	**N**	**B**	**I**	**K**	**Y**	**H**	**P**	**D**	**I**
D	**S**	**P**	**S**	**T**	**I**	**B**	**T**	**Y**	**H**	**A**
S	**E**	**R**	**O**	**H**	**C**	**E**	**E**	**H**	**J**	**A**

A.ROSALINE BESANTIA-16/UPHA/039
S.SUSHMA EVANGELIN-16/UPHA/048

Achievement List

1) Name: **P.Sivapriya**
   Event: Maze runner
   Prize: second prize
   College: Anna Adarsh College for Women, Chennai.

2) Name: **Gowsalya**
   Event: Potpourri
   Prize: Third prize
   College: Anna Adarsh College for Women, Chennai.

3) Name: **Raganandhini.A**
   Event: Quiz competition
   Prize: 2nd prize
   College: Anna Adarsh College for Women, Chennai.
   Event: Quiz competition
   Prize: 3rd prize
   College: JBAS College for Women, Chennai.
   Event: Tamil essay writing competition
   Prize: 1st prize
   College: Stella Maris College, Chennai.

4) Name: **Yuvaneshwari.R.M**
   Event: Quiz program
   Prize: 3rd place
   College: JBAS College for Women, Chennai.

5) Name: **Princy Jessica AM**
   Event: Treasure hunt
   Prize: 2nd Prize
   College: Anna Adarsh College for Women, Chennai.

6) Name**: Thillai Shanmughi**
   Event: Reclamation (Best out of waste)
   Prize: First Prize
   College: Anna Adarsh College for Women, Chennai.
   Event: Paper presentation
   Prize: Second Prize
   College: JBAS College for Women, Chennai.

7) Name: **Fathima.N**
   Event: Paper presentation
   Prize: 2nd prize
   College: JBAS College for Women, Chennai.

8) Name: **Jenova.I**
   Prize: First prize
   Event: Reclamation (Best out of waste)
   College: Anna Adarsh College for Women, Chennai.

9) Name: **Sylvia Reena**
   Event: comic strips
   Prize: Second Prize
   College: Ethiraj College for Women, Chennai.

10) Name: **Aslin Jensi Priya**
    Event: Potpourri
    Prize: Second Prize
    College: Madras Christian College, Chennai.

INTERNSHIP

THIRD YEARS

INTERNSHIP ON SUSTAINABLE ENERGY- SOLAR POWER PLANT

Dorothy Selvam M, Krithika Jain and Shifana Lourdes completed an internship from 20 April, 2016-30 May, 2016 on 'SUSTAINABLE ENERGY-SOLAR POWER PLANT' under Mr. Priyadarshi Khare of Refex Energy Limited.

The interns were provided with data sheets and technical drawing of the solar modules manufactured by Refex Energy Ltd and were taught in detail about the terminologies used in the solar industry, incoming solar radiation, solar plant site selection, solar parameters, inverter efficiency, mismatch, shading, parts of a solar factory, a full integrated solar fabrication and related topics like nuclear and hydro power plant, the green house effects, extraterrestrial radiations, etc... The students were also trained in analytical and problem-solving skills and the internship served its purpose fully.

WPER 2016-IIT

Fathima.N, Swetha, Thillai Shanmughi of third year got selected for the WPER 2016 programme offered by the physics department at IIT Madras. The programme had 21 lectures and 5 lab sessions. Lectures were based on various fields in physics and the students were also given hands on experience with practical experiments.

INTERNSHIP AT METEROLOGICAL CENTRE

A group of 10 members, Aslin Jensi Priya, Christma Eunice Sherina, Princy Jessica, Sharon, Swetha, Sonia, Gowsalya, Helen, Janet and Wincy completed an internship at the meteorological Centre at Chennai. From there we got to learn a lot about the instruments used to measure rainfall and pressure. We were also taken to the Doppler weather radar station and were explained about the prediction and warning of the cyclones. The seismological Centre educated about the earthquake prediction. There were a lot of books and magazines in the library which had been very useful for our references.

IMPLANT TRAINING-IGCAR

A group of 7 members Anugraha, Swetha, Fathima, Thillai Shanmughi, Raga Nandhini, Infant Stany and Jenova underwent implant training on 'Ionizing Radiations and their safety measures' in Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam, for a week and learnt the salient features about the three stage program that India has adopted, different types of nuclear reactors and were made aware of the protective measures that were taken in order to prevent the nuclear disasters.

SECOND YEARS

TATA INSTITUTE OF FUNDAMENTAL RESEARCH
RADIO ASTRONOMY CENTRE
MUTHORAI-OOTY

Keerthana.S and Sonno Benny

- Theoretical classes on radio telescopes.
- Visit to the control room.
- Wide information on astronomy.

INSTITUTE OF WATER STUDIES
THARAMANI, CHENNAI

Divya Sherin.G.T and Shiny Jerushah

- Lectures on remote sensing technology and its applications.
- Activities of Q-Gis, Mapping.
- One day class on evolution and kinds of soil.
- Lectures on river basins of different states.
- Information about processing of rain water.

VELLORE INSTITUTE OF ASTRO PHYSICS

Roshini Xavier

- Went for site visit
- Learned about the VINU BAUGH Telescope – the largest telescope in Asia.
- Working of the telescope and had a view on how it works.

CPRI AND IISC
BANGALORE

Junia Shelori Solomon

- Lectures on SEM, optical and light microscope, transformer, material analysis and testing.
- Hands on experiments with SEM and light microscope.
- Experiments for determining ratio between e and m and diffraction patterns.

MG UNIVERSITY
KOTTAYAM, KERALA

Aleena Ann Mathew

- Nanostructured material epoxy BBS block polymer.
- Experimental work on nanoscience.
- Attended an international conference conducted for 3 days.
- Lab work on epoxy-SBS-blends.

OPTICAL CHARACTERIZATION ON NANOPARTICLES
UNDER THE GUIDANCE OF- DR. NANDHA KUMAR KALARIKA

Caroline.K

- Characterized ZnO Nanoparticle using UV-visible spectroscopy.
- Had a concise understanding of transmission electron microscopy.
- Attended five paper presentations of Ph.D. scholars.
- Attended an international conference.