NEBULA

~ PHYSICS JOURNAL ~

vol : 13 issue : 1
June 2022

DEPARTMENT OF PHYSICS

B. BOROOAH COLLEGE

Guwahati : 781007

NEBULA

An Annual Journal

Volume : 13 Issue : 1

2021-2022

Department of Physics
B. Borooah College
Guwahati - 781007
Assam

"Learn from yesterday.
Live for today
Hope for tomorrow.
The important thing is
not to stop questioning"

- Albert Einstein

In today's age, science has made so much progress that human beings can not live without the amazing discoveries and inventions. With the help of science and instruments, the human race has climbed over the mountains and has marked it's footprint on the land of moon. From getting up in the morning to sleeping at night, all kind of equipments we use is the blessings of science and technology. Radio, television, airplane, mobile, bike, motor, fan, agriculture and many more are all given by science.

In this volume, our authors have tried to colourfully depict the diversity of scientific study. Our article in the range from the origin of universe to journey of science and many other interesting topics. Also, our authors have tried to explain many fascinating phenomenon through poems. The diversity of achievement in scientific research and opinion brilliantly complemented by the work of our creation team. We hope you enjoy the wonderful artwork of 'NEBULA', which makes it a unique publication.

We planned to publish 'Nebula' in 2021. But due to Covid-19 pandemic, we suffered last two years a lot. Now, we hope this 'volume XIII' refreshes and encourages readers to explore the field of science.

Editorial Board,
'NEBULA'

"Nothing is better than reading.
and gaining more and more knowledge"

- Stephen Hawking

Objectives Of **NEBULA**

The objectives of publishing 'NEBULA' are :

1. To publish articles on science and education written by students, alumni and faculty members of the department.
2. To encourage the students to write science related articles for popularization of science and to grow scientific mind.
3. To familiarize editing scientific journal.
4. To inform the B. Borooah College fraternity about various activities of the department.
5. To provide a medium of interaction for the alumni of the of the department.
6. To give an exposure to the activities of the alumni of the departmemnt.

The opinion expressed in this journal are those of the individual authors and do not reflect the views of the department of physics, B. Borooah College or the editorial board of the '**NEBULA**'

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“Everything is theoretically impossible,
until it is done.”
– Robert A. Heinlein.

ARTICLES

“The good thing about science is that,
it's true whether or not you believe in it.”
– Neil deGrasse Tyson

Origin of the Universe

~Biman Jyoti Das
B.Sc. 2nd Semester

The universe is everything. From the tiniest particles to the largest galaxies, to the very existence of space, time and life, but how did it all begin?

Multiple scientific theories plus creation myths from around the world have tried to explain its mysterious genesis. However, the most widely known and accepted explanation is the Big Bang Theory.

The Big Bang Theory states that the universe began as a hot and infinitely dense point. Only a few millimeters wide, it was like a supercharged black hole. About 13.7 billion years ago this singularity violently exploded. And it is from this explosion, that all matter, energy, space and time were created. What happened next were the two major stages of evolution of the universe called the radiation and matter eras, they are defines by key events that helped shape the universe.

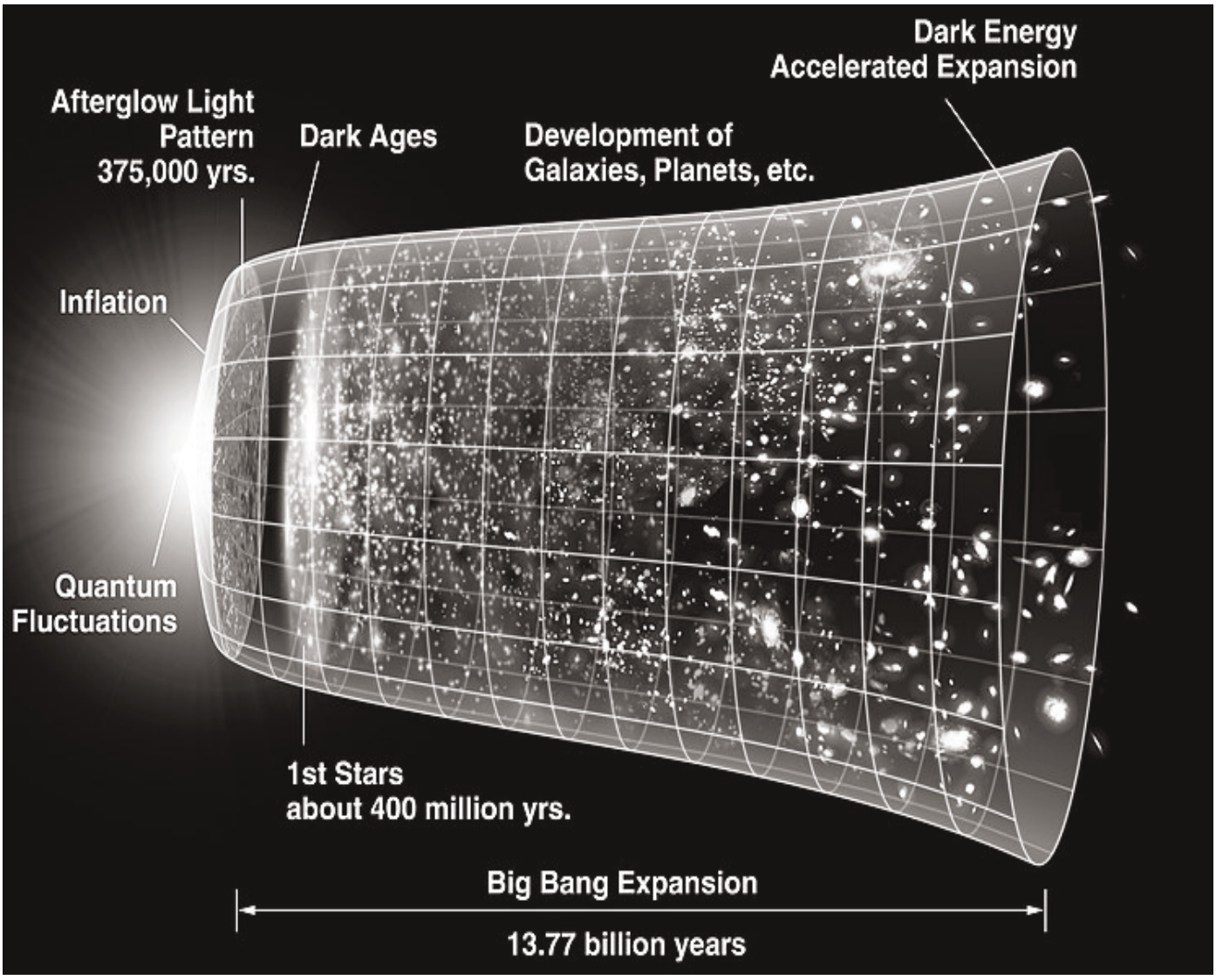
First came the radiation era, named for the dominance of radiation right after the Big Bang. This era is made of smaller stages called epoch that occurred within the universe's first ten of thousand of years. The earliest is the Plank's epoch. No matter existed in this universe at this time, only energy and the ancestor to the four forces known as super-force existed. At the end of the stage, however a key event occurred in which gravity split away from super-force. Next came the grand unification epoch named for the three remaining unified forces of nature. This epoch ended with splitting of strong nuclear force.

Then the inflationary epoch began during which the universe expanded rapidly. The universe at this time was piping hot and it churned with electrons, quarks and other particles. After that came the electroweak epoch, when the last two forces electromagnetic and weak finally split off. During the next stage, the quark epoch, all of the universe's ingredients were present. However, the universe was still too dense and hot for the subatomic particles to form. Then in the hadron epoch the universe cooled down enough for the quarks to bind together and form protons and neutrons. In the lepton and nuclear epochs, the radiation era's last two stages, the protons and neutrons underwent a significant change. They fused and created nuclei. And in doing so they created the first chemical element in the universe, Helium. The Universe's new ability to form elements, the building blocks of matter queued the matter era.

As the name suggests, the matter era is defined by the presence and predominance of matter in the universe.It features three epochs that span billions of years, The vast majority of the universe's life span, and includes

, and includes the present day. The first was the atomic epoch. In this stage, the universe's temperature cooled down enough for electron to attach to nuclei for the first time. In this process Hydrogen was created. This hydrogen atom along with helium atom dotted the universe with atomic clouds. Within the clouds, small packets of gas may have enough gravity to cause atoms to collect. These clusters of atoms, formed during the galactic epoch became the seedlings of galaxies. Nestled inside those galaxies, stars began to form. And in doing so, they queued the latest and current stage of the universe's development, the stellar epoch.

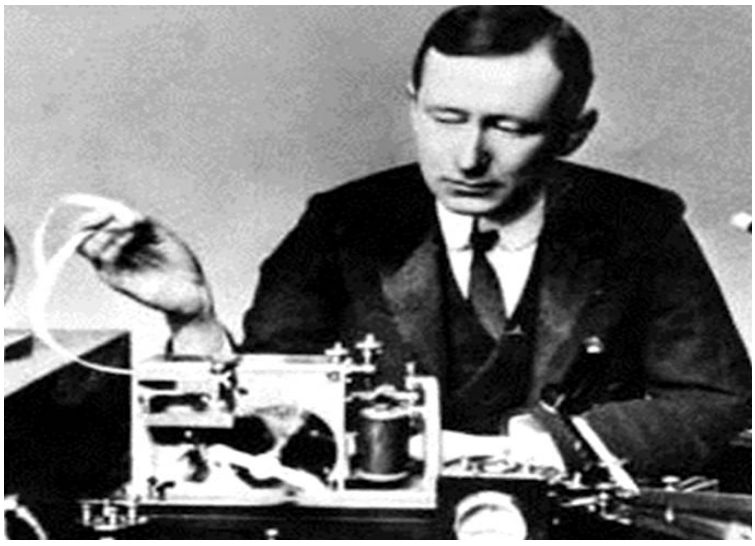
The formation of stars then caused a tremendous ripple effect and help shape the universe as we know it. Heat within the stars caused the conversion of helium and hydrogen into almost all the remaining elements in the universe. In turn those elements became the building blocks for planets, moons, life, everything we see today. This ecosystem of everything was only possible because of the many stages of in the Universe's development.While countless questions of the origins of our universe remain, it's only a matter of time for some long-sought answers to emerge.



Guglielmo Marconi

~Dipangkor Basumatary
B.Sc. 2nd semester

Guglielmo Marconi was born April 25, 1874, Bologna, Italy. He was an Italian physicist and inventor. He began experimenting with radio waves in 1894. His work on the development of shortwave wireless communication constitutes the basis of nearly all modern radio broadcasting. His improved aerials greatly extended the range of radio signaling. In 1899 he established communication across the English Channel. In 1900 he established the American Marconi Co. In spite of the opinion expressed by some distinguished mathematicians that the curvature of the Earth would limit practical communication by means of electric waves to a distance of 161–322 km, Marconi succeeded in December 1901 in receiving at St. John's, Newfoundland, signals transmitted across the Atlantic Ocean from Poldhu in Cornwall, England. This achievement created an immense sensation in every part of the civilized world, and, though much remained to be learned about the laws of propagation of radio waves around the Earth and through the atmosphere, it was the starting point of the vast development of radio communications, broadcasting, and navigation services that took place in the next 50 years . He acquired numerous patents, though probably his most famous one, No. 7777, for an apparatus that enabled several stations to operate on different wavelengths without interference, was later overturned. Marconi shared the 1909 Nobel Prize for Physics with K. Ferdinand Braun. He was made a marquis and was nominated to the Italian Senate, and he was elected president of the Royal Italian Academy. He died on July 20, 1937, Rome.

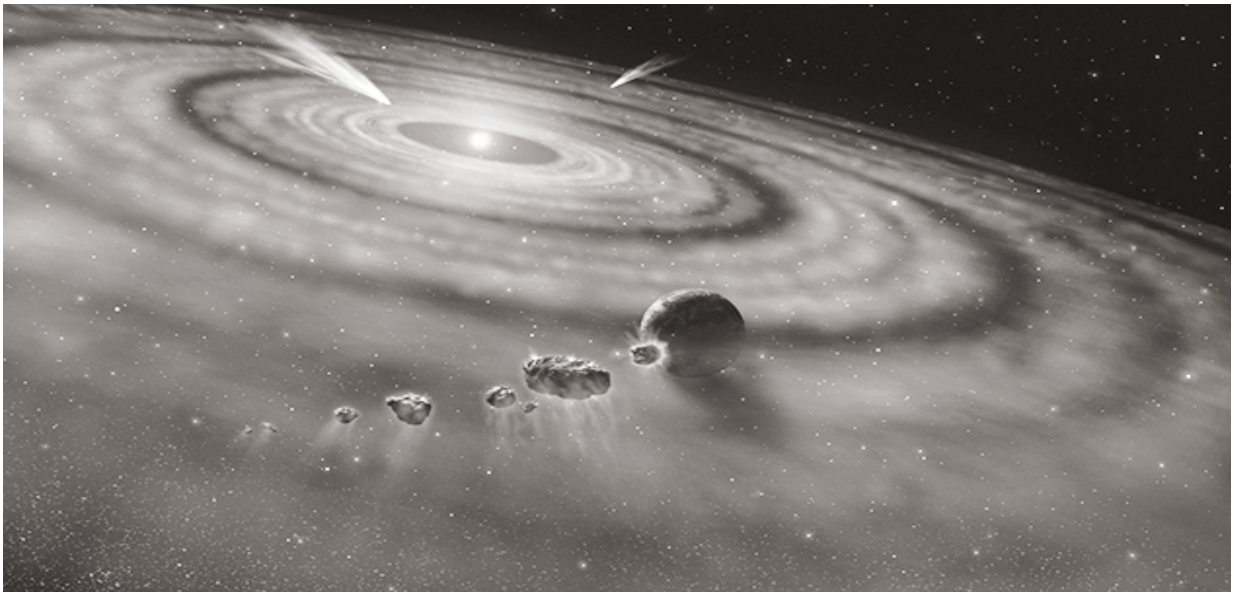


Journey of science

~Dwaipayan Kashyap
Bsc. 2nd Semester

The entire universe is full of mysteries and inexplicable phenomena that compel us to fathom innumerable questions. But, the simplest question is that "Do we really know anything about our universe and how it formed?" Many greatest of minds spent their entire life trying to find the answer to this simple yet complicated question. On their journey, they gifted us with many shocking discoveries and useful inventions that curved a new path for us to understand nature and helped us to observe things from a different perspective. We cannot but wonder at the fact that what we know is ridiculously negligible compared to what we still do not know or are not sure exist.

The greatest scientist ever, Albert Einstein, through his famous theory of relativity led our minds to a whole new state since it opened the possibility of time travelling. From time to time, we had been constantly focusing to reach near the end of side where we no longer have any answers to seek for. And it is obviously absurd to even imagine that. But still we came a long way and became more hardworking to seek for those answers. Because who knows.....maybe a time will come when we can actually imagine that state of knowing everything.



N95 Physics: More Physics than you think

~Raj Kishore Sarma
Bsc. 2nd semester

Have you ever thought what goes into making a N95 mask? Of course you haven't. If you have, well you are a geek for sure. You have simply thought it is a mask with very small holes that does not allow Covid-19 virus (SarsCov-2) to pass through. You maybe thought that it has several layers to make sure nothing passes through. YOU ARE WRONG. Now lets get into what it really is.

N95 masks do have small holes and several layers, but that's not the reason why they are so effective. They can easily block out large and extremely small particles, it's the medium sized particles that cause problems. There are three different reasons why N95s work. We'll learn about them one by one.

Okay so the first reason is that there are several layers. The large particles(not so large) of sizes about 1 micrometer(1000th of a millimeter) mostly travel in straight lines because of their inertia(basically because of their masses). Since there are several layers, these particles collide one or the other layer of the mask. Now what happens after they collide? The fibers of the mask are made in such a way that the particle stick to them and airborne particles do not stay airborne anymore.

Second reason is also that they have several layers. But this reason has more to do with the size and properties of the particle less than 0.1 micrometers in size move in zig zag lines, called Brownian motion, because of their extremely light weights. Since the particles move in zig zag lines, the chances of them hitting the layers is more. Hence they too stick to the fibers.

The third reason is the most interesting one. It has do with electricity. We know that

neutral objects develop an internal electrical imbalance when placed near a charged object. This attracts the originally neutral objects to the source. This is the reason why neutral paper stick to oiled glass rulers. Static electricity. But the fibers in N95s do not use static electricity, they are permanently charged. Just liked pieces of iron can me permanently magnetized to form magnets, pieces of plastic can be permanently electrified to form electrets. Hence when neutral particles like dust,viruses,bacteria etc. approach an electrified fiber they develop internal electric imbalance which attracts them to the fibers and they stick to them. Genius right?

"Science is simply the word to describe a method of organizing our curiosity."

— Tim Minchin

Humans and Artificial Intelligence : What are humans worth?

~Raj Kishore Sarma
BSc. 2nd Semester

As the days roll by, newer technologies roll out. That is fantastic. But is it? Will robots replace human and are we on the verge of extinction? The answer is NO. Lets find out why the answer is no.

Currently the world is not on the verge of the third mass-scale, inevitable social revolution in as many decades. Blockchain, NFTs, crypto these are the words on everyone's mouths. But what are these? These are technologies which promote decentralization. That means there are no central institutions like governments,banks and corporations who control our money and information. It is basically democracy in terms of information sharing. There will be no mediators in the process of sharing data. Well it sounds brilliant right, that's because it is brilliant. All the villainous corporate lords with champagne in their glasses, or the bald and fat politicians with cigars in their lips cannot play with our money or our private information. This is the Web 3.0 and anyone is allowed to join in. I'm totally for that.

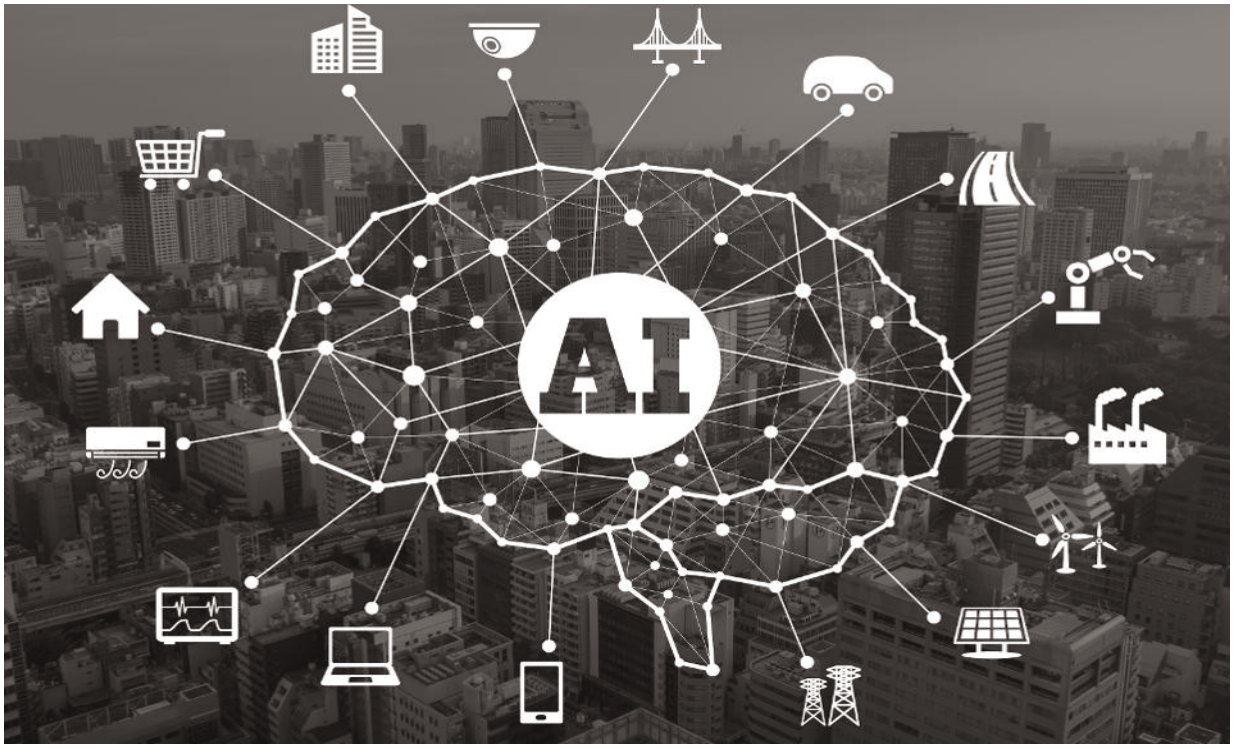
The problem now is not with Web 3.0 then, it is with artificial intelligence, augmented reality, virtual reality and you can bring out thousands of such other words. This is all a part of the Metaverse,and no this is not a Zuckerburg creation. He just simply renamed his company to suit the revolution,so that it looks at the forfront. In the metaverse almost everything is automated, your job is done for you by a computer and it does it better than you. It does not get tired, request leaves, everything is just perfect. For business owners it is very cost effective. But is it that effective for us humans? If everything is done by a machine for us, what is our worth then? Most of us are not genius level engineers to be building those machines. And once the machines get a proper brain they can build even more machines. The human essence is lost.

Today we work,we fail,we lose,we get up and learn. All along the way,we do not keep an extreme level of our work. We have down days and days where we are supermen. That is what humans are - imperfect. On the contrary if a machine does everything, things will be perfectly done each time. That would make no sense,as we would have no metric to judge what perfect is and what is not. We would not know what a terrible thing could look like. If AI bots create art and sing and dance,there would be be zero value of human emotions. For sure the AI is based on some human's brain,but the thing is it is made up of only the best parts,neglecting the bad parts. I say include the bad parts too,then they would be close to humans.

Jobs would be lost,there would be social anarchy. Human resource,heck most of the population could go to waste. Among the rich

the majority will be slobs, sleeping on the couch,eating food a bot made,watching some show bots wrote,directed and acted in. If I can see and feel what my friend in Paris sees, I'd be mind blown. It would be so nice to feel Paris without visiting. But what will be unique in me or my friend there,if all our experiences are collective.

Now the positives are our live would become much more simpler if we use AI tech well,and with limits. Also with people becoming lazier and lazier, becoming great would be a easy process. You just have to be better than the lazy guys.



"It doesn't matter how beautiful your theory is, it doesn't matter how smart you are. If it doesn't agree with the experiment, it's wrong."

- Richard P. Feynman.

Time: Extrapolating the Conundrum

~Nishan Das
Bsc. 2nd Semester

One of most influential physicists to have ever lived, Albert Einstein, shared his view, writing, “People like us who believe in physics know that distinction between past, present, and future is only a stubbornly persistent illusion.” In non-relativistic or classical physics, the concept of time generally used is that of absolute time (also called Newtonian time after its most famous proponent), time which is independent of any perceiver, progresses at a consistent pace for everyone everywhere throughout the universe, and is essentially imperceptible and mathematical in nature. This accords with most people’s everyday experience of how time flows. However, since the advent of relativity in the early 20th Century, relativistic time has become the norm within physics. This takes into account phenomena such as time dilation for fast-moving objects, gravitational time dilation for objects caught in extreme gravitational fields, and the important idea that time is really just one element of four-dimensional space-time. Time is surrounded by many mystifications. Most physicists agree that time had a beginning, and that it is measured from, and indeed came into being with, The Big Bang some 13.8 billion years ago. Whether, how and when time might end in the future is a more open question, depending on different notions of the ultimate fate of the universe and other mind-bending concepts like the multiverse. According to the theory suggested by a group of Spanish scientists led by Prof. Senovilla, and University of Cambridge cosmologist, Time is slowing down, and may eventually grind to a halt, resulting in all of existence being frozen “like a snapshot” within a single moment in time, similar to how a wind-up mechanical timepiece loses its energy. A British theoretical physicist, Gary Gibbons opined on the claim: “We believe time appeared at the Big Bang, and if time can appear, it can also vanish — it’s just the opposite effect.” We know (or think we know) that time must be greater — deeper — wider — richer than we can yet comprehend with our limited senses. We are smart enough to give it a name, and smart enough to know that there’s more to it than we can really explain, but that’s where our abilities end. Maybe we will eventually evolve the ability to move through time in ways we can’t now. Maybe there are other beings in the universe who already can. Who can say? Time is a mystery and will be a mystery — for a long time.

Tokamak Reactors: The Future Now

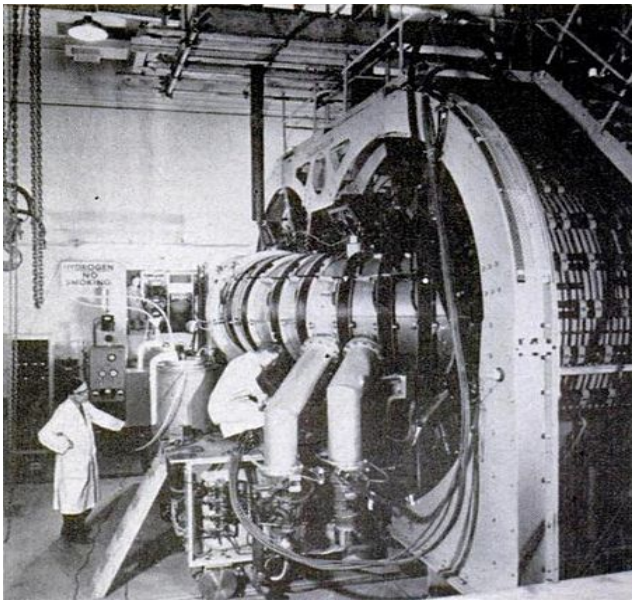
~ Raj Kishore Sarma
Bsc. 2nd Semester

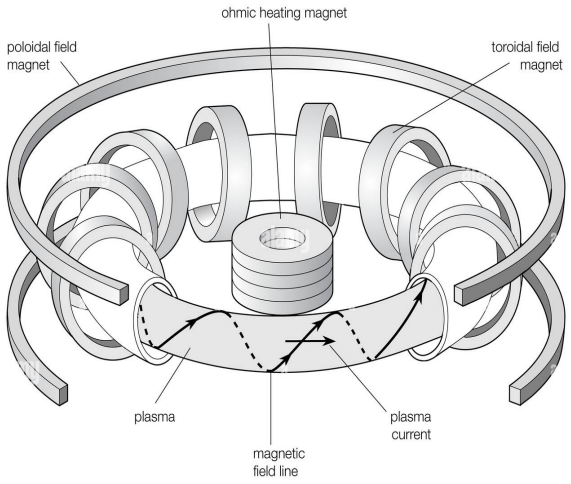
Tokamak reactors are experimental reactors which are designed to harness the energy of nuclear fusion. Inside a tokamak,the energy produced through the fusion of atoms is absorbed as heat in the walls of the vessel. This heat is used to produce steam and then electricity by way of turbines and generators.

The heart of the reactor is its doughnut-shaped vacuum chamber. Inside,due to extreme heat and pressure, gaseous hydrogen fuel turns into plasma. Plasma provides the environment in which elements can fuse. The plasma can be shaped and controlled by massive magnetic coils placed around the vessel.

Initially,air and impurities are evacuated from the chamber.Then the magnet systems are charged up and the gaseous fuel is introduced. Due to strong electric current,the gas is ionized forming plasma.As the plasma particles are energized,they collide and heat up. Particles energized to such a degree fuse,releasing huge amounts of energy.However,the energy needed to kick start and sustain the initial reaction is high.We have not been able to successfully build an energy positive reactor,but we are close.

At the present, the largest tokamak reactor in the world is the ITER, or the International Thermonuclear Experimental Reactor, which is being constructed in France.When nuclear fusion is proven out as a sustainable energy generation method, it will be fully waste-free and capable of powering entire cities through just one reactor.





What DARK ENERGY & DARK MATTER is????

~Bideep Barman
Bsc. 2nd Semester

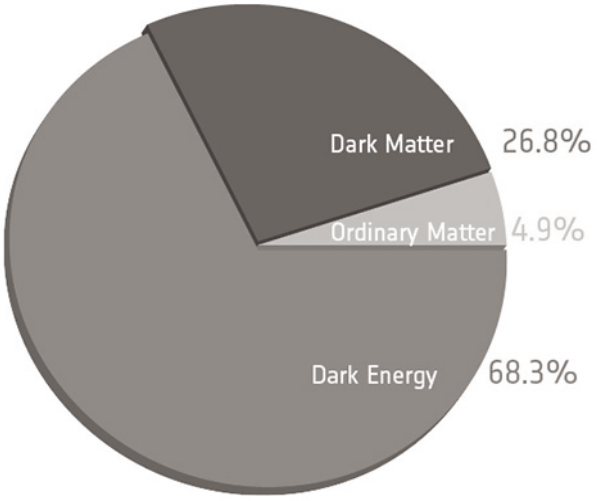
In the early 1990s, one thing was fairly certain about the expansion of the universe. It might have enough energy density to stop its expansion and recollapse, it might have so little energy density that it would never stop expanding, but gravity was certain to slow the expansion as time went on. Granted, the slowing had not been observed, but, theoretically, the universe had to slow. The universe is full of matter and the attractive force of gravity pulls all matter together. Then came 1998 and the Hubble Space Telescope (HST) observations of very distant supernovae that showed that, a long time ago, the universe was actually expanding more slowly than it is today. So the expansion of the universe has not been slowing due to gravity, as everyone thought, it has been accelerating. No one expected this, no one knew how to explain it. But something was causing it. Maybe there is something wrong with Einstein's theory of gravity and a new theory could include some kind of field that creates this cosmic acceleration. Theorists still don't know what the correct explanation is, but they have given the solution a name. It is called DARK ENERGY

We know how much dark energy there is because we know how it affects the universe's expansion. Other than that, it is a complete mystery. But it is an important mystery. Here's a sobering fact: The matter we know and that makes up all stars and galaxies only accounts for 5% of the content of the universe! Where is the rest? It turns out that roughly 68% of the universe is dark energy. Dark matter makes up about 27%. The rest - everything on Earth, everything ever observed with all of our instruments, all normal matter.

In physical cosmology and astronomy dark energy is an unknown form of energy that affects the universe on the largest scales. One explanation for dark energy is that it is a property of space. Albert Einstein was the first person to realize that empty space is not nothing. Space has amazing properties, many of which are just beginning to be understood. The first property that Einstein discovered is that it is possible for more space to come into existence. Then one version of Einstein's gravity theory, the version that contains a cosmological constant, makes a second prediction: "empty space" can possess its own energy. Because this energy is a property of space itself, it would not be diluted as space expands. As more space comes into existence, more of this energy-of-space would appear. As a result, this form of energy would cause the universe to expand faster and faster. Another explanation for how space acquires energy comes from the quantum theory of matter. In this theory, "empty space" is actually full

of temporary (virtual) particles that continually form and then disappear. But when physicists tried to calculate how much energy this would give empty space, the answer came out wrong - wrong by a lot. The number came out 10120 times too big. That's a 1 with 120 zeros after it. It's hard to get an answer that bad. So the mystery continues.

As we described above, ~68% dark energy, ~27% dark matter, ~5% normal matter. What is dark matter? Dark matter is a hypothetical form of matter thought to account for approximately 85% of the matter in the universe Its presence is implied in a variety of astrophysical observations, including gravitational effects that cannot be explained by accepted theories of gravity unless more matter is present than can be seen. For this reason, most experts think that dark matter is abundant in the universe and that it has had a strong influence on its structure and evolution. Dark matter is called dark because it does not appear to interact with the electromagnetic field which means it does not absorb, reflect or emit electromagnetic radiation and is therefore difficult to detect. We are much more certain what dark matter is not than we are what it is. First, it is dark, meaning that it is not in the form of stars and planets that we see. Observations show that there is far too little visible matter in the universe to make up the 27% required by the observations. Second, it is not in the form of dark clouds of normal matter, matter made up of particles called baryons. We know this because we would be able to detect baryonic clouds by their absorption of radiation passing through them. Third, dark matter is not antimatter, because we do not see the unique gamma rays that are produced when antimatter annihilates with matter. Finally, we can rule out large galaxy-sized black holes on the basis of how many gravitational lenses we see. High concentrations of matter bend light passing near them from objects further away, but we do not see enough lensing events to suggest that such objects to make up the required 25% dark matter contribution. However, at this point, there are still a few dark matter possibilities that are viable. Baryonic matter could still make up the dark matter if it were all tied up in brown dwarfs or in small, dense chunks of heavy elements. These possibilities are known as massive compact halo objects, or MACHOs. But the most common view is that dark matter is not baryonic at all, but that it is made up of other, more exotic particles like axions or WIMPS (Weakly Interacting Massive Particles)



Marie Curie - An Inspiration

~Karabi Das
Bsc. 6th Semester

As a woman it is always hard to pursue higher education , but everything seems quite easy when we compare the barriers and hardships we face with that of Madam Curie's. She was born in Poland under Austrian rule to a secondary school teacher's house. She completed her high school from Poland and later on she moved to Paris where she earned both Physics and Mathematics degrees at this point she survived only eating bread and tea and sometimes fainted due to starvation. She met her science partner/ lover piere Curie in Paris and soon got married. They were a great team together. When Henri Becquerel discovered that Uranium emmited a mysterious X-ray like radiation that interacted with photographic films , Madam Curie was curious and soon found that Thorium emmited same kind of radiation, She even noticed that the elements radiation was dependent only on the element's quantity and thus, she concluded that the radiation was coming from somewhere within the atom. This created havoc among the scientists as this would disprove the long existing model of atoms as indivisible objects. Mr. and Mrs. Curie later on discovered two new elements Polonium and Radium later on Piere Curie was nominated for noble prize but Marie was overlooked, Piere took a stand for her and thus both of them along with Henri Becquerel shared the Noble Prize making Marie the first female Nobel laureate. Piere died from a horrific accident and Marie took over her husband's teaching position making her the first female professor of Sorbonne University.
She continued her research and received one more noble prize in Chemistry for her earlier research this made her the only person to win two noble prizes in different subjects. She died due to a bone marrow disease which many think was because of the radiation exposure.

Her discoveries uncovered many mysteries of science.For a girl trying to purse science Madam Curie sure seems like a guiding angel.

Radioactivity in daily life

~Paushali Deb
Bsc. 6th Semester

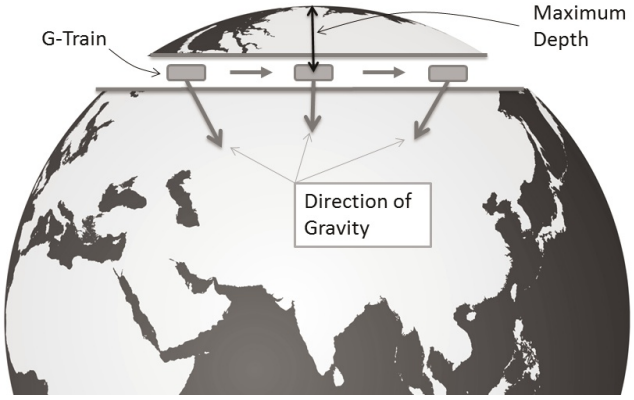
Is radioactivity very common in our life? No, actually it is a part of our life. It has existed all along with us. It is not only connected to nuclear reactors, fission or fusion process, but also can be seen in our day to day life. The outer space also known as cosmic rays is the type of radiation that we receive each and every moment. Radioactive materials are present in earth's crust, the floors, walls of our homes, schools and even in the food we eat and drink. Our bodies, muscles, bones and tissues contain naturally occurring radioactive elements. We have radioactive elements such as Potassium-40, C-14, Radium-226 in our blood or bones. Even the consumer products like Luminized wrist watches, ionization smoke detectors also give out radiation. Although everyone is familiar with the use of radiation to diagonose diseases and treat cancer, many people when the hear the terms "radiation" or "radioactive", tend to think of huge black clouds or monster mutants that inhabit the world of science fiction movies and comic books. But, there is nothing like this in real world. Even the smoke detectors used now a days contain a low activity Americium - 241 source. Alpha particles emitted by the Americium ionize the air, making the air conductive. Any smoke particles that enter the area reduce the current and set off an alarm. Modern watches and clocks sometimes are a small quantity of hydrogen - 3(tritium) or promethium - 147 as a source of light. Ceramic materials (like tiles and pottery) often contain elevated levels of naturally occurring uranium, thorium and potassium to provide it the glaze needed. Glassware, especially antique glassware with a yellow or greenish colour contain detectable quantity of uranium. Such glass are known as canary vaseline glass. About food an interesting fact is that even the bananas that we eat have naturally high level of potassium and a small fraction of all potassium are radioactive. Each banana can emit 0.1 microsieverts of radiation. But, there is nothing to worry about these because the radiation level is extremely low and not harmful for us.

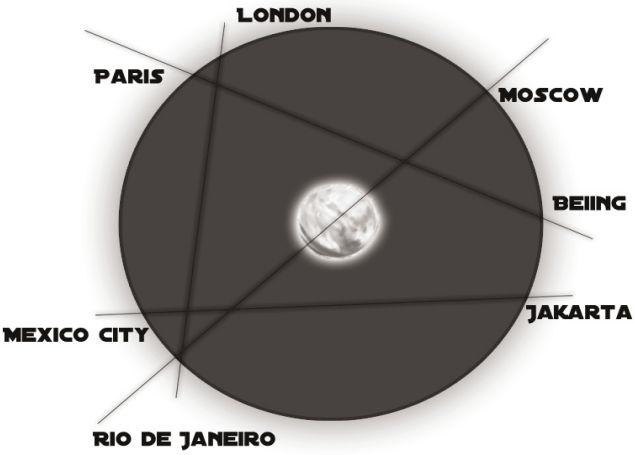
Gravity Train

~ Simanta Baishya
Bsc. 2nd Semester

In the 17th century, British scientist Robert Hooke presented the idea of an object accelerating inside Planet in a letter to Isaac Newton. A gravity train project was seriously presented to the French Academy of Science in the 19th Century. The same idea was proposed, without calculation byLewis Carrall in 1893 in Sylvie and Bruno concluded.

The idea was rediscovered in the 1960 whenPhysicist Paul Cooper published a paper in the American journal of physics suggesting that gravity trains be considered for a future transportation project. A gravity train is a theoretical means of transportation for purpose of commuting between two pointson the structure of sphere, by following a straight turned connecting the two points through the interior of sphere.In a large body such as a planet this train could be left to accelerate using just the force of gravity, sinceduring the first half of the trip (From the point departure untied the middle), the downward pull towards the center of gravity would pull towards the center of gravity would pull it towards the destination. During the second half of the trip, the acceleration relative to the trajectory but, ignoring the effects of friction, the speed acquired before would be exactly enough to overcome this deceleration and as a result, the train speed would reach zero at precisely the moment the train reached its destination.





"Physicists have come to realize that mathematics, when used with sufficient care, is a proven pathway to truth."

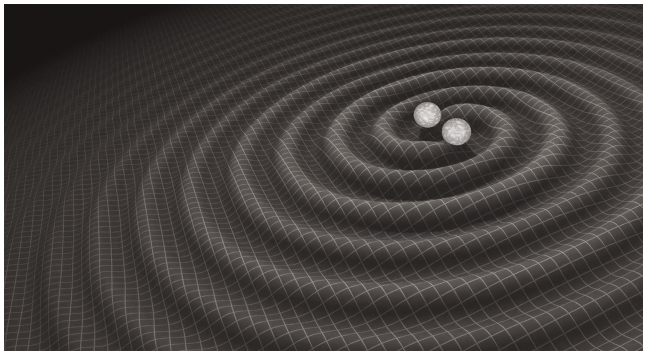
- Brian Greene.

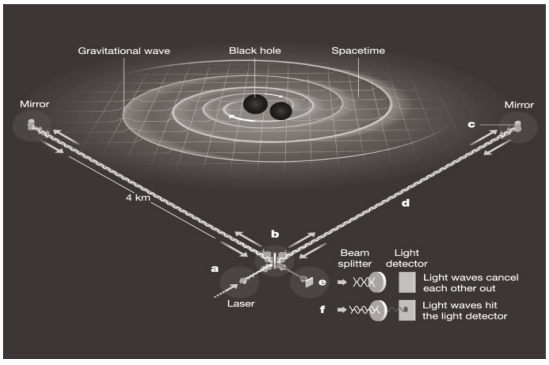
Gravitational Waves

~Simran Kaur
Bsc. 2nd Semester

Gravitational waves are invisible ripples in the fabric of spacetime.They are caused by some of the most violent and energetic events in the universe.These include colliding blackholes,collapsing stellar cores, merging neutron stars or white dwarf stars,the wobble of neutron stars that are not perfect spheres and possibly even there remnants of gravitational radiation created by the birth of universe.Gravitational waves travel at the speed of light(186,000 milespersecond or 299,000 kilometersper second),squeezing and stretching anything in their path. In hishistory of general relativity, AlbertEinstein predicted the existence of gravitational waves.In 1916, his calculations showed that massive, accelerating objects would disrupt and distort spacetime like waves moving away from a stone thrown in to a pond.On September 14,2015,the National Science Foundation's Laser Interferometer Gravitational– Wave Observatory(LIGO) physically sensed the distortions in spacetime caused by passing gravitational waves generated by two colliding black holes nearly 1.3billion lightyears away.

This was a dramatic,direct proof of Einstein's well–established theory. In 2017,NASA scientists detected light tied to a gravitational wave event,thanks to two merging neutron stars in the galaxy NGC4993, located about 130 million lightyears from Earth in constellation Hydra. The merging stars likely had masses between 10 and 60 percent greater than that of our sun, but they were no wider than Washington D.C.The pair whirled around each other hundreds of time a second,producing gravitational waves at same frequency.As they drew closer and orbited faster,the stars eventually broke apart and merged, producing both a gamma ray burst and a rarely seen explosion called a kilonova.It was observed that this flare of light from kilonova fade over the course of sixdays, as shown in the observation taken on August 22, 26and 28. Astronomers think a kilonova's visible and infrared light primarily arises through heating from the decay of radioactive elements formed in the neutron rich debris. Crashing neutron stars may be the universe's dominant source for many of the heaviest elements including platinum and gold.



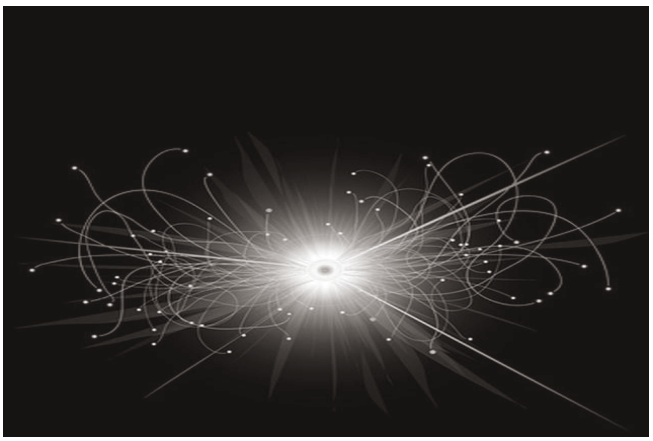


Higgs Boson

~ Rideep Choudhury
Bsc. 2nd Semester

Particle physics (also known as high energy physics) is a branch of physics that studies the nature of the particles that constitute matter and radiation . We all are well known with the term particle which can refer to various types of very small objects or quantities like protons , electrons, gas molecules , photons and other related substances. Particle physics usually studies about the smallest detectable particles and the fundamental interaction necessary to explain their behaviour. Physicists explain the fundamental particle and force of our universe in terms of the Standard model –it is a widely accepted framework based on quantum field theory that predicts almost all known particles and forces other than gravity with great precise and accuracy. In the Standard Model, the particles and forces in nature arise from properties of quantum fields, known as gauge invariance and symmetries. The Higgs boson (H°), sometimes called the Higgs particle , is the fundamental particle associated with the Higgs field. The Higgs boson was proposed in the year 1964 by Peter Higgs along with 5 other physicists to explain why certain particle have mass. A particle's mass determines how much it resists changing its speed or position when it encounters a force. Not all fundamental particles have mass, the particle of light photon carries the electromagnetic force but has no mass at all. Scientists confirmed the existence of Higgs Boson (H°) in 2012 through the ATLAS and CMS experiments at the Large Hadron Collider (LHC) at CERN in Switzerland. This discovery led to the 2013 Nobel Prize in Physics being awarded to Higgs and Englert. With a mass of 125.10 ± 0.14 GeV/c2 and mean lifetime of 1.56×10^{-22} , the Higgs Boson is a very unstable particle and it decays almost immediately into other particles . Scientists are now studying the characteristic properties of the Higgs Boson to determine if it precisely matches the predictions of the Standard Model of particle physics. If the Higgs Boson deviates from the model, it may provide clues to new particles that only interact with other Standard Model particles through the Higgs boson and thereby lead to new scientific discoveries. Although the Higgs field would exist everywhere, proving its existence was not as easy as it seems . It was therefore several decades before the first evidence of the Higgs Boson could be found. Particle colliders, detectors, and computers capable of looking for Higgs Bosons took more than 30 years (1980~2010) to develop. The importance of this fundamental question led to a 40-year search, and the construction of one of the world's most expensive and complex experimental facilities to date, CERN's Large Hadron Collider , in an attempt to create Higgs Bosons and other particles for observation and study.

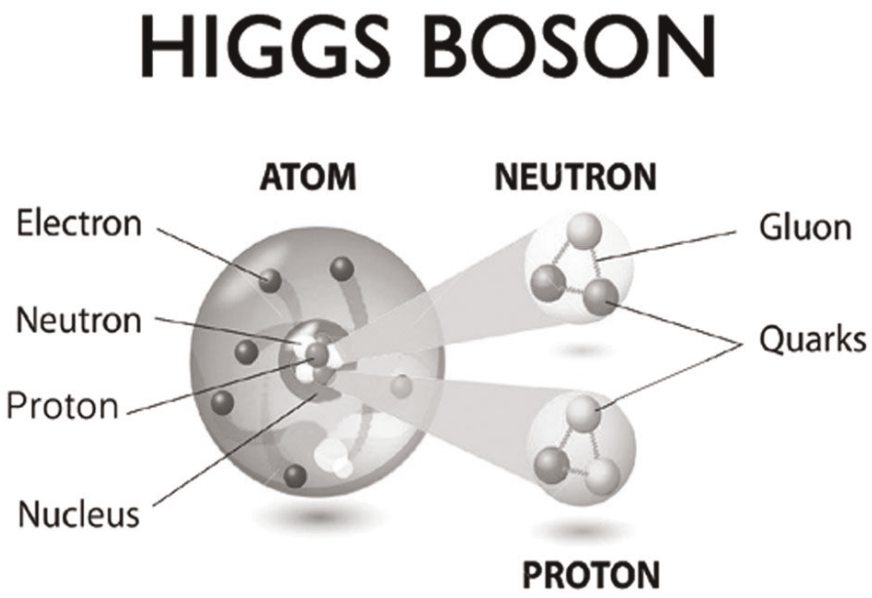
On 4 July 2012, the discovery of a new particle with a mass between 125 and 127 GeV/c2 was announced. Physicists suspected that it was the Higgs Boson. Since then, the particle has been shown to behave, interact, and decay in many of the ways predicted for Higgs particles by the Standard Model, as well as having even parity and zero spin, two fundamental attributes of a Higgs boson. This also means it is the first elementary scalar particle discovered in nature.



It is worth noting that the Higgs field does not "create" mass out of nothing, which would violate the law of conservation of energy , nor is the Higgs field responsible for the mass of all particles. In Higgs-based theories, the property of "mass" is a manifestation of potential energy transferred to fundamental particles when they interact with the Higgs field, which had contained that mass in the form of energy.

“The physicists defer only to the mathematicians, and the mathematicians defer only to God.”

— Leon M. Lederman.



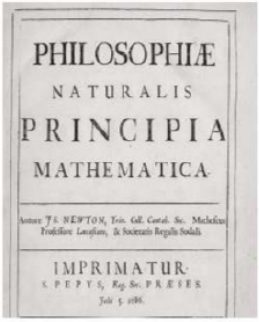
পদার্থ বিজ্ঞান আৰু প্ৰকৃতি

আৰম্ভণি: মানৱ মনত সৃষ্টিশীলতাৰ বীজ নিহিত হৈ থাকে। সেয়েহে আধুনিক যুগটোক বিজ্ঞানৰ যুগ হিচাপে অভিহিত কৰিব পাৰি। বৰ্তমান যুগৰ প্ৰতিখন সমাজেই প্ৰতিটো খোজাতেই বিজ্ঞানৰ ওচৰত ঋণী। পদার্থ বিজ্ঞান হৈছে প্ৰাকৃতিক বিজ্ঞানৰ এটা গুৰুত্বপূৰ্ণ শাখা য'ত স্থান-কালৰ মাজেৰে পদার্থ, ইয়াৰ গতি আৰু আচৰণকে ধৰি অন্যান্য সংযুক্ত ধাৰণা সমূহ যেনে শক্তি আৰু বল ইত্যাদি বিষয় সমূহ অধ্যয়ন কৰা হয়।

পদার্থ বিজ্ঞানৰ ইতিহাস : পদার্থ বিজ্ঞান প্ৰাচীন বিদ্যায়তনিক বিষয়সমূহৰ ভিতৰত অন্যতম। জ্যোতি বিজ্ঞানৰ অন্তভুক্তিৰ ফলস্বৰূপে ই প্ৰাচীনতম বিদ্যায়তনিক বিষয় হিচাপে স্বীকৃতি লাভ কৰিছে। শেষৰ দুটা সহস্ৰাব্দলৈ পদার্থ বিজ্ঞান, ৰসায়ন বিজ্ঞান, জীৱ বিজ্ঞান আৰু গণিতৰ কিছু সংখ্যক শাখা প্ৰাকৃতিক দৰ্শনৰ অংশ আছিল যদিও ১৭ শতিকাৰ বৈজ্ঞানিক বিপ্লৱৰ সময় নিজস্ব অধিকাৰত একক অনুসন্ধান প্ৰয়াস হিচাপে জ্ঞাত হয়।

পদার্থ বিজ্ঞানৰ ইতিহাস অতি পুৰণি। ছাৰ আইজাক নিউটনে ১৬৮৭ খ্ৰীষ্টাব্দত প্ৰকাশিত তেওঁৰ বিখ্যাত গ্ৰন্থ "Philosophy Naturalis Principia Mathematica" ত তেঁওৰ সূত্ৰ সমূহৰ ব্যাখ্যা আগবঢ়ায় । নিউটনে এই সূত্ৰ সমূহৰ বহুতো ভৌতিক অৱয়ৱ আৰু প্ৰণালীৰ গতিৰ অধ্যয়ন আৰু ব্যাখ্যা কৰাত ব্যৱহাৰ কৰিছিল। একাধাৰে পদার্থ বিজ্ঞানী, গণিতজ্ঞ, জ্যোতিবিজ্ঞানী, প্ৰাকৃতিক দার্শনিক ছাৰ আইজাক নিউটন ইতিহাসৰ সবাতোকৈ প্ৰভাৱ শালী ব্যক্তিসকলৰ ভিতৰত অন্যতম। তেওঁৰ উপৰিও গেলিলিঅ', আইনষ্টাইন, মেৰি কুৰিৰপৰা আৰম্ভ কৰি ষ্টিফেন হকিংচলৈকে বিজ্ঞানীসকলে বিভিন্ন সময়ত বিধে বিধে মানৱজাতিৰ হিতৰ অর্থে উদ্ভাৱন তথা আৱিষ্কাৰ কৰিছে।

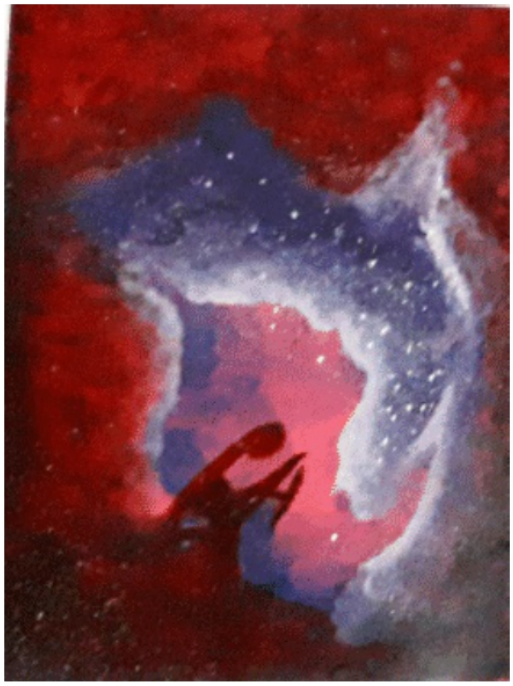
প্ৰকৃতিৰ লগত ইয়াৰ সম্পর্ক : আধুনিক যুগত বিজ্ঞানক প্ৰায়েই প্ৰাকৃতিক আৰু ভৌতিক বিজ্ঞান বুলি বুজোৱা হয়। সেইবাবে ই ভৌতিক বিশ্ব ব্ৰহ্মাণ্ডৰ



পৰিঘটনা আৰু তাৰ নিয়মাৱলীৰ অধ্যয়ন সম্বন্ধীয় শাখাতহে সীমাবদ্ধ বুলি ক'ব পাৰি। সাধাৰণ ব্যৱহাৰত ইয়েই এতিয়া মুখ্য অর্থ। 'প্রাকৃতিক নিয়ম'ৰ সংজ্ঞা দিবলৈ চেষ্টা কৰা কেপ্ লাৰৰ সূত্র, গেলিলিঅৰ সূত্র, নিউটনৰ গতিসূত্রৰ আদিৰ ফলতহে বিজ্ঞানৰ সংকীর্ণভাৱৰ বিকাশ ঘটে। এই সময়ছোৱাত পদার্থ বিজ্ঞানক প্রাকৃতিক বিজ্ঞান বুলি কোৱাটো সুলভ হৈ পৰিছে। সেয়েহে প্রকৃতি আৰু পদার্থ বিজ্ঞানৰ মাজত যে এক মধুৰ সম্পর্ক বিৰাজমান সেয়া আমি ইয়াৰ পৰাই অনুমান কৰিব পাৰো। বুনিয়াদী বৈজ্ঞানিক অধ্যয়নৰ ক্ষেত্রসমূহৰ ভিতৰত পদার্থ বিজ্ঞান অন্যতম আৰু ইয়াৰ মূল উদ্দেশ্য হৈছে প্রকৃতিৰ পৰিঘটনা সমূহ পুংখানুপুংখ ভাৱে অধ্যয়ন কৰা। গতিকে, পদার্থ বিজ্ঞান হৈছে বিজ্ঞানৰ প্রাচীন তম শৈক্ষিক ভাগ। এই শ্রেণীত সর্বমুঠ ৩০ টা উপশ্রেণী আছে। তাৰ কেইটামান উপশ্রেণী হ'ল - অণু বিদ্যুৎ, আণৱিক পদার্থ বিজ্ঞান, আন্তর্জাতিক একক প্রণালী, আপেক্ষিকতাবাদ, আলোক বিজ্ঞান, চুম্বকীয়, ডায়'ড, ভেক্টৰ, শক্তি, বল বিজ্ঞান ইত্যাদি।

সামৰণি : উপৰোক্ত বিশ্লেষণৰ পৰা এয়াই বুজিব পাৰি যে, সামগ্রিকভাৱে পদার্থ বিজ্ঞান হ'ল বিশ্ব ব্রহ্মাণ্ডৰ আচৰণ আৰু প্রাকৃতিক পৰিঘটনা সমূহৰ সাধাৰণ বিশ্লেষণ। অর্থাৎ, বিজ্ঞানৰ বিভিন্ন বিষয়ৰ ভিতৰত অন্যতম হৈছে পদার্থ বিজ্ঞান। আধুনিক যুগত এৰ'স্পেচ, অভিযান্ত্রিক কর্ম, মহাকাশ, টেলিকমিউনিকেশ্বন আদিতো ইয়াৰ প্রয়োগ দেখা যায়। সেয়েহে প্রকৃতিত পদার্থ বিজ্ঞান বা পদার্থ বিজ্ঞানত প্রকৃতিৰ এক গুৰুত্বপূর্ণ ভূমিকা দেখিবলৈ পোৱা যায়।

দীক্ষিতা বেজবৰুৱা
দ্বাদশ শ্রেণী
বি. বৰুৱা কলেজ।



The Eagle Nebula

The Butterfly Nebula

The Hourglass Nebula

~Katha Mitra
Bsc. 4th Semester

“We cannot solve problems with the same thinking we used to create them.”

– Albert Einstein

POEMS

“An experiment is a question which science poses to Nature,
and a measurement is the recording of Nature’s answer.”

– MAX PLANCK

I'm a blackbody

No color of light could flee from my proximity

They cried, I absorbed all of them

A lot of energy I released as heat,

They named it Thermal Radiation.

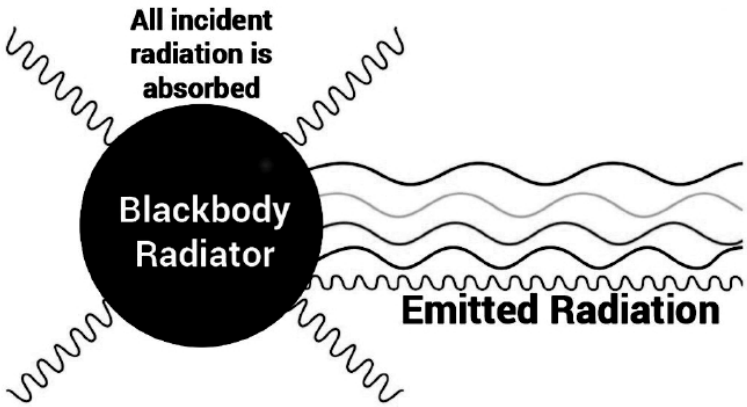
Alas they couldn't cease any absorption

Short to long, all lengths of radiations I engulfed.

Wide or Narrow, none could be saved

For i am the perfect absorber of all visiting radiations.

And hence called the Black Body.

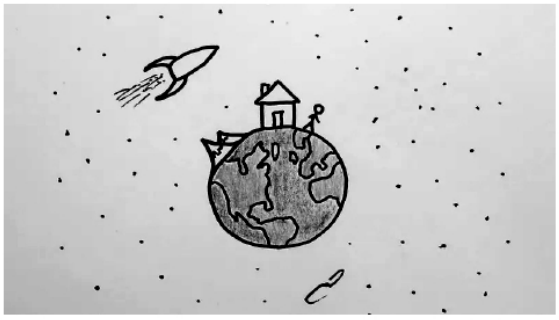


~Lucky Paul
Bsc. 6th Semester

The Physics World

Falling is essential
What if Newton had fallen for
Love?
Rather than for an Apple,
We wouldn't have laws to grapple...
Live and grow,
Prospering like maple

Concave mirror gathering rays all
their way,
Intruding into single tip,
Just like tiptoeing in area of grey,
Real images are upside
down,
All the ages,
Just when,
Reality comes in frame,
Real configuration offer
Blessings in disguise game...



And of course, is the kinetics
Inevitable?
Once in motion like it was never
steady,

The depths are shallow,
Than we see,
But it hardly matters,
As 'mu' has made depth look so
easy...
Even when water looks bit frizzy

Friction crown their own glory,
To be inclined more
on thin ice
Things get reckless in mankind,
Roughage cut down slippage

~Bandita Barman
Bsc. 4th Semester

এটা কোৱান্টাম সপোন

এটা পোহৰৰ কণিকা হৈ
মই ঘূৰি ফুৰিছোঁ,
বাধাহীনভাৱে।
কেতিয়াবা কাঞ্চনজংঘাৰ শুভ্ৰ চূড়াত
প্ৰতিফলিত হৈ ৰৱণ সলাইছোঁ,
কেতিয়াবা প্ৰশান্ত মহাসাগৰৰ বুকুত
প্ৰতিসৰিত হৈ
মানিক বিচাৰি ফুৰিছোঁ।
কেতিয়াবা সূক্ষ্ম আঁহৰ মাজেৰে
কঢ়িয়াই নিছোঁ অগণন খবৰ,
কেতিয়াবা ডাৱৰৰ মাজত সোমাই
জিলিকি উঠিছোঁ সাতৰঙী ৰামধেনু হৈ।
কেতিয়াবা মৰুভূমিৰ তপ্ত বলুকাত
সাজিছোঁ মৰীচিকা,
কেতিয়াবা আকাশ উজ্বলাই
সৃষ্টি কৰিছোঁ বিচ্ছূৰিত বৰ্ণালী।
এপিটাফৰ পৰা ওলাই আহিছে
মেক্স প্লাংক,
পৰীক্ষাগাৰত ফট'ন বিচাৰি
ঘূৰি ফুৰিছে আইনষ্টাইন।
মই ৰূপ সলাইছোঁ।
এটি তৰংগ হৈ
মোৰ পৰা তোমালৈ
সৃষ্টি কৰিছোঁ
এখন কোৱান্টাম দলং।
হৃদয়ৰ পৰা হৃদয়লৈ
বিস্তাৰিত হৈছে কোৱান্টামৰ টো।
কেতিয়াবা সমাৰোপন হৈ
সোমাই পৰিছোঁ ময়ূৰৰ পেখমৰ মাজত,
কেতিয়াবা অপবর্তন হৈ
জিলিকি উঠিছো সূর্য্য বলয়ত।
কেতিয়াবা সমাবর্তন হৈ
সৃষ্টি কৰিছোঁ ত্ৰিমাত্ৰিক কথাছবি,
কেতিয়াবা আন কণিকাক
খুন্দিয়াই সৃষ্টি কৰিছোঁ
হেজাৰ হেজাৰ আলোক কণিকা।
কেতিয়াবা আন তৰংগৰ সৈতে যুটি বান্ধি
গতি কৰিছোঁ বিশ্বব্ৰহ্মাণ্ডৰ কোনোবা কোণলৈ,
পুনৰ ঘূৰি আহিছোঁ অসংখ্য খবৰৰ সন্ভেদ লৈ।
ঘূৰি ফুৰিছোঁ পৃথিৱীৰ ইমূৰৰ পৰা সিমূৰলৈ
কেতিয়াবা এটা কোৱান্টাম কণিকা হৈ,
কেতিয়াবা এটা কোৱান্টাম তৰংগ হৈ,
'লুই ডি ব্ৰই'
আপুনি টোপনি যাওক।
এটা কোৱান্টাম সপোনে
সাৰ পাই উঠিছে।

~ স্মৃতিমালা শর্মা
সহকাৰী অধ্যাপিকা
বি. বৰুৱা কলেজ

স্বপ্ন,পদার্থ (আৰু কিছু অনুভূতি)

যোৱা নিশা কোৱাযাৱ্ ৰ সপোনে মোক ত্যক্ত কৰিছিল,
মই থিয় হৈ আছিলো
এক ঢুকি নোপোৱা কক্ষপথত!
এশ কৌটি তৰা দগ্ধ হৈয়ো
যেন মোৰ স্পর্শৰ পৰা বহু দূৰত ।
বিস্ময়েৰে মই চাই ৰৈছিলো।
অৱতীর্ণ হোৱা তৰা, নক্ষত্র, ঋক্ষ,
আৰু সৰি পৰা তাৰকাপুঞ্জ ।

সপোনত মই দেখিছিলো কৃষ্ণ গহ্বৰ,
যত পোহৰ ও অৱৰুদ্ধ,
যত ষড়যন্ত্রকাৰী সময়ে ও চলাব পৰা নাছিল নিজৰ চক্রান্ত ,
মই খোজ দিছিলো এক অন্ধকাৰময় পথেৰে,
সেই গভীৰতাক চূর্ণ -বিচূর্ণ কৰাৰ লক্ষ্যৰে,
সেই এককতাক /অনন্যতাক নিলম্বিত কৰাৰ আশাৰে!

ৰাতিপুৱা শুই উঠি দেখিলো,
ইয়ো আছিল মোৰ এক স্বপ্নবিহীন প্রত্যাশা ,
অনুভৱ কৰিলো ,
মই ও যেন সামান্য এক
স্বপ্নবিহীন স্বপ্নদ্রষ্টা !

আহ্ পদার্থবিদ্যা -তুমি কিয় ইমান অস্পষ্ট অথচ সম্পূর্ণ ?
হর্ষিত অথচ ৰোমহর্ষক ?
জৈৱিক অথচ ঐশিক ?
তোমাৰ প্রতি মোৰ প্রণয় পৰিমাণ -কোৱান্টাম নে যথেষ্ট
ইয়াৰ আধাৰত ও যেন আছে অনিশ্চয়তাৰ সূত্র ,
তোমাৰ দ্বাৰাই যেন নিয়ন্ত্রিত

~ ৰিম্ লী ৰাজ সিন্ হা
স্নাতক, চতুর্থ ষান্মাসিক

"চঞ্চলা তুমি....."

চঞ্চলা তুমি (নে আমি ???)
আপেক্ষিকতাৰ প্ৰাচীৰক নেওচি,
তুমি পৰমৰূপী;
'আলোকী'।
দাপোণৰ পৃথিৱীত তোমাৰ মৃদু পৰশত,
মই পাওঁ নিজৰ
অস্তিত্ব বিচাৰি।
কালৰ সত্তাত ক্ৰন্দনৰ ঢৌ তুলি,
প্ৰচণ্ড বক্ৰতাত স্হানক তুমি
লোৱা আঁকোৱালি।
স্হিৰ অস্তিত্বহীন,
গতি বিৰামহীন।
ধ্ৰুৱ বেগেৰে ধাৱিত হৈও;
অস্হিৰতাত পোৱা তুমি,
স্হিৰতা বিচাৰি।
তুমি পৰমৰূপী 'আলোকী'।

~ৰাজদ্বীপ তালুকদাৰ
স্নাতক, ষষ্ঠ ষান্মাসিক

"Not only is the Universe stranger than we think, it is stranger than we can think."

-Werner Heisenberg.

Recent advancements in science

"In questions of science, the authority of a thousand is not worth the humble reasoning of a single individual."

- Galileo Galilei

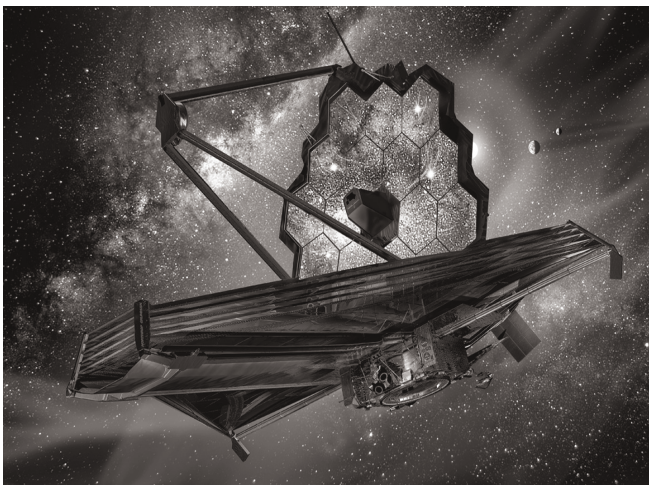
James Webb Space Telescope

~Atikur Rahman
Bsc. 6th Semester

To study the universe, scientists use different types of telescopes to detect different radiations in the electromagnetic spectrum.
The James Webb space telescope falls under the category of infrared telescopes which uses infrared light to detect celestial bodies. The telescopes today are so advance that, an event which occurred billions of years ago can also be seen today.

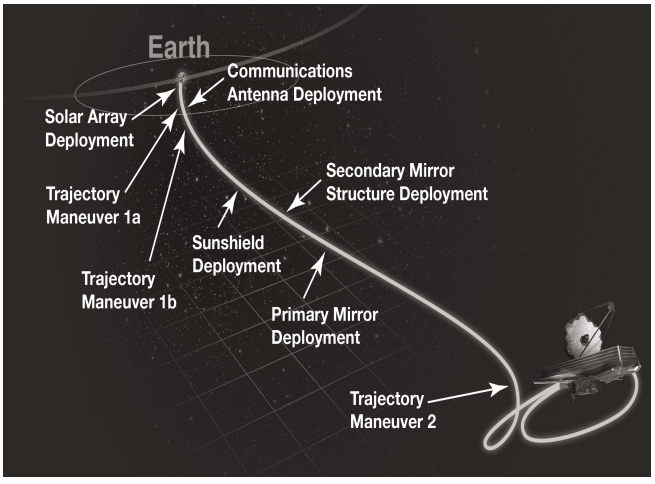
Some of the early photons which were born billions of years ago and travelled unhindered through empty space for about 13.4 billion years will finally reach its destination which is the man-made James Webb telescope. Thus, it will give us a detailed glimpse of the early universe from which we and everything we know was born.

As the name suggests it is a space telescope but unlike Hubble it does not Orbit around earth, it is launched to a destination 1.5 million kms from earth called Lagrange point 2(L2 point), which are special equilibrium positions that allows the body to remain almost static relative to the gravitational bodies that they are travelling with. James Webb being an infrared telescope must operate at nearly -233° Celsius to observe the cold, distant universe. It has finally reached its destination on 27th of January,2022. As of now, its first image is being awaited…



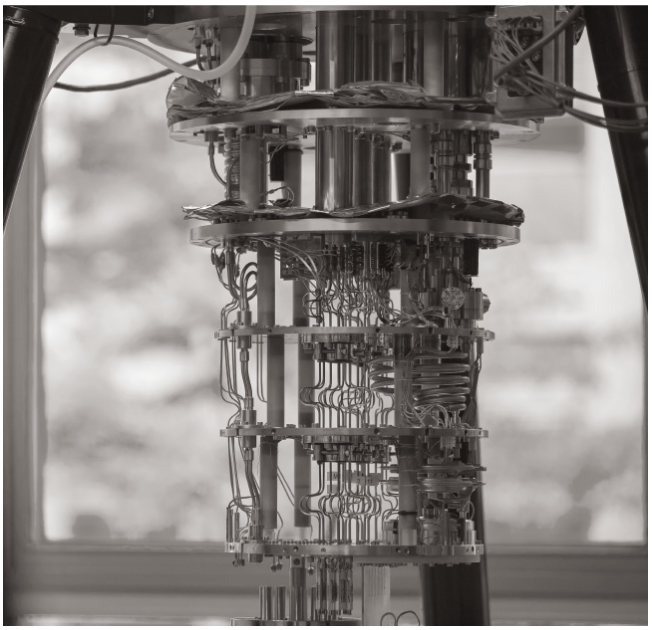
"By 2100, our destiny is to become like the gods we once worshiped and feared.
But our tools will not be magic wands and potions but the science of computers, nanotechnology, artificial intelligence, biotechnology, and most of all, the quantum theory."

- Michio Kaku



Quantum Computers

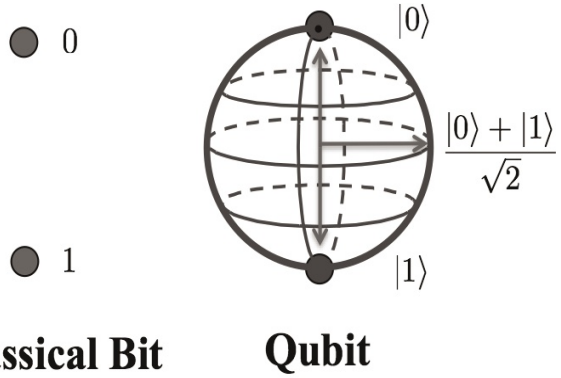
~Atikur Rahman
Bsc. 6th Semester



The classical computers use bits (strings of 0's and 1's) to describe or simulate things. The classical computers do not have enough computational power to simulate quantum bodies thus, the idea of a device which used quantum particles was introduced. Instead of bits, the quantum computers use qubits (0's,1's and a linear combination of both) as the basic computational units. In order to encode n density of information, a total of n bits is needed for classical computers. Example if n= 1 thus 1bit gives us only 1 density of information but in quantum computers we need 2^n density of information to encode n qubits. Example for n=1 thus 1qubit gives us 2^1= 2 density of information. In order to visualize the power of quantum computer imagine that we have a quantum computer of 10 qubits thus it will have 2^10 = 1024 values of information, for this value of information to be encoded in classical computers we need 16000 bits, expand this to 500 qubits and we will now require a greater number of classical bits than there are atoms in the observable universe. Thus, quantum objects aren't computable using classical computers. Logic gates using qubits have also been developed although quantum computers are exceedingly difficult to engineer, build, program and even the slightest interaction with environment can cause alteration in the results it has a great potential.

"If you are not completely confused by quantum mechanics,
you do not understand it"

-John Wheeler

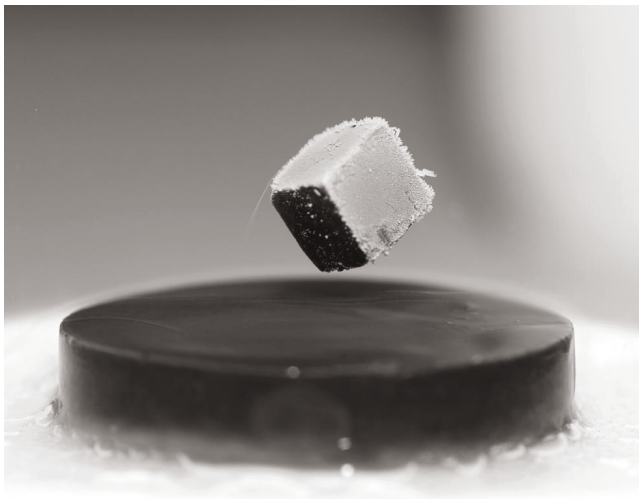


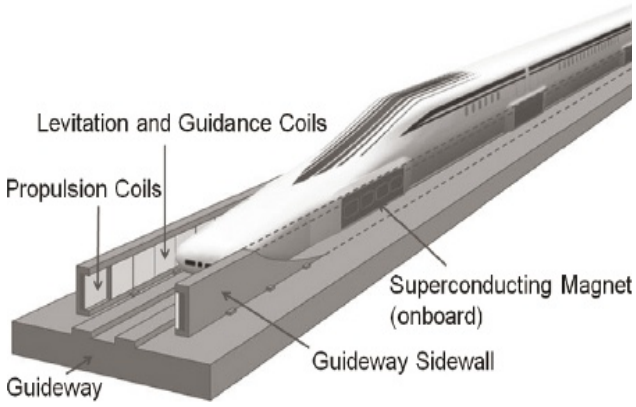
Room temperature superconductors

~Atikur Rahman
Bsc. 6th Semester

Superconductors are materials that show properties like zero electrical resistivity and perfect diamagnetism below a certain temperature known as the critical temperature.

These properties have many applications, energy loss transmission of data, electromagnetic levitating trains being some of them.
The problem with superconductors is that the critical temperature required for a material to obtain superconductivity is very low (near the absolute zero) this disadvantage restricts us from using them in our day-to-day life. After its discovery researchers have had a steady progress in finding a superconductor which has an easily attainable critical temperature thus, superconductivity at ambient temperature has been a holy grail in physics.
Few years back a compound of hydrogen, carbon and sulfur showed superconductivity at about 15°C. So, the quest of a day-to-day usable superconductor has ended? Not exactly, the compound here does have a critical temperature of 15°C but a pressure of 2.6 million times atmospheric pressure is also needed which again adds up to the cost factor.





Recently, IISC Bengaluru has claimed that a compound of gold and silver was observed to have a critical temperature of 13°C and at ambient pressure. IISc Bengaluru, have shared a video that shows clear evidence of diamagnetism at ambient temperature and pressure. The video shows nanoparticles made of gold-silver mixture seen inside a test tube getting repelled when brought close to a permanent magnet. This is evidence of magnetic levitation. The other property i.e., zero electrical resistivity of the material is yet to be confirmed. If all the properties of superconductor are observed in this material this could revolutionize data transmission, transportation and many others. India may even have a shot for the noble prize in Physics.

“Science and everyday life cannot and should not be separated.”

– Rosalind Franklin

STORIES

“We are just an advanced breed of monkeys on a minor planet of a very average star. But we can understand the Universe.
That makes us something very special.”

– Stephen Hawking

~ন'টিফিকেশ্চন ~

~ভাস্বতী ভৰদ্বাজ
স্নাতক, ষষ্ঠ ষান্মাসিক

পাখিলগা সময়ৰ ৰথত উৰি আহি কেনেকৈনো ডিজিটেল জগত পালে অৰুণিমাই গমেই নাপালে। ধাতৰ শব্দত উটি অহা ৰংচঙীয়া ন'টিফিকেশ্চনৰ মাজত আবদ্ধ হৈ থকা জীয়েকলৈ চালে অৰুণিমাই। ওলাই আহিব খোজা হুমুহুনিয়াহটো বুকুতে সামৰি আকৌ উভতি গ'ল তেওঁ শৈশৱৰ বকুল তললৈ। কিৰিলি পাৰি থকা এজাক লৰা ছোৱালী, কইনাৰ সাজত অৰুণিমাৰ লাজকুৰীয়া চাৱনি, উৰুলিৰে মুখৰিত বকুলতল। সেইবোৰ তাহানিৰ খেল, অৰুণিমাহতঁৰ, দৰা -কইনাৰ খেল।

ক্রিং..... ক্রিং....। আন এক ন'টিফিকেশ্চন অহাৰ জাননী। ডিঙিটো সামান্য বেকাঁ কৰি জীয়েক নেহালৈ চালে তেওঁ। মাকৰ অৱস্থিতিকো উপেক্ষা কৰি ব্যস্ত তাই অনুভৱহীন আপডেটৰ সৈতে।

স্বামীৰ মৃত্যুৰ পিছত ঘৰখনত মাত্র দুটি প্রাণী। মাক আৰু জীয়েক। কিন্তু বিচৰণ কৰে দুয়ো সম্পূর্ণ পৃথক পৃথিৱীত। যি সময়ত মাকে থাকে অতীত খুচৰি , জীয়েক থাকে ম'বাইলৰ ভিন্নৰঙী ডিজিটেল জগতখন খুচৰি।

আজিকালি তাই মাকৰ চুমাৰ পৰশত সাৰ পোৱাৰ পৰিবর্তে নির্ভৰশীল এলামৰ ওপৰত। অৰুণিমাই বুজে আজিকালি ডিজিটেল যুগত ম'বাইলৰ প্রয়োজনীয়তা। তেওঁ নিজেও আচৰিত হয় যে বিজ্ঞানে কিমান সৰল কৰি দিছে আমাৰ জীৱন। তথাপি ইমানবেছি নির্ভৰশীলতা তেওঁ ভাল পোৱা নাই।অত্যাধিক অমৃতেও বদহজম কৰাৰ দৰে ম'বাইলে এলেহুৱা কৰিছে সকলোকে। সকলোৱে কেৱল সকলো সময়তে চমু পথ বিচাৰি ফুৰে।

শূন্য ঘৰখনত দম দমকৈ পৰি থাকে কিতাপবোৰ । খুউব চখ আছিল অৰিন্দমৰ । বুকুৰ মাজত কিতাপ লৈ শোৱা মানুহ। কিন্তু নেহাৰ এইবোৰলৈ ধাউতি নাই। আজিকালি হেনো সকলোবোৰ হাতৰ মুঠিতে উপলব্ধ।

কেতিয়াবা খুউব ভয় লাগে অৰুণিমাৰ। স্বাভাৱিক সন্তানৰ প্রতি মাতৃৰ এই ভয়। ডিজিটেল ঘোঁৰাৰ তীব্র চেকুৰত জীয়েকক হেৰুওৱাৰ ভয়।

"Happy birthday, Maa" নেহাৰ আৱেগভৰা মাতত তন্ময়তা ভাগিল তেওঁৰ। সামন্য আচৰিতভাৱে চাই পঠিয়ালে তেওঁ নেহাৰ মুখলৈ। মাকৰ উত্তৰলৈ অপেক্ষা নকৰি আকৌ নিজৰ জগতখনত সোমাই পৰিল তাই। আজিটো তেওঁৰ জন্মদিন নাছিল তেওঁৰ, কিন্তু তথাপি ধন্যবাদৰ হাঁহিৰে সামৰি থলে তেওঁ কথাটি।

জপিয়াই জপিয়াই পাকঘৰলৈ পানী খাবলৈ যোৱা নেহালৈ চাই ৰ'ল তেওঁ, ছোৱালীজনী চোন ডাঙৰেই হ'ল। চোফাতে পৰি ৰোৱা মোবাইলৰ স্ক্ৰীনত ভাঁহি উঠা ন'টিফিকেশ্চনটোলৈ চাই তেওঁ আচৰিত হ'ল।

" Today Arunima Samra's birthday"

বহুদিন আগতে নেহাৰ জেদতে অৰুণিমাই ফেচবুক একাউন্ট এটি খুলিচিল। কিন্তু চলাবলৈ মনৰ হাবিয়াস নোহোৱাত তেনেকৈয়ে পৰি থাকিল। তাতে তেওঁৰ জন্মদিনটো ভুল হৈ আছিল। সামন্য হাঁহিলে তেওঁ। আজিকালি ন'টিফিকেশ্চনৰ গুৰুত্ব বহুত বেছি। অৰুণিমাই ঢুকি নাপায়।

শেতাঁ হাঁহিৰে চাই পঠিয়ালে বাহিৰলৈ। বতৰটো গোমা থিক মনটোৰ দৰেই।

জৰ্জ বার্ণাড শ্ব'ই কৈছিল: বিজ্ঞানীসকলে এটা সমস্যা সমাধান কৰা মানেই নতুন দহ সমস্যা উদ্ভাৱন কৰা।

বিজ্ঞানীৰ ৰসাল কাহিনী

~ভাস্বতী ভৰদ্বাজ
স্নাতক, ষষ্ঠ ষান্মাসিক

(১)

ৰয়েল ইনষ্টিটিউচনত কিছুদিনৰ বাবে এগৰাকী অতিথি গৱেষকে কাম কৰিছিল। এদিন তেখেতে দেখিলে যে এটা চুকত লেতেৰা কাপোৰ পিন্ধা দাড়িয়ে-গোফে ভোবোকাৰ এজন বৃদ্ধ লোকে কিবা কাম কৰি আছে।

অতিথি গৱেষকজন তেখেতৰ কাষলৈ গৈ সুধিলে ,

'আপুনি বহুবছৰ ধৰি ইয়াত আছে?'

'হয়।'

'আপুনি ইয়াৰ দাৰোৱান নেকি?'

'তেনে বুলিয়েই ধৰক।'

'দৰমহাও চাগে ভালেই পায়!'

'কম নাপাওঁ।'

'আপোনাৰ নামটো?'

'মাইকেল ফেৰাডে।'

গৱেষক জনৰ আৰু কিবা সুধিবলৈ সাহস নহ'ল। তেখেতে মাত্ৰ বাৰে-বাৰে কলে, 'মোক ক্ষমা কৰক।' তেতিয়া ফেৰাডেই ক'লে, 'বাপু, সাজ-পোছাকেই সকলো নহয়।'

(২)

এডিচন ছাৰৰ নাম নুশুনা মানুহ চাগে নিশ্চয় নোলাব। তেওঁৰ সম্পূৰ্ণ নাম আছিল টমাচ আলফা এডিচন। বিজ্ঞান জগতলৈ তেখেতৰ অমূল্য অৱদানৰ লগতে তেখেতৰ অফুৰন্ত ধৈৰ্য শক্তিৰ সৈতে সকলো পৰিচিত।

কোনো এটা দিনত পুৱাৰে পৰাই এডিচন ছাৰ খুৰেই ব্যস্ত। বিজ্ঞানৰ কোনো এটা আৱিষ্কাৰৰ কামত খোৱা-বোৱা পাহৰি গৱেষণা কৰি আছে। চাওঁতে চাওঁতে বেলি দুপৰত উঠিল। ছাৰৰ পত্নী মানে বাইদেউৱে দুপৰীয়াৰ আহাৰ খাবলৈ ছাৰক মাতেহে-মাতে ; কিন্তু নাই, ছাৰৰ কোনো ভ্ৰুক্ষেপই নাই। গভীৰ মনোযোগৰে নিজৰ কামত ব্যস্ত হৈ আছে। ইফালে বাইদেউ ৰৈ ৰৈ অধৰ্য্য হৈ পৰিছে।

এসময়ত তেওঁৰ বৰ খং উঠিল আৰু পানী এবাল্টি লৈ গৈ ছাৰৰ মূৰত ঢালি দিলে। ছাৰৰ কিন্তু খং নুঠিল। মিচিকঁকৈ হাঁহি এটা মাৰি তেখেতে ক'লে, "গাজনি ঢেৰেকণিৰ পাছত বৰষুণ আহিব বুলি মই ভাবিছিলোৱেই"।

(৩)

সেইদিনাও ছাৰ খুবেই ব্যস্ত আছিল। বিজ্ঞানৰ কোনো এটা জটিল সমস্যাৰ কথা ভাবি থাকোতেই হঠাতে তেখেতৰ মনত পৰিল, যে সেই দিনটো আছিল কাছৰীত দিব লগা কোনো এটা কৰ দিয়াৰ শেষ দিন। সেয়ে লৰা-লৰিকৈ ছাৰে কাছাৰীলৈ গৈ দেখে যে কৰ দিয়া ঠাইত বৰ ভিৰ আৰু মানুহবোৰে দীঘলকৈ শাৰী পাতি ঠিয় হৈ আছে। ছাৰো গৈ শাৰীত ঠিয় হ'ল। কিন্তু যেতিয়া তেখেত গৈ টকা জমা দিয়া কক্ষটোৰ মুখত ঠিয় দিলে তেতিয়া ছাৰক তেখেতৰ নামটো সুধিলে।

কিন্তু কি আচৰিত!

ছাৰে নিজৰ নামটো কব নোৱাৰিলে,

মাত্ৰ কলে 'পাহৰিলো' !

এনে এটা অদ্ভূত উত্তৰ শুনি পাছৰ মানুহবোৰে হাঁহি দিলে। কোনোবা এজনে যেনিবা 'এডিচন' 'এডিচন' বুলি কোৱাতহে ছাৰে সেইদিনা কৰ খিনি দিব পাৰিলে।

এই সকল বিজ্ঞানী আমাৰ চিৰ নমস্য। তেখেতসকলৰ এই ৰসাল কাহিনীৰ উপস্থাপনৰে আমি তেখেতসকলক অতি শ্ৰদ্ধাৰে সোঁৱৰিছো।

তথ্য সংগ্ৰহ : ডিম্বেশ্বৰ চলিহাৰ 'বিজ্ঞানীৰ বিচিত্ৰ বতৰা' নামৰ গ্ৰন্থখনৰ পৰা।

"Our virtues and our failures are inseparable, like force and matter. When they separate, man is no more."

– Nikola Tesla

Departmental Activities

Physics Forum Plus is an organization formed within the **Dept of Physics, B. Borooah College** to promote and participate in innovative and creative endeavors in the domain of Physics. We have organized several events like a state level essay competition, and workshops in collaboration with Tezpur University and Dept of Science and Technology, Govt. of India and T. C girl's school. Some glimpse of various activities and given below: