

ISSUE 9 | 2021-22

PHYSIKOS

Department Of Physics
Gargi College



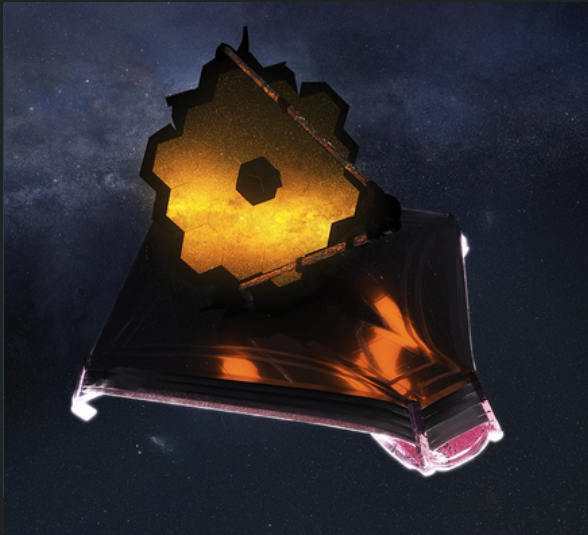
PAINTING BY VAISHALI BHASKAR ,3rd year Bsc(H) Physics

"The important thing is not to stop questioning. Curiosity has its own reason for existing." - Albert Einstein



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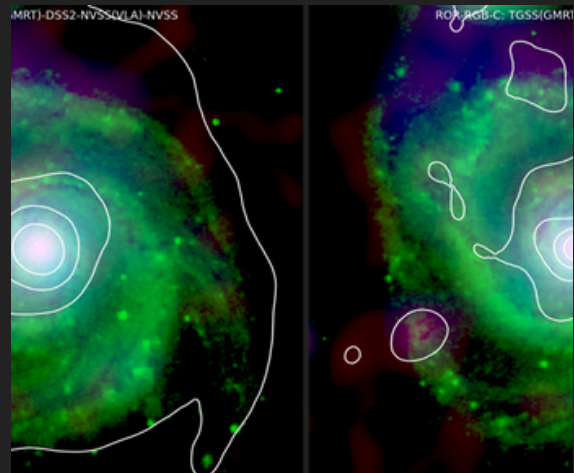
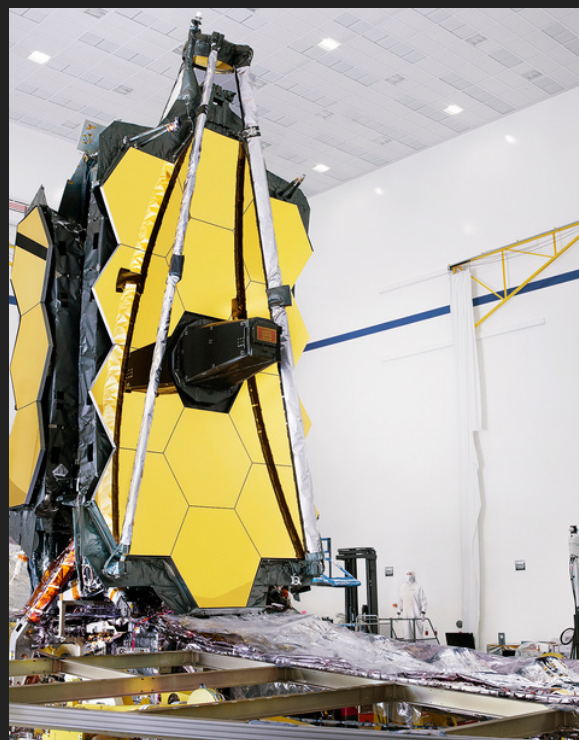




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From the Principal's Desk



The onerous task of moulding the thoughts can be performed only through education. At this crucial juncture when the tidal wave of transition is sweeping across the world, old is collapsing and new is struggling to be born. The college periodicals reflects the accomplishments of the students and provides them an opportunity to showcase their latent creative potential. I am delighted to know that the Department of Physics is releasing its annual magazine “Physikos” for the year 2021-22.

The past almost one year has proved that Life is not always a bed of roses but with determination, dedication and diligence you have made the unimaginable happen. We lived in a virtual world yet so meaningfully connected and you have performed every single duty whether academic or cultural so efficiently. These unprecedented circumstances have made it so evident that you are capable of handling the hurdles of life with your wisdom, skill and sophistication.

There is no doubt that this attitude will take you on a newer height in life. Grab every single opportunity that comes in your way and make your dreams come true but never forget that wisdom with which you use your knowledge, is the most precious gift. Make sure that a passion to grow in wisdom should never die because it will always guide you and show you the right path.

I congratulate the entire editorial team & contributors for the upcoming issue of Physikos and enthusiastically look forward to reading our students' perspective on various issues undertaken.

Prof. Promila Kumar



From the Teacher Coordinator



Welcoming our students in-person after becoming accustomed to engaging in all social activities over a screen has brought much awaited joy. The tumultuous Covid times remain an important learning experience for us all, although the precautions we still abide by have become a new normal.

It is my utmost delight to congratulate the Physikos team comprising of creative team members Anjali Kumar as a committed and wonderful Editor, Anwasha Bhattacharjee as dynamic Co-Editor, enthusiastic content writers, Anshita Singh and Kirti Pandey and a passionate designer Avantika Nikhrey. A painting aligned with the theme of the magazine by Vaishali as cover page is more than a treat to the viewers. Hearty congratulations to all the worthy contributors for the content writing, articles or designing amongst various other contributions. This magazine is always a display of creativity, dedication and commitment by an enthusiastic team.

We shall remain extremely thankful to esteemed Radio Astronomer Professor Udaya Shankar from Raman Research Laboratory for our second session on Ask An Expert. Astronomy and Astrophysics being this year's theme of Physikos, our conversation with Professor Shankar could not have been any more enlightening and informative. He has been kind enough to answer our questions on his field of research which may inspire and orient many students for higher studies in this field. Thanks are also due to Dr. Apoorva Mittal, our alumnus from batch 2009-12, for providing insights into medical physics which will benefit the students immensely.

The summer workshop was organized in July 2021 in which lectures were delivered by Prof. Binay Kumar from the department of Physics & Astrophysics, University of Delhi and Dr. Ritu Dingra from Maitreyi College. Dr. Alka Garg, Dr. Supreeti Das, Dr. Archana Tripathi, Dr. Hira Joshi and myself from our college also delivered talks on diverse topics. The workshop was convened by Dr. Alka Garg. Dr. Supreeti Das, Dr. Hira Joshi, Dr. Archana Tripathi and myself were a part of the organising team. The topics ranged from Crystallography, Nanotechnology to Extraction of oil from Waste Plastics, X-Ray diffraction, Non-linearity and Machine Learning, respectively. The students attended all the talks with great eagerness.

E-polling has been observed to be more pertinent during the times of Covid. It gives me immense pleasure in introducing the new batch of our versatile Union members for the year 2021-22 with Arzoo Dagar as President, Neha Chaudhary as Vice President, Gursimran as Secretary and Priya Rajput as Treasurer under the teacher coordinators Mr. Munish, Dr. Supreeti and Ms. Mansi Aggarwal. Kudos to the team. The e-polling for the union posts was conducted on October 5th with 100 % participation. What a turnout!

The year-long activities began with the World Food Day Celebration. A documentary was screened as well as a quiz being organized on October 16 aiming to create awareness. It was centred around the theme "Save Food now for a healthy tomorrow". After winning three rounds, Janvi Aggarwal was declared the winner.

Following this, a virtual inaugural lecture on "Nanotechnology for Semiconductors: Opportunities and Challenges" by Dr. Ashutosh Kumar (Scientist at RISE Sweden) was conducted on October 28. After the enlightening lecture of the speaker, the annual magazine "Physikos" for the session 2020-21 was inaugurated and the new student council was announced.

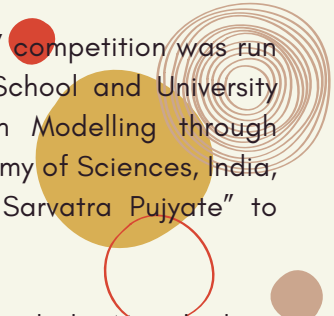
The Physics department has been taking initiatives for e-waste collection and awareness for many years. This year it was held in association with AVNI, the Eco club of our college and an inaugural ceremony in which another e-waste drop box was installed on November 11. The students, faculty members and office, administrative, accounts and non-teaching staff collectively participated.

A career guidance session "Irshaad" was organized for the preparation of competitive exams for higher education for the students. The event was organized on 21 November, 2021 in which two of our alumni, Ms. Manisha having AIR-388 in IIT JAM, currently working with CHEGG India and Ms. Tanvi with AIR-143 in JEST who is a Ph.D. Student in astronomy at National Central University, Taiwan interacted with the students.

On November 22, an orientation program for the 1st year students was held to formally welcome and introduce them to the department and college societies. A fun and stress buster activity "Cinema Quizohilic" to guess the names of the movies. Namra Arya of 3rd year was the winner of the event. Another exciting lecture by Dr. Kajoli Banerjee Krishnan, a former Principal Scientist at GEs Global Research Centre, Bengaluru on "Why I loved Science" was presented on February 9, 2022.

On the National Science Day, all the Science and Mathematics department in collaboration with IQAC conducted "Revel, a paper presentation and Parody and slogan writing" event under the aegis of National Academy of Sciences, (India) by Delhi Chapter to celebrate the ethos of Nobel Prize by Sir C.V. Raman on February 28. The themes of the event were focussed around sustainable development and a sustainable future.

On March 10, "Memania - a meme making competition" was held to bring out the creativity amongst the students keeping humorous and wittiness alive with Physics as the theme. Our union has continually posted on social media platforms such as Instagram, Facebook and WhatsApp. Make sure to check them out regularly.



“Vigyan Tarang: A step towards Nourishing Scientific Temperament” competition was run by Dr. Alka Garg on National Science Day which was open to School and University students to demonstrate an innovative experimental set-up on Modelling through simulations. This was organised in collaboration with National Academy of Sciences, India, Delhi Chapter to commemorate Govt. of India’s vision “Vigyan Sarvatra Pujyate” to celebrate “Azadi Ka Amrit Mahostav”.

This year a range of activities were also organized in collaboration with the Microbiology department under National Academy of Sciences (India), Science - Society program in association with National Academy of Sciences, India (Delhi Chapter). Many activities were organised with other institutes as collaborating and supporting partners to celebrate the 75th year of Indian Independence under “Azadi Ka Amrit Mahotsav”. These events were convened by myself and Professor Shashi Chawla from the Microbiology department. The details of these events are given here:

In Ask An Expert cum International Webinar Series, scientists across the globe provided insights on different interdisciplinary topics of their expertise and interacted with the students on a virtual platform. We are immensely thankful to Professor Chennupati Jagadish from Australian National University for his wonderful talk on “Semiconductor Nanomaterials for Optoelectronics applications” held on February 19 with Indian Association of Physics Teachers as supporting partner. A talk by Professor L.S. Shashidhara, President of the International Union of Biological Sciences and Dean Ashoka University on “Science, Technology and Innovations: Future Prospects and Opportunities” was held on March 12. This was organised with, as supporting partners, Indian Association of Physics Teachers, Microbiology and Delhi Effective Education and Pedagogy - Cluster. This was followed by a talk by Dr. Cindy Gunawan, Australian Institute of Microbiology and Infection, University of Technology, Sydney on “Bacteria adaption to Nanoparticle Toxicity and how to overcome it” on March 26, 2022. (Supporting partners, MSI and DEEP-C). All these talks were highly appreciated by the participants across the country.

An online quiz was organised on Air Pollution: Causes, Prevention & Remedies and Policies on February 6, 2022 with IAPT, MSI and DEEP-C as supporting partners. This was conducted to raise awareness amongst students and the general public about the increasingly prevalent issue of air pollution. Students from across the country participated in it. Many congratulations to the winners.

To apprise the participants about IPRs, a talk was presented by Mr. N. Subramanian, Assistant Manager, Cell for IPR Promotion and Management (CIPAM), Ministry of Commerce and Industry, Govt. of India on February 26, 2022 on “Overview of Intellectual Property Rights”

Revel - A paper presentation online event was organised in association with all Science and Mathematics departments to celebrate the National Science Day on February 28. The theme was Integrated Approaches in Science and Technology for a Sustainable Future, Govt. of India and International Year of Basic Sciences for sustainable development by United Nations.

An online workshop was organised on Food Adulteration: Unboxing the Boxes by Dr. Geeta Mehra, Head, Department of Food Science, Mehr Chand Mahajan DAV College for Women, Chandigarh on March 24, 2022. This was done with AVNI, the Eco club of Gargi College and DEEP-C as supporting partners.

We acknowledge the mentoring and guidance of Professor Ajoy Ghatak, President of National Academy of Sciences, India, Vice President of National Academy of Sciences and Chairman Delhi Chapter, Prof. Anurag Sharma and other officials at Prayagraj, NASI (India) for the Science-Society grant under which these activities were performed.

We heartily congratulate three students under my supervision for the award of Ph.D degree: "Studies on Zinc Oxide Based Nanopowders and Radiation Induced Effects" by Dr. Anita, "Investigations on Yttrium and/Or Tin doped Barium Titanate for Ferroelectric Applications" by Dr. Sachin Kumar and "Synthesis, Characterization and Gas Sensing Applications of undoped & Fe-/Co-substituted Strontium Titanate Ceramics" by Dr. Neha.

We also congratulate all the winners, sports achievers, NCC cadets, NSS participants and members of different societies of the college for their commitment and dedication especially their time management. Many students passionately took part in internships, research projects and many other assignments. Kudos to all. We should all make endeavours so that maximum students can gain experience through internships, research projects as well as take part in the volunteering activities beneficial to the society.

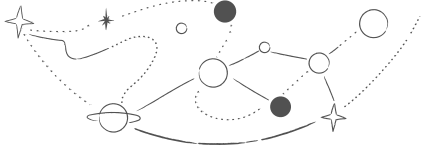
We are thankful to our Principal, Professor Promila Kumar, administrative, accounts and office staff for their immense support throughout the year The non-teaching staff is the backbone of our department and a heartfelt thanks to them. We acknowledge the far reaching benefits of the grant received in the past from DBT, Star Scheme as the facilities developed under it will continue to benefit teaching and research alike even after the tenure of the grant is over!!.

We welcome suggestions, comments and feedback and strive hard to make Physikos better than ever before.

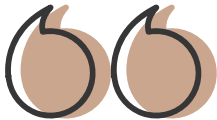
***"Success is not final,
Failure is not fatal,
It is the courage to continue
That counts"
Winston S. Churchill***

With Best wishes to everyone,

**Teacher Coordinator, Physikos,
Professor Vandna Luthra
Department of Physics,
Gargi College.**



MESSAGE FROM TEACHER - IN -CHARGE



I would like to extend my heartiest congratulations to all the contributors and editorial group of 'physikos', the physics department magazine, for successfully presenting another edition of the magazine for year 2021-2022. I am sure that 'Physikos' will give all the readers a mindful delight. I wish all the students, the very best for their future .



Dr. Hira Joshi
Teacher In Charge
Physics Department
Gargi College
University Of Delhi

Editor's note



ANJALI KUMAR
3rd Year, Bsc(H) Physics
Editor

“

It gives me immense joy and pleasure to finally introduce the 9th edition of the annual magazine of the department of physics, PHYSIKOS.

Serving as the editor for two years had been an amazing experience for me. This has taught me to work effectively and efficiently, along with it, it has taught me the importance of publishing your own work and avoiding plagiarism. I will always be grateful to Vandna Ma'am for giving me this opportunity to learn and contribute. A lot of effort has been put into this, and everything was made successful with the sincere contribution of the team members.

PHYSIKOS is a reflection of the student's creativity and efforts throughout the year. In this edition the theme revolves around the most likable field astronomy. Two 'ask the expert' and 'Q&A sessions' have also been reported for you to expand your knowledge and understanding.

Hope you will enjoy it and suggestions are always welcomed.

Happy reading!

”

ASK THE EXPERT-EPISODE II

with Professor Udaya Shankar N, formerly with the Raman
Research Institute (RRI), India.

IN CONVERSATION WITH PROFESSOR VANDNA LUTHRA

It is a delight to present an eminent scientist of repute for this episode. This year's theme for the magazine is Astronomy and Astrophysics, which interests many, especially kids. With the much-awaited launch of Webb's Telescope, we are eagerly waiting for newer and newer observations and discoveries. Students have been curious about this topic from childhood and needed orientation to take it at higher levels. This conversation is aimed at providing enriching information.

Thank you, Sir, for providing insightful, valuable information for the faculty members and students alike. Your wide spectrum of contributions and experience from the basics to many advanced indigenous and mega-scale collaborative technologies will inspire as well as motivate all to be passionate about doing Science with enthusiasm. On one hand, it is providing details of Radio Astronomy for decoding signals related to early universe, challenges of decoding faint signals, design and commissioning of the Radio telescopes, innovations in measurements, and devising novel methods of measurements and adding so significantly to newer findings. It has been my privilege to present this conversation with respected Sir which will not only benefit enthusiastic students and faculty members but also orient towards taking up this challenging fields as a career option.

PROFESSOR VANDNA LUTHRA

A Brief CV: Professor Shankar, Raman Research Institute.



Dr. N. Udaya Shankar is a Retired Senior Professor from the Department of Astronomy & Astrophysics, Raman Research Institute, Bangalore. He has served the A&A department in various capacities for almost four decades. He has contributed substantially to several radio telescopes designed, built, and operated by RRI and other international agencies. His current interest is in detecting global 21 cm emission from neutral H atoms from the early Universe to study the formation of the first stars and their environment. He is a part of the team which built innovative antennas and precision receivers and observed to put limits on the properties of the first stars and their environment. He currently holds several positions in Scientific Institutions:

1. Chairman, Giant Meterwave Radio Telescope Time Allocation committee, NCRA Pune, A center of Tata Institute Of Fundamental Research, Mumbai.
2. Representative of India in the Scientific and Engineering Advisory Committee of the Square Kilometre Array, An international Megaproject with its HQ in Manchester.
3. Assistant Editor of Journal of Astronomical Instrumentation Published by world Scientific.

Q & A

Q1. Sir, kindly provide an update on the research and development in Cosmology and some highlights of your work?

SARAS 3 is a radio telescope invented and built by astronomers at the Raman Research Institute (RRI). This is a purpose-built telescope to observe radio wave signals from Cosmic Dawn, a time in the infancy of our Universe when the first stars and galaxies came into existence. Recently astronomers from Arizona State University/MIT had claimed the detection of radio signals from Cosmic Dawn. Observations by RRI astronomers using SARAS3 had conclusively refuted their claim. The signal claimed to have been seen by them required exotic and non-standard physics. It caused astrophysicists worldwide to invent new theories that our findings no longer support. The RRI findings are now published in Nature Astronomy.

SARAS: Experiment and Science.

SARAS is a high-risk and high-gain experimental effort of RRI initiated and led by Prof. Ravi Subrahmanyan (Now with CSIRO in Australia) and Prof. N. Udaya Shankar. It is a courageous attempt to design, build and deploy in India a precision radio telescope to detect extremely faint radio wave signals from the depths of time, from our "Cosmic Dawn" when the first stars and galaxies formed in the early Universe.

The CMB Distortions Laboratory at RRI has pioneered the development of state-of-the-art radio telescopes. These instruments are designed to detect faint cosmological signals, especially radiation emitted by hydrogen atoms at the 21-cm wavelength (1.4 GHz) arising from the depths of the cosmos. The signal from Cosmic Dawn is expected to arrive on Earth stretched in wavelength to meters and lowered in frequency by the expansion of the Universe to lie in the radio frequency band 50-200 MHz. Detecting a faint signal from such an early period of the Universe is extremely difficult. It requires ingenuity in antenna and electronics design, exceptional care in construction, meticulous selection of an observing site, and skill in mathematical and statistical analysis of data. The celestial signal is exceptionally faint – buried in sky radio waves that come to us from the gas in our Galaxy, the Milky Way, which is a million times brighter. More unfortunate for astronomers is that this cosmic signal is in a radio wavelength band used by numerous terrestrial communications equipment and TV and FM radio stations, which makes detecting the extra-terrestrial signal extremely difficult.

However, RRI scientists and engineers have successfully risen to the challenge. The SARAS radio telescope has been meticulously designed and calibrated to discern signals from Cosmic Dawn. It is today one of the most sensitive instruments in the world in this field of research.

Having designed, built, and validated performance in the RRI laboratories, the SARAS radiometer was deployed by the RRI team led by Prof Subrahmanyan in isolated sites in India to gather celestial radio waves with minimum terrestrial man-made radio interference. The telescope was first deployed in rural Timbaktu Collective in the Anantapur district. Here lives a community that "lives simply so others may simply live," then in trans-Himalayan Ladakh in valleys where only nomads wander with yaks. These expeditions (what more is needed to enjoy Science?) yielded sensitive data that significantly improved our knowledge of Cosmic Dawn by ruling out with a high level of confidence families of theoretical models previously believed possible.

Claimed discovery by ASU/MIT researchers:-

The ASU/MIT researchers had previously announced their discovery of a radio wave signaling the birth of the First Stars in the prestigious journal Nature. This had created much excitement in the astronomy

community worldwide, which Harvard astrophysicist Avi Loeb also hailed as worthy of two Nobel prizes. But the strength of the reported signal from Cosmic Dawn was indeed bizarre compared to theoretical predictions; therefore, the EDGES claim of detection had led to several speculations about how the Universe might be different compared to current understanding. These speculations included exotic physics, non-standard cosmology, new astrophysics, and new models of dark matter that may have resulted in such an unusual signal.

However, appreciating that in such difficult measurements, errors in instrument calibration might result in spurious deductions, cross verification of such a claim has become an urgent priority. The world awaited confirmation from independent researchers.

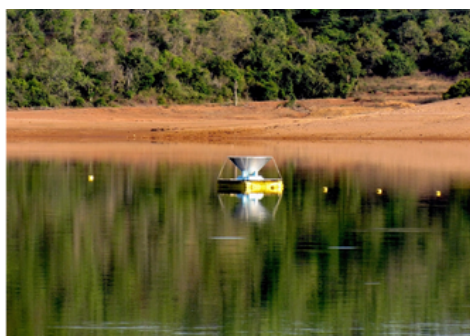
Latest unique deployment by RRI over water and findings.

The focused goal during this deployment by RRI was the cross-verification of the claimed detection of the 21-cm signal by the ASU/MIT EDGES experiment.

In a significant innovation, RRI astronomers came up with the idea of floating the radio telescope on a raft on water. This ingenious design substantially enhanced telescope performance and had never before been conceived of in the world. The scientific reason for floating the telescope on the water is to provide a homogenous medium of high dielectric constant below the antenna. This improves sensitivity and reduces confusing radio waves emitted by the very ground beneath radio telescopes. In an expedition in early 2020, the third edition of the radio telescope, SARAS 3, was deployed in lakes in Northern Karnataka, on Dandiganahalli Lake and Sharavati backwaters. RRI astronomers gathered the most precise measurements from observations carried out at this site. By this, we achieved the sensitivity that conclusively refuted the claim of the ASU/MIT researchers.

After a rigorous mathematical, statistical analysis led by Dr. Saurabh Singh, now an Assistant Professor at RRI, SARAS 3 did not find any evidence of the signal claimed by the EDGES experiment. The presence of the signal is decisively rejected after a careful assessment of the measurement uncertainties. Therefore, the finding implies that the detection reported by EDGES was likely contamination of their measurement and not a signal from the depths of space and time. SARAS 3 was indeed the first experiment to reach the required sensitivity and cross-verify the claim of the signal detection.

However, astronomers still do not know what the actual signal looks like! Having rejected the ASU/MIT claim, the SARAS experiment of the Raman Research Institute is geared toward discovering the true Nature of Cosmic Dawn. The SARAS 3 team is planning more observations on remote lakes in India. Such expeditions will allow the team to detect the 21-cm signal from the cosmic dawn and unravel this last remaining gap in the history of our Universe.



**SARAS 3 radio telescope
deployed on water**

Q2. At which level should Astronomy and Astrophysics courses offered: at Secondary school level, at UG level, or at PG level?

It is helpful to introduce Astronomy and Astrophysics at the secondary school level. This does not mean I recommend starting new courses at the secondary level. Astronomy and Astrophysics should merge with Physics taught without discontinuities. A simple example is when Atoms and Molecules are introduced in standard 9, one can introduce Atoms and Molecules discovered in space and how their understanding has fed back to the realm of Physics.

Q3. Can you mention some of the institutes/courses students can join after completing B.Sc (H) Physics and B.Sc (Physical Sciences)?

Do not be concerned that you have to study Astronomy and Astrophysics courses in your PG studies to do research in A&A. Students from various backgrounds like M.Sc. Physics, M.Sc. electronics, and engineering degrees have become world-famous astronomers. So, it is essential to join institutions that teach the fundamentals of Physics well. If you get an opportunity to study two degrees together, offering a choice of diversified learning, embrace it.

Q4. Kids become curious about this subject from a very young age. Still, as far as formal education is concerned in this field, majorly it is done at the PG level in Indian Universities. Kindly share your thoughts on this.

Make young students study Astronomy and Astrophysics as a part of their extra-curricular activities and teach them the interdependence of Physics and Astronomy. Studying Astronomy should be a celebration of the physics they learned in the class rather than looking for one more topic for examination.

Q5. What is Radio Astronomy?

It is the study of the Universe using Radio waves (frequencies 3 KHz to 300 GHz) emitted by celestial sources.

Q6. What advantages and disadvantages does Radio Astronomy offer?

Today people believe in Multi-wavelength astronomy. Astronomers appreciate that different celestial sources emit in various wavelength bands. Sources that emit over an extensive range of wavelength bands often bring complementary information when observed at multiple wavelengths. All wavelength bands are equally essential to deciphering the hidden secrets of the cosmic sources and help astronomers visualize a coherent picture of the Universe.

Q7. Can you elaborate on how signals are detected from the epochs of recombination and reionization?

I have included all the details in my answer to question 1.

Q8. What is the current status of Radio Astronomy in India vis-a-vis the rest of the world?

Indian Radio Astronomy has its own niche in the global scenario. In experimental astronomy, we specialize in Low-Frequency Radio astronomy, observing the Universe at frequencies below 2 GHz. We have three major research institutes in India: (1) National Centre for Radio Astrophysics of the Tata Institute of Fundamental Research, Pune, (2) Raman Research Institute, and (3) the Indian Institute of Astrophysics in Bangalore. They are leaders in their fields, building their own radio telescopes, which are internationally competitive, and carrying out research in challenging areas of Astrophysics. NCRA has set up a unique facility, the GMRT, for radio astronomical research at meter wavelengths. GMRT is a very versatile instrument for investigating various radio astrophysical problems ranging from the nearby Solar system to the edge of the observable Universe. Raman Research Institute specializes in building precision radiometers to observe spectral distortions of the Cosmic Microwave Background Radiation from the expected blackbody spectrum. The IIA focuses on solar radio astronomy.

These three institutes and The Inter-University Centre for Astronomy and Astrophysics located in Pune are also leaders in Theoretical Astrophysics, which involves developing models and numerical simulations to understand the physical properties and underlying physical phenomena of celestial objects like stars, planets, galaxies, interstellar medium, etc. Theorists in these institutes also work on answering fundamental questions on the formation and evolution of the Universe.

Q9. What are the current challenges in this field?

One of the most surprising discoveries of the 20th century was that ordinary matter makes up less than 5 percent of the mass of the Universe. The rest of the Universe appears to be made of a mysterious, invisible substance called dark matter (25 percent) and a force that repels gravity known as dark energy (70 percent).

This is only the tip of the iceberg. There is a long list of unsolved problems in Astronomy. The list is dynamic, and the interplay between theory and observational astronomy keeps the list dynamic and exciting. Innovation holds the key to solving most of these problems. Some may also require new instruments to be built to provide transformational Science. One such mega project is **SKA**. The Square Kilometre Array (SKA) project is an international effort to build the world's largest radio telescope, eventually over a square kilometre (one million square meters) of collecting area. The two sites that will host the SKA Telescope core are Australia and South Africa, while the SKA Organisation Headquarters is in the UK. The scale of the SKA represents a giant leap forward in both engineering and research & development toward building and delivering a unique instrument. The SKA will be so sensitive that it will be able to detect an airport radar on planet tens of light-years away.

It will generate unprecedented data about the Universe, with Data flowing from the antennas to the on-site signal processor at rates 100,000 times faster than the projected global average broadband speed for '2022'. With this data, challenges of Big Data, Data Analytics, AI, and Deep Learning will lead the data analysis and advancing astrophysics beyond the present horizon dominating the science scenario.

Q10. What are scopes for the science graduates vis-a-vis engineering students in this field currently and in the near future in India and abroad?

Enormous. Both Engineering and Science graduates will have ample opportunities to participate in the megaprojects in their countries that have decided to be partners. No less will be the role of small-sized innovative projects within institutions. Think about your strengths and dreams before making a career choice, even in Astronomy.

Q11. What efforts can make youngsters experience the joy of Science and be more oriented towards it?

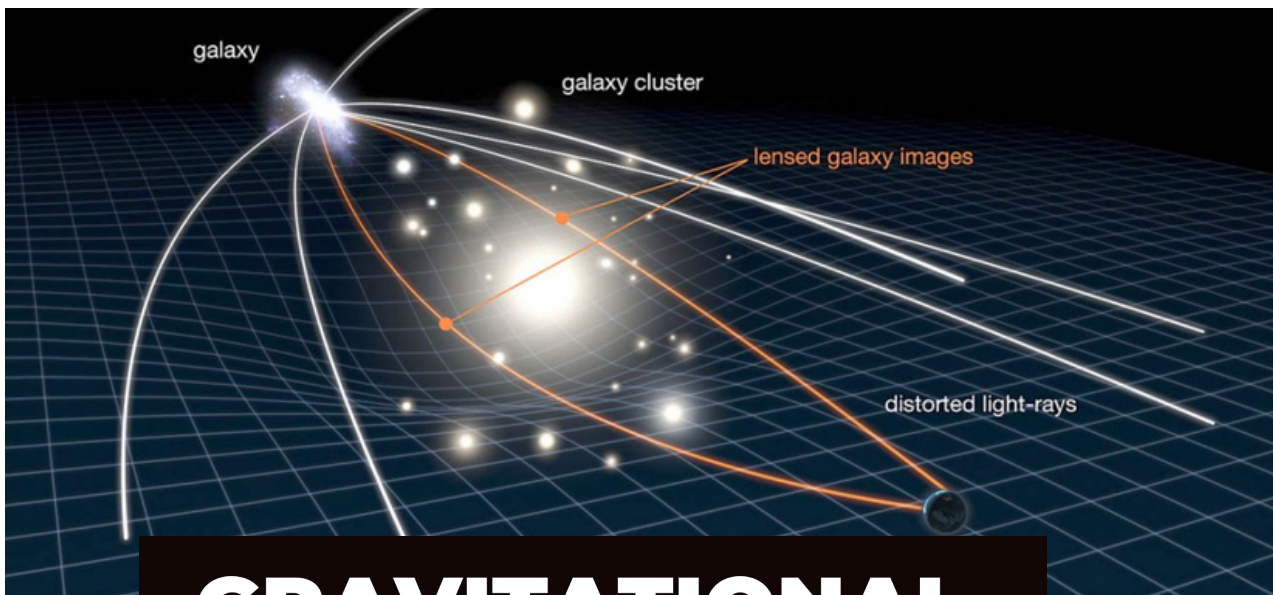
The joy of Science can be experienced by looking around you and connecting what you learned in your class to them. For example: When you dive into a pool of water, watch the sky above you and enjoy looking at light rays traveling from a rare medium to a denser medium. Participation in science quizzes and do-it-yourself projects always brings happiness and satisfaction beyond scoring high marks in class exams. During summer vacations, do not sit idle at home but visit scientific institutions near you in your own state, within the country, and even abroad. The choice depends on your age and the class you are studying in. Many institutions offer travel and subsistence allowance and welcome you with open arms as Visiting Students. Make an application, mail scientists whose work you like, interact and plunge into Science at a younger age.

Useful Web-links:

Important message by Sir.

Let us not spoon-feed them. Reading our conversation, students will be able to easily search for links that describe topics of their interest. I will only make an exception to two URLs:

1. Careers and Jobs in Astronomy and Astrophysics
<https://www.stoodnt.com/blog/careers-in-astronomy-and-astrophysics/>
2. <https://marjan.in/web-stories/astronomy-picture-of-the-day-by-nasa/>



GRAVITATIONAL LENSING

Gravitational lensing is a phenomenon caused by any heavier body when light from a source passes across it, gets deflected and forms multiple images of the object. As we know that the spacetime fabric gets curved around any massive body (spherically symmetric) so when light follows that curved path, it gets deflected and forms a circular ring of the source (with respect to the observer) around that massive object, also referred to as the 'Einstein ring'. When this massive body is a galaxy or cluster which is not completely circular or symmetric then it produces a distorted image of the light source or sometimes multiple images of the source. The number and shape of these images depend upon the relative position of the source, observer, and the curvature of the massive body.

The effect of gravitational lensing acts equally on all kinds of light present in the electromagnetic spectrum and also on non-electromagnetic radiation like gravitational waves. This phenomenon is used to study cosmic microwave background, galaxy surveys, etc.

Priyanshi Mishra
Bsc(H)Physics
3rd year

Einstein's gravitational theory, which is said to be the greatest single achievement of theoretical physics, resulted in beautiful relations connecting gravitational phenomena with the geometry of space; this was an exciting idea.

-RICHARD P. FEYNMANN

Image Source: <https://www.universetoday.com>

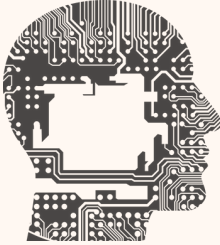
References: 'The science of interstellar' by Kip Thorne, Wikipedia

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STORY

THAT NIGHT THE WHOLE WORLD WAS BLANK ...



Boom...Boom...Boom...

Something exploded terribly but Professor Sharad was told to think so much. He was very busy with his calculations. Boom...boom. It sounded again. Now it caught the professor's attention. What was that?? Was it a blast? Let me check. Talking to himself he opened the door of his lab to see what happened outside. Nothing was there, everything was fine. Professor checked all around but not a single scar was found. 'Maybe I made a mistake in listening'. Thinking this, he again got busy with his work. A few moments later, his lab started fluctuations like a T. V. screen. It seemed like a black and white picture. Sometimes it disappeared but came back again.

Professor felt like he is in a dream. He rubbed his eyes many times but it was reality. In a hurry, he came out of his lab to see whether this going on only in his lab or all over the world. As he opened the door he couldn't believe his eyes. The roads were flowing like a river and the things were moving. The whole world was fluctuating like the screen of a device. When the signal was full, everything was normal but the signal went away, everything went away. Before he could come out of his thoughts, his hands and feet started a movement and soon he flew like a car in the sky. Some strange things appeared in the sky with a scary sound. The professor was very scared and started crying for help but no one responded as if everyone was frozen by some supernatural power. It seemed like everything was going to vanish tonight. He joined hands to pray and looked up in the sky to pray. Suddenly a message appeared "YOUR WORLD HAS BEEN HACKED". The professor closed his eyes in fear. There came a Ray of Hope. Someone put his hand on the professor's shoulder and called him by his name. Professor turned to see. It was a white man with a laptop in his hands. Professor was afraid to see him. " Don't get afraid professor, I am not a ghost and not going to harm you. I am going to help you", said the white man. "Who are you?", asked the professor with some fear curiously. "I know It is going to be very hard for you to digest. But this is the reality that I am your operator not only yours but of this world to whom you called God", said the white man with tension on his face. What do you want to say this world is not real but a software being operated by you?" asked the professor with wide-opened eyes in surprise." Let me explain everything. The world you see is not real but a computer software made by me and installed on an advanced supercomputer. The things you see, the people around all are robots with different programming skills like thinking ability, etc. Unfortunately, this software has been hacked by a malware by someone who wants to overcome my operating power. I am here to ask you for help to save this world because you are brilliant and have a deep knowledge of quantum computing. We have no time to waste to make you believe.", the white man explained with some tensed lines on his face. Professor was still frozen by this bitter reality so he couldn't speak and stood there with his mouth and eyes opened in surprise. "Hurry up, professor. You should help me to create another operating system and re-install the software to save this world", saying this the white man shook the professor to awake him from surprise. Professor suddenly came back from his state of surprise. By understanding the situation he agreed to help him.

The white man held the professor's hand and blinked his eyes and within a second they were in the world of perfection. This is the world where the white man lived and was of such an advanced technology which was not possible for a man to think.

Professor was wondering about this and the white man took him into an advanced laboratory with very fast, highly accurate, and advanced computers. The white man gave him a capsule to eat . After eating this professor soon was able to understand the coding and system of this world and all the instructions to make the operating system copied to his mind. Soon professor and the white man were able to make a more advanced operator than the previous one. Now the white man copied the software in this new operator to a pen drive. Now it's time to destroy the previous one. As the white man clicked auto-destruction mode of the system everything vanished within a second and came back again as he restarted the new one. It seemed like one-click can destroy and create our world. Before the professor could ask anything, the white man clicked his forehead in the middle of his eyes. The professor lost his memory and could only remember that he was working in his lab on his calculations.

So dear readers, can you all imagine yourself being operated like a robot by someone else???

Think !!

Anjali Rajput
3rd year, B.Sc(H) Physics

Galaxies

Avantika Nikhrey
1st year, B.Sc (H) Physics



When you look into the night sky, what do you see?

Stars, duh. The answer should be obvious but it is not correct actually. Sometimes, the bright objects that our eyes perceive to be stars are, in fact, a cluster of billions, maybe even trillions, of stars called galaxy. A galaxy is a system of dust, gas, dark matter and innumerable celestial bodies bound together by gravity. It is believed that all galaxies have massive black holes at their center. Our galaxy, The Milky Way, revolves around Saggitarius A, a supermassive black hole with mass equal to four million suns.

For a long time, it was believed that the Milky Way was the only galaxy in existence and astronomers used to call the other galaxies “nebulae” as they looked like fuzzy clouds. It was in the 1920s that famous astronomer Edwin Hubble showed that Andromeda “nebula” was, as a matter of a fact, a galaxy. Although, the Andromeda galaxy is roughly 2.5 million light-years away from our galaxy, yet it poses to be the largest galactic neighbor.

DID YOU KNOW?

- German philosopher Immanuel Kant coined the term “island universes” to mean that galaxies are separate from each other.
- The term “black hole” was coined by John A. Wheeler in 1967.
- The Black Eye Galaxy famous for the dark band of absorbing dust that lies in front of the galaxy’s bright nucleus.



Types of Galaxies

Edwin Hubble came up with a system to classify galaxies in 1926. Known as the Hubble sequence (or Hubble tuning fork), it arranges galaxies on the basis of their shape.

1.) Spiral Galaxies-It has a flat, spinning disk with a central bulge surrounded by spiral arms. Milky Way is a spiral galaxy. These galaxies are a hotbed for star formation. It is believed that spiral galaxies evolve into elliptical galaxies.

2.) Elliptical Galaxies- They are the most abundant type of galaxies in the universe. They are round but can stretch longer along one axis than along the other. The stars found in these galaxies are usually quite old and dimmed which makes it difficult to spot them.



3.) Lenticular Galaxies- These are an intermediate between spiral and elliptical galaxies. They are called lenticular because they resemble lenses. An example of this galaxy is the Sombrero galaxy.

4.) Irregular Galaxies- The galaxies which do not fall into the category of spiral, elliptical, or lenticular are called irregular galaxies. They are among the smallest of galaxies and contain dust and gas.

References

- 1.)<https://www.nationalgeographic.com/science/article/galaxies>
- 2.)<https://www.space.com/15680-galaxies.html>
- 3.)<https://theplanets.org/galaxies>



The James Webb Telescope

Written by Anjali Kumar
Bsc(H)Physics, 3rd year

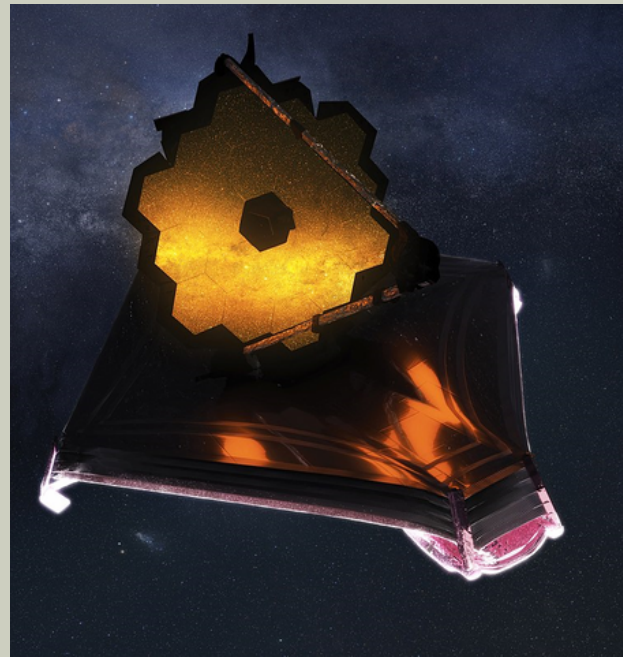
With the launch of the James Webb Telescope, a new era of astronomy has been established. JWT is a wonder for all the scientific community in countless ways. It is NASA's most powerful space science telescope. Also called as 'Time Machine' by some, this telescope will observe the early universe nearly as back as the Big Bang itself.

Can JWT really time travel?

The fellow that can only see a week ahead is always the popular fellow, for he is looking with the crowd. But the one that can see years ahead, he has a telescope and he can't make anybody believe that he has it.

-Will Rogers

Since light, time, and distance all work together, we can theoretically see things that might have happened in past. The light coming out from distant galaxies travel mostly empty vacuum of space for millions of years, largely undisturbed, so the present image of this beam received is the same as it would be when it was first originated, and hence it will appear as if we are looking back in time. But in actuality, the time has passed. Hence, time travel is not possible.



<https://www.flickr.com/photos/50785054@N03/50489833002/>

How far can it go?

The telescope will orbit the sun, 1.5 million kilometers away from the earth at a point called the second Lagrange Point or L2. After launch, the telescope took roughly 30 days to reach the start of its orbit at L2.

Now the question is, what is L2 point?. It is a special stable point in space, where objects when sent, tend to stay there. In other words, they are the parking spaces for spacecraft. At these points, the gravitational pull of two large masses precisely equals the centripetal force required for a small object to move with them. Interesting! isn't It? Well, physics has never been boring. These points in space can be used by the spacecraft to reduce fuel consumption and carry out observations.

What are the aim and objectives of JWT?

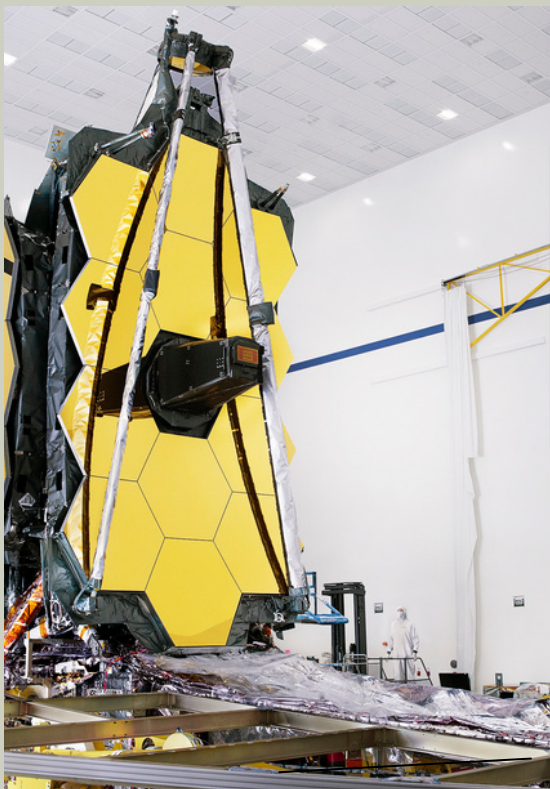
The JWT is based on the infrared technology i.e it will be able to observe infrared light whereas Hubble could only detect Ultraviolet and visible light. The main objectives are:



01. Examination of the first light in the universe
02. Investigate how the galaxies are formed and evolved.
03. Study the life of distant exoplanets and their origin
04. Study the dark matter

THE FIRST IMAGE

The first Images are not scientific - instead are engineering images. The star (known as HD84406), whose picture has been taken too is of little interest yet the image has been the most popular images across the astronomical world. These images are a success. The telescope took this picture after having completed its self-assembly of 18 segments that make up the 6.5m diameter mirror. James Webb once again proved its capabilities.



In this image: The fully assembled James Webb Space Telescope with its sunshield and unitized pallet structures (UPSs) that fold up around the telescope for launch, are seen partially deployed to an open configuration to enable telescope installation.

Image credit: NASA/Chris Gunn
<https://www.flickr.com/photos/nasawebbtelescope/48636487363>

JAMES WEBB TELESCOPE VS . HUBBLE TELESCOPE

JWT is designed to observe the cosmos in infrared light.

James Webb telescope orbits the sun.

James, beyond expectations orbits around the L2 point which is a million miles away.

James will be able to see the early galaxies because of its infrared telescope.

Hubble observes the universe in optical and ultraviolet wavelengths.

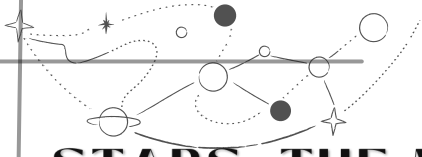
Hubble orbits the earth.

Hubble is around 340 miles away.

Hubble cannot detect as old galaxies as the James Webb telescope.

References :

- 1-www.space.com
- 2-<https://cosmosmagazine.com/space/james-webb-telescope-first-images/>
- 3-<https://jwst.nasa.gov/>



ARTICLE

STARS: THE METAPHOR OF THE NIGHT SKY!

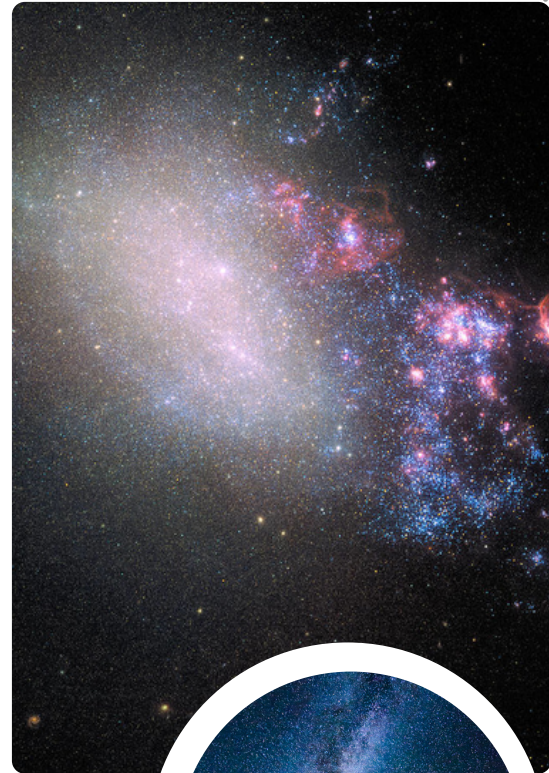
Anwasha Bhattacharjee
Bsc(H)Physics ,1st year

When we recite 'Twinkle Twinkle Little Stars' to the kids, it is meant to be a simple poem or lullaby, but it pops a big question in the kid's brain- WHAT IS A STAR? Let's say it in simple words- a gigantic ball that emits gas! Stars are nothing but gaseous ball of hydrogen and helium that act as an extravagant light source due to the nuclear reactions that take place inside its core. When we look up to the dark sky, millions of tiny sparkles enlighten our eyes. These enlightening sources are the building block of galaxies. According to the National Geographic report, there are 300 billion stars in our Milky Way.

The birth of a star is a long process. It starts inside hydrogen- based dust clouds called Nebulae. Gravity causes the dense matter to collapse under its own weight. This forms a mass of gas called protostar which is the first stage of the birth of a star. According to the conservation of angular momentum, protostars get smaller and smaller due to continuous spinning. At this stage, the pressure increases and the temperature rises and the star enters the relatively brief T Tauri phase. Millions of years later, the core temperature comes down to 15 million Celsius, nuclear fusion begins and the star is formed. These stars exist in a stable state of nuclear fusion, converting hydrogen to helium and radiating x-rays. This process emits an enormous amount of energy, keeping the star hot and shining brightly. Most stars are found in clusters. So the next question that pops-'What could possibly be these cluster of heavenly bodies?' That's when we are told about constellations. The Oxford Dictionary defines them as a group of stars that forms a shape in the sky and has a name.

In simple words, constellations are a cluster of stars that somehow form a pattern and the subconscious mind draws the line along the lines and thinks of it as some figure or mythological characters.

look there in the night sky!



In prehistory days people used to correlate their stories, faiths and beliefs and creations. Different cultures and different countries adopted different constellations which lasted a long time. Talking about the history, the small groups of stars within a constellation are called 'Asterisms' (eg: Big Dipper is a part of the Ursa Major Constellation); some stars are presented with some specific names that emphasise the mythological beliefs.

Article Reference

- [1] <https://en.wikipedia.org/wiki/Constellation>
- [2] <https://www.britannica.com/science/constellation>
- [3] <https://www.nationalgeographic.com>
- [4] <https://www.flickr.com/photos/gsfrc/33992375698>

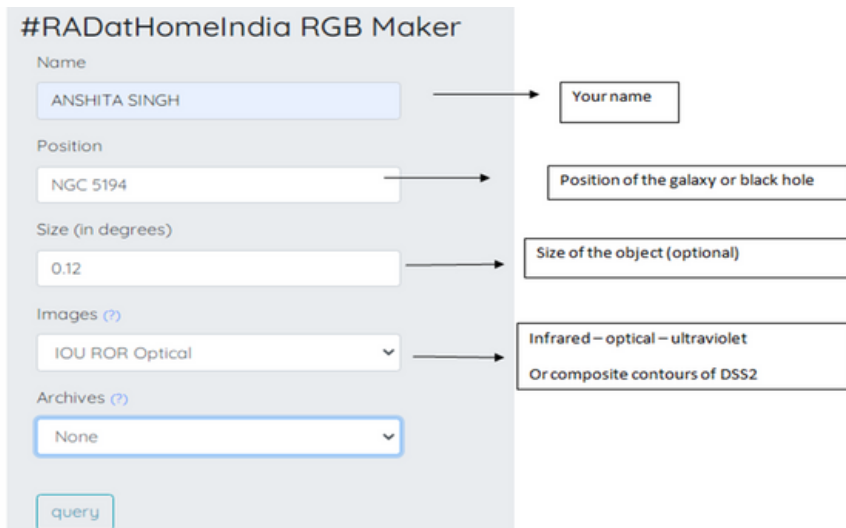


LET'S DO SOME ANALYSIS

“ Unless we combine Undergraduate education with Research and experiments in all disciplines . we cannot expect our Universities to become world class”

With promoting the same genre of radio astronomy, a genius and proficient scientist “Dr. ANANDA HOTA “ laid the foundations of RAD@HOME INDIA. RAD@HOME Astronomy Collaboratory #RADatHomeIndia is the first Indian citizen-science research platform in astronomy. This internationally – acclaimed , zero – funded , nationwide, Inter – University , Collaboratory was established in the year 2013. In this collaboratory, anyone, with B.Sc or BE degree (even undergraduates) could do basic red-green-blue or RGB image analysis of galaxies observed in UV, optical, IR or radio wavelengths. The images can be obtained by simply defining position, size or image type for a basic entry to the observational study of galaxies with actively accreting supermassive black holes. This multi-wavelength RGB-image analysis could be done by anybody sitting at any corner of the country and of free of cost. Now I would show you one example of how to perform the analysis .

- **Firstly , clicking on the link { source: <https://www.radathomeindia.org/rgbmaker> , we reach to a page as shown below .**



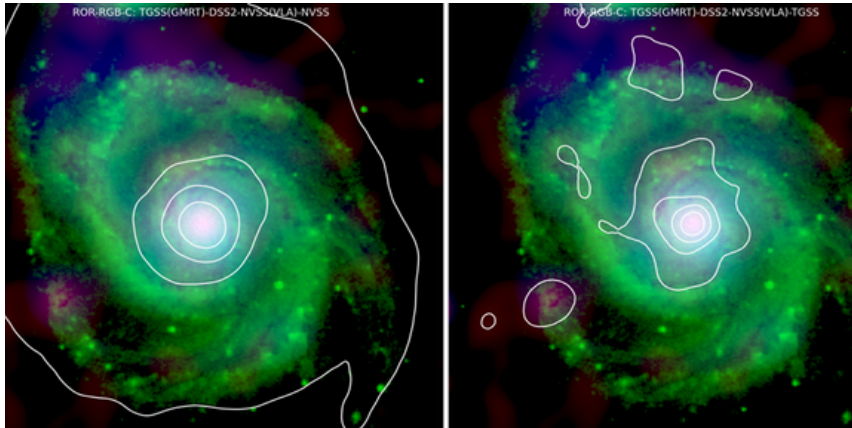
The screenshot shows the '#RADatHomeIndia RGB Maker' web form. It includes several input fields and dropdown menus, each with an arrow pointing to a descriptive label:

- Name:** Input field containing 'ANSHITA SINGH' → Label: 'Your name'
- Position:** Input field containing 'NGC 5194' → Label: 'Position of the galaxy or black hole'
- Size (in degrees):** Input field containing '0.12' → Label: 'Size of the object (optional)'
- Images (?):** Dropdown menu with 'IOU ROR Optical' selected → Label: 'Infrared – optical – ultraviolet Or composite contours of DSS2'
- Archives (?):** Dropdown menu with 'None' selected

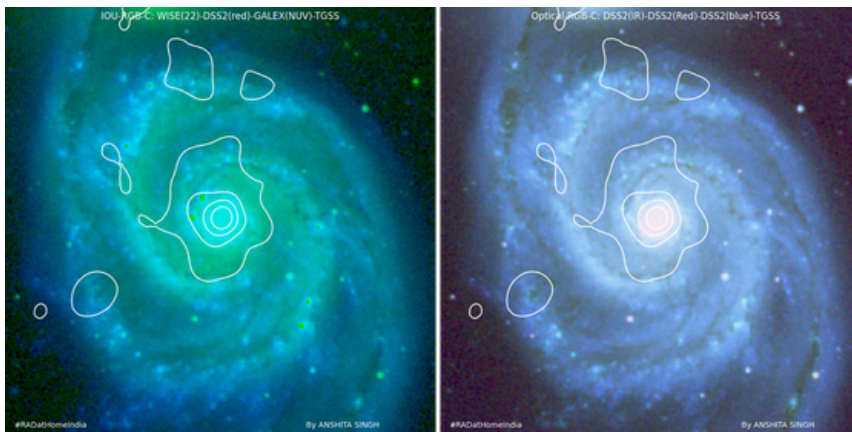
A 'query' button is located at the bottom left of the form.

- **After that , click on the query and experience the beautiful images to analyse .**

Here we are going to do the analysis of a very beautiful WHIRLPOOL GALAXY , also known as Messier 51a , M51 and NGC 5194 is an interacting grand design spiral galaxy . It lies in the constellation Canes Venatici . Its distance is 23.16 million light years away from Earth with the diameter equals to 76,000 light years. (source: https://en.wikipedia.org/wiki/Whirlpool_Galaxy) The following images are IOU [Infrared – Optical – Ultraviolet] , false colour multi – wavelength images , one visible and two invisible to human eyes. While optical image show the Sun like billion year old stars, UV shows hot massive young (a few million year) stars and IR (22 micron) show emission from frozen, comet like, dust and PAH (polycyclic aromatic hydrocarbon).



The image is ROR-RGB image where optical image is in red, image from our Indian radio telescope GMRT [Giant Metrewave Radio Telescope] is in red and image from Very Large Array of the USA is in blue. Red shows the 150MHz (wavelength 2m) and blue shows the 1400MHz (20cm) image of the same galaxy seen in optical (green). Radio band shows the synchrotron radiation from relativistic electrons gyrating in the magnetic field of this galaxy. Note that the radio emission, seen with the GMRT, is also shown in white line or contour maps on IOU and optical images. These iso-intensity Contours represent regions having equal intensities of radio emission. GMRT image is taken from TGSS [TIRF GMRT Sky Survey] and VLA image is from the NVSS [NRAO VLA Sky Survey] .



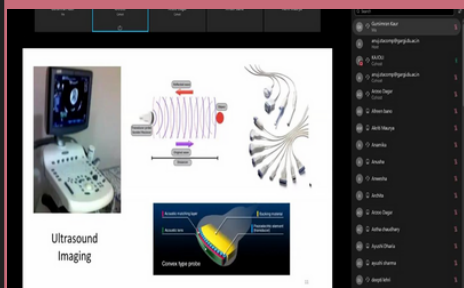
In the IOU-IRB image the Infrared data was taken from WISE [Wide field Infrared Survey Explorer] and similarly the UV data was taken from GALEX [Galaxy Evolution Explorer]. Both WISE and GALEX are space telescope of NASA. Optical data is from DSS2 [Digitised Sky Survey] . The data from various telescopes are freely supplied for scientists all over the world and RAD@home RGB-maker web-tool has collected it via NASA Skyview server.
{source: <https://radathomeindia.org/rgbmaker-info>}

Further more such interesting analysis could be done under the guidance of Dr. Ananda Hota and his team of trained citizen scientists in a discussion mode in their Facebook page " <https://www.facebook.com/groups/RADathome>. Discussions happens everyday (#DailyGalaxyRGB) and live interaction happens every Saturday 2-3 pm during online e-class. Citizens who perform well get selected for further training to enable #DilSeDiscovery and achieve co-authorship in research proposals and publications as demonstrated in the Hota et al 2014 paper available at {<https://ui.adsabs.harvard.edu/abs/2016JApA...37...41H/abstract>}

I'm also it's part and requesting you to join and explore more.

I LOVED SCIENCE

February 9, 2022
Arzoo Dagar
3rd year, Bsc(H) Physics



Quasar organized an online talk with Dr. Kajoli Banarjee Krishnan on February 9, 2022. The talk was named "I Loved science" in which Dr. Kajoli shared her life lessons and experiences with the students. A google form was circulated among the students in which they were required to register themselves for the event. The participants were then provided with the meeting link. The event was conducted on the platform - Cisco Webex. The event started at 3 PM sharp. Dr. Kajoli shared about her experiences of college life at St. Stephens College and Indian Institute of Technology. She then introduced the students to technology that attracted her to the field of science. She talked about biomedical ultrasound, wave propagation and many more interesting optics. Her talk helped the students to learn that success is a journey, not a destination. The program ended by thanking Dr. Kajoli and all the teachers for their valuable presence. At the end a feedback form was shared among the students for their valuable feedbacks and suggestions.

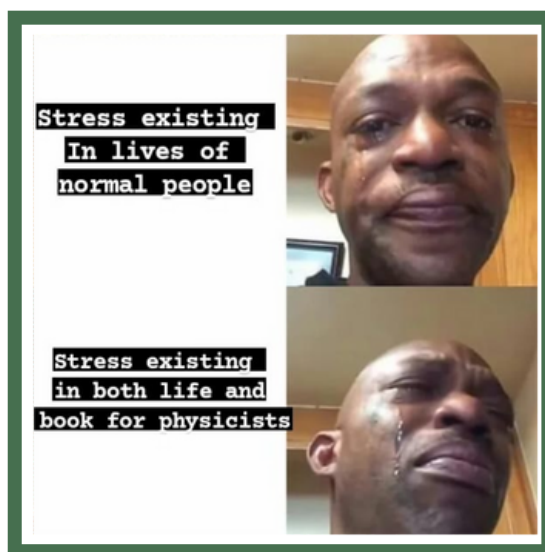


Arzoo Dagar
3rd year, Bsc(H) honours.

Quasar organized Memania- a meme making competition. The theme for the events were as follows-

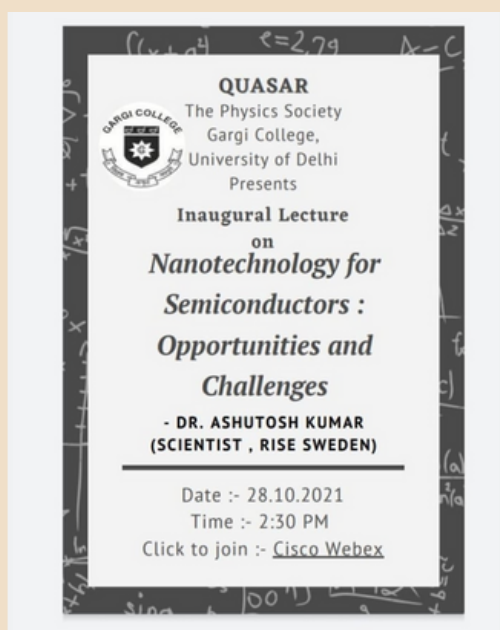
- **Astronomy and Astrophysics.**
- **Perks of being a Physicist**
- **Physics in our daily life**

The poster was circulated among the students. The participants were provided a Google form where they need to register themselves for the event. Also all the participants were made aware about the rules for the event. Plagiarism was strictly prohibited. And also the participants need to specify the source of the picture present in their meme. A Google form was provided to the participants to submit their work. The best entries were provided with the e-certificates and got featured on our official Instagram handle.



INAUGURAL LECTURE

October 28, 2021



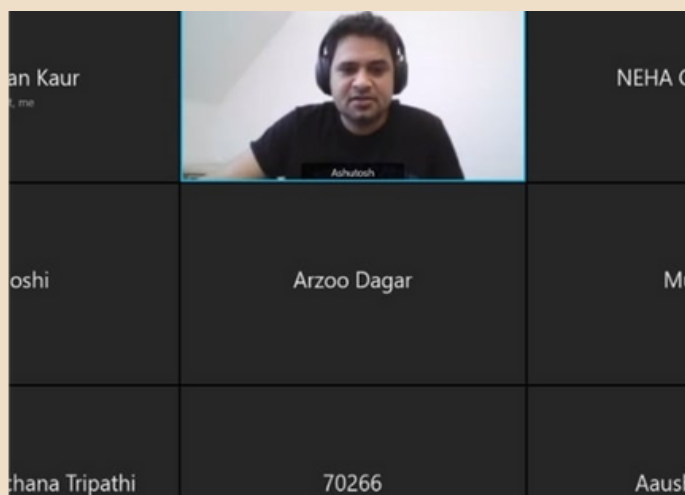
Quasar, The Physics Society of Gargi College organized a virtual inaugural lecture on “Nanotechnology for Semiconductors: Opportunities and Challenges” by Dr. Ashutosh Kumar (Scientist at RISE Sweden) on 28 October, 2021. When the annual magazine “Physikos” for the session 2020-21 was inaugurated and its new council was announced.

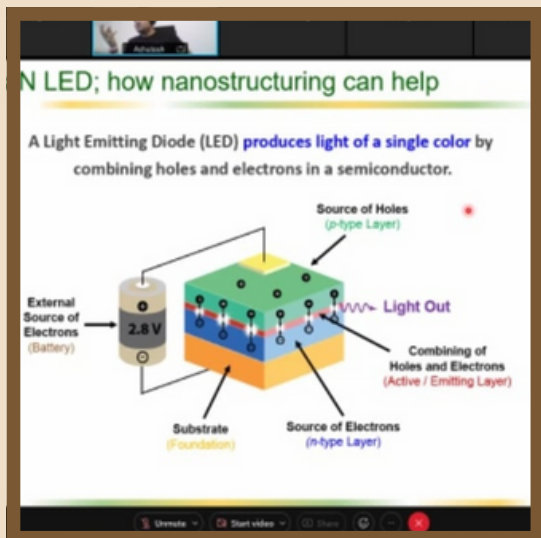
Ashutosh Kumar is a Scientist at RISE Research Institutes of Sweden since October 2020. His research is focused on exploring III-V semiconducting materials and devices at varying dimensions, ranging from bulk to atomic-scale for various technological applications.

Before joining RISE, he was a post-doctoral fellow at National Institute for Materials Science, Japan where he worked towards development of GaN-based devices with leading companies like Fuji Electric and Sony Corporation for high-power and solid-state lighting applications.

His current research interest at RISE involves growth and processing of III-V materials followed by device fabrication and characterization.

Dr. Ashutosh Kumar earned his doctorate degree in semiconductor physics from Indian Institute of Technology Delhi, India in 2016.





During his doctoral studies, he was awarded with Deutscher Akademischer Austauschdienst (DAAD) fellowship to work on GaN nanostructures in Max Planck Institute for Science of Light, Germany for a period of six months.

Till now, he has contributed to various research projects on nitride semiconductors which mainly includes electrical transport at metal/GaN interfaces, low-frequency noise characterizations, GaN nanostructures, graphene/GaN interfaces, microstructural and atomic-scale investigations of defects.

This event was one and half hour long and it was indeed a motivating event. Students got a chance to learn about Nanotechnology and also about DAAD scholarships which helps students to go to Germany for higher education.

At the end, the event had a question - answers round which was very enlightening and interactive.

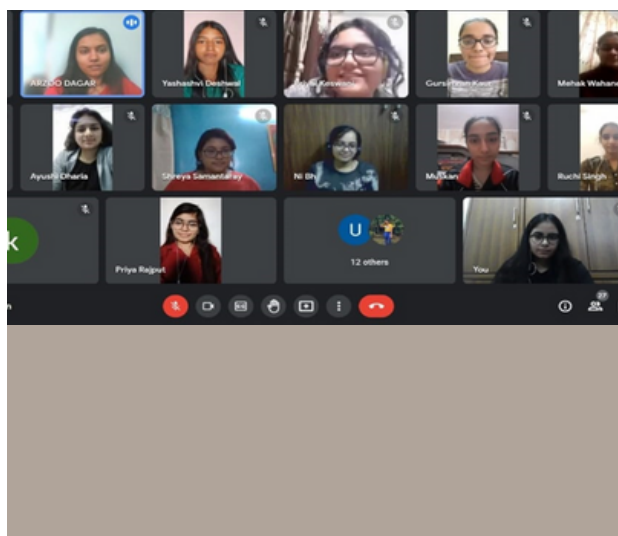
After this event, we had introduced our department magazine "physikos" and also shared the form (for freshers) to be part of the departmental magazine and so that they can enhance their writing skills.

Neha Choudhary
2nd year, Bsc(H) Physics

ORIENTATION LECTURE

QUASAR, The Physics Society of Gargi College organized an event for the freshers, Orientation Program, on November 22, 2022. The event was aimed to give freshers a virtual tour of the college, staff, and the enthusiastic college life. A write-up and poster were circulated among the students and provided them with a meeting link. The Orientation Program was held on Google Meet and started at 1:00 PM by giving freshers a warm welcome. A Presentation was being shown which comprised of a brief introduction of the college, its teaching & non-teaching staff, council members, and some video clips of the college. Students were briefed about the physics society and physics department. They were made aware about the events hosted by the physics society by means of video clippings of the events of the last year. After that, TIC along with other teaching staff guided freshers and shared knowledgeable thoughts with them .

Priya Rajput
2nd year, Bsc(H) Physics
November 22,2021



Then all of them gave their introduction by turning their cameras on. In the end, Quasar student union interacted with the juniors. The council members had a warm conversation with the students regarding the college life. The program was terminated by thanking all the teachers and students for spending out time with freshers.

CINEMA QUIZOHILIC

January 16, 2022

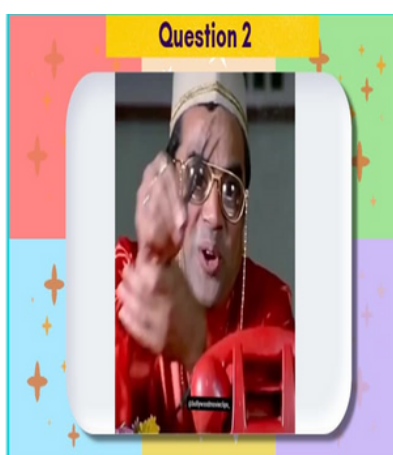
Priya Rajput
2nd year, Bsc(H) Physics



QUASAR, The Physics Society of Gargi College organized a stress buster event. It was basically a quiz for the students where they had to guess the name of Bollywood Movies. The event was named Cinema Quizohilic and was scheduled on January 16, 2022.

Write-ups & posters were circulated among the students and a Google meet link was provided. The event was conducted on Google Meet platform and started at 4 p.m. by welcoming the teachers and students present over there. The quiz competition took place by presenting the presentation and dictating rules and regulations of the event. Students were supposed to guess the name of movies with the help of hints given to them.

The event helped students to refreshen their minds. The program ended by thanking everyone for their valuable presence. Lastly an attendance form was shared to collect their attendances and reviews for the upcoming events.



Winner of the event Namra Arya, 3rd year student, was announced and was tagged on the story of the official Instagram handle of Quasar.



SCIENCE DAY CELEBRATION

REVEL – A PAPER PRESENTATION
COMPETITION
February, 28 2022

Arzoo Dagar
3rd year, Bsc(H) Physics

Quasar in collaboration with all the science departments and mathematics department organized Revel – a paper presentation competition to celebrate the ethos of the national science day and Nobel Prize of Sir CV Raman. This event was organized under aegis of the National Academy of Science (India), Science -Society program in association with NASI Delhi Chapter. The themes of the paper presentation were as follows

1. Integrated Approaches in Science and Technology for a Sustainable future, Ministry of Science and Technology, Government of India.
2. International Year of Basic Sciences for Sustainable Development by United Nations.

The students were required to register themselves for the paper presentation competition using the Google form. After the registration process all the participants mailed their respective ppt's to the authorities. The competition took place on the platform of Cisco Webex.



Meeting link was provided to the students on 27th Feb, 2022. The event took place on 28th Feb, 2022 at 4:30 PM. All the participants presented their presentation with enthusiasm which was followed by a question and answer session by our judges for the participants. We had a total of 6 presentations on the day.

After Revel, the slogan and parody competition was organized for which the topics were released at the starting of the meeting. The topics were also available in the chat box. The participants of the slogan and parody competition needed to submit their work on the Google form available in the chat box within the given time frame. After the participants submitted their work the judges took some time to prepare the result. Meanwhile a short documentary was shown to the students on the life of Sir C.V Raman. The judges then announced the result for all the three competitions. The students who secured 1st position were-

1.Revel

Drishtant Sen

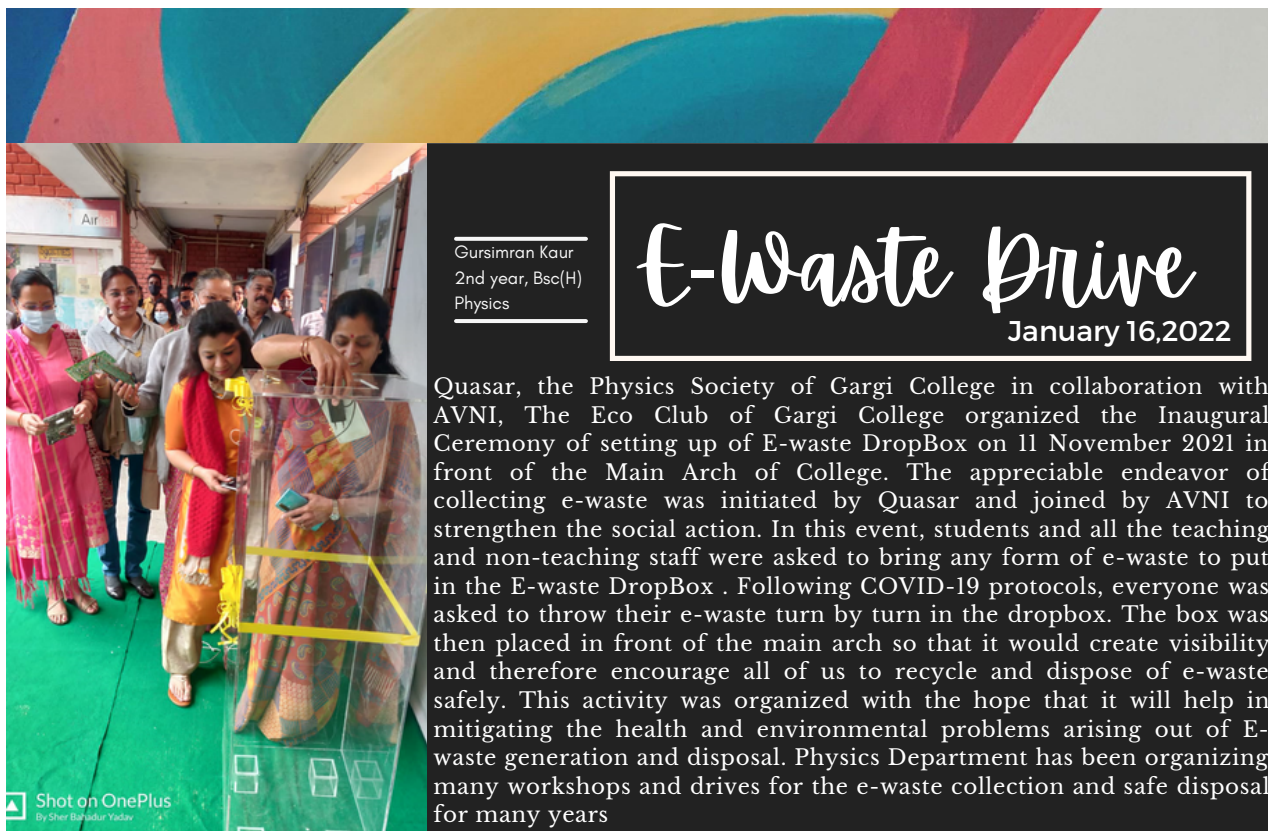
B.Sc Zoology(H), Deshbandhu College, Delhi University

2.Slogan Writing Competition

Rajaswi

B.Sc Life Science, Gargi College, Delhi University

After the announcement of the result, a vote of thanks was presented and feedback was collected from the Quasarians present at the event through a Google form.



Gursimran Kaur
2nd year, Bsc(H)
Physics

E-Waste Drive

January 16, 2022

Quasar, the Physics Society of Gargi College in collaboration with AVNI, The Eco Club of Gargi College organized the Inaugural Ceremony of setting up of E-waste DropBox on 11 November 2021 in front of the Main Arch of College. The appreciable endeavor of collecting e-waste was initiated by Quasar and joined by AVNI to strengthen the social action. In this event, students and all the teaching and non-teaching staff were asked to bring any form of e-waste to put in the E-waste DropBox. Following COVID-19 protocols, everyone was asked to throw their e-waste turn by turn in the dropbox. The box was then placed in front of the main arch so that it would create visibility and therefore encourage all of us to recycle and dispose of e-waste safely. This activity was organized with the hope that it will help in mitigating the health and environmental problems arising out of E-waste generation and disposal. Physics Department has been organizing many workshops and drives for the e-waste collection and safe disposal for many years

IRSHAAD

Quasar organized the career guidance session on JAM and JEST "Irshaad" for the students. The event was organized on 21 November, 2021 through Google Meet. It was organized in collaboration with Ms. Manisha having AIR-388 in IIT JAM and Ms. Tanvi with AIR-143 in JEST.

About the speakers-

Ms. Tanvi

Ph.D. student in Astronomy at National Central University, Taiwan (2018-current) and Project assistant at Aryabhata Institute Of Observational Sciences, Nainital(2018-2019)

Ms. Manisha

currently working with CHEGG INDIA(2019-Now) and M.SC THESIS "Theory of Skyrmions in Chiral Magnets guided by Prof. Sudhansu Sekhar Mandal" (2019-2020)

The session started at 4 p.m. After the formal introduction of the speakers by the president of Quasar, Ms. Manisha took over and guided the students through her experiences and recommended some books for their better preparation. After her talk, Ms. Tanvi guided students about the JEST and other related programs. It was a nice session and lasted till 5 p.m.

QUASAR
The Physics Society
Gargi College
Presents

IRSHAAD :
guidance session for IIT-JAM
and JEST -2021

By -



Ms Manisha
AIR-387 in JRFNET in
CSIR [June 2019]
AIR-388 in IIT-JAM [2018]

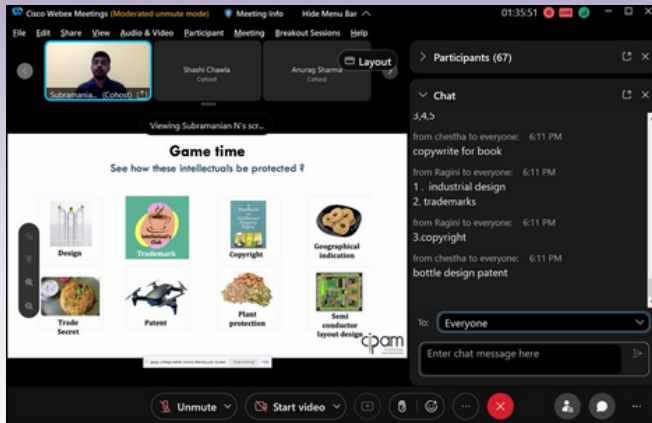


Ms Tanvi Sharma
Cleared JEST -2018 (AIR, 143)
Cleared GATE -2018 (AIR, 744)

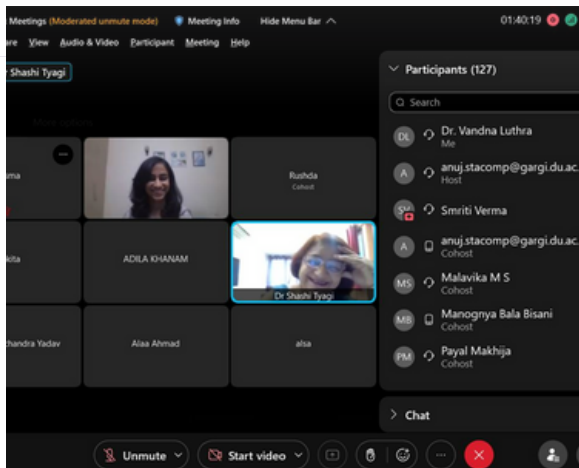
Schedule
21 November , 2021
Timing :- 4 PM
Link :- Google Meet

November 21, 2021

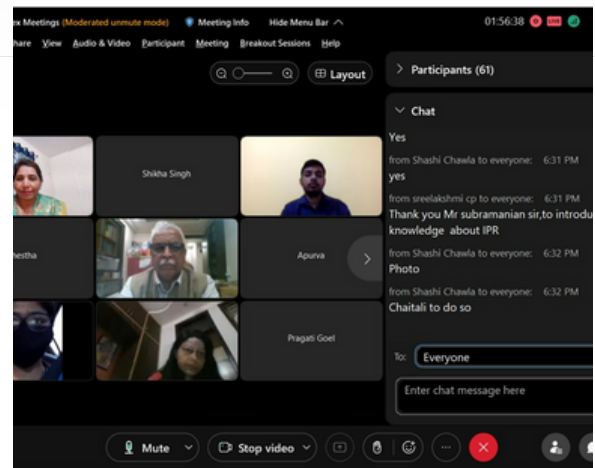
Gursimran Kaur
2nd year, Bsc(H) Physics



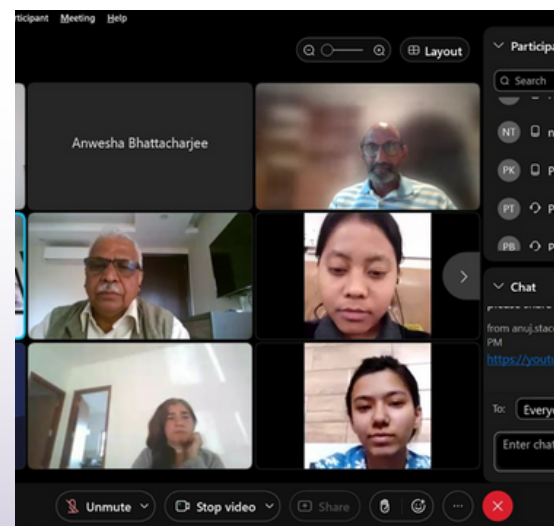
Webinar on "An Overview of IPR"



Revel- A paper presentation and Slogan Writing on National Science Day



GLIMPSES OF THE ACTIVITIES/ EVENTS/WORKSHOPS/ WEBINARS/ QUIZZES HAV ORGANIZED UNDER THE AEGIS OF NASI, (INDIA) SCIENCE - SOCIETY PROGRAM IN ASSOCIATION WITH NASI DELHI CHAPTER



OPPORTUNITIES FOR B.SC STUDENTS IN MEDICAL PHYSICS

**Dr. Apoorva Mittal , Young Scientist Fellow
Department of Radiation Oncology, All India Institute of Medical Sciences**

Thanks to Dr. Apoorva, our alumnus from the 2009-12 batch. I remember how passionately she had participated in a project while she was a student at Gargi. Later she completed her M.Sc. and joined as a research fellow at All India Institute of Medical Sciences to work on the development of radiochromic films for the measurement and monitoring of radiation doses in medical applications. Her journey from a Physics graduate to a Young Scientist Fellow in a Premier Institute of India will inspire many other students to take up Medical Physics, Radiation Physics, Clinical Medical Physics, and many other related fields for higher studies. She has published research papers in the International journals. We are thankful to you for the prompt reply to pen down the useful information and career options for our students.

Best Wishes,
Vandna Luthra

Medical Physics is a branch of applied physics that uses principles of physics for the diagnosis and treatment of human diseases with a specific goal of improving patients' quality of life and better treatment outcomes.

Medical physicists are healthcare professionals with specialized academic knowledge and clinical training in medical physics. Their work involves the use of ionizing and non-ionizing radiation in diagnosis and therapy. Medical physicists generally find employment in diagnostic or radiation therapy clinics or medical research institutes. Medical Physics specialty may further be classified into a number of sub-specialties including therapeutic medical physics, diagnostic medical physics and nuclear medical physics. In all these sub-fields, physicists are involved in clinical service, radiation safety aspects and research and development.

Clinical Service

The responsibilities of a clinical medical physicist lie predominantly in the areas of radiotherapy, nuclear medicine and diagnostic imaging. The main role of a medical physicist in radiotherapy includes treatment

planning, quality assurance and calibration of machines. 1. Nuclear medicine physicists are responsible for ensuring the correct handling of radionuclides and equipment used in nuclear medicine clinics. 2 In diagnostic imaging, the role of a medical physicist includes machine procurement and installation, calibration, quality control and operation. The responsibilities of a clinical medical physicist lie predominantly in the areas of radiotherapy, nuclear medicine and diagnostic imaging. The main role of a medical physicist in radiotherapy includes treatment planning, quality assurance and calibration of machines.

Research and Development

It is pertinent to accurately determine the radiation doses during diagnostic and therapeutic procedures as over exposure to radiation entails potential risk to the human body and under exposure affects treatment efficacy. Therefore, one of the key objectives of research in the medical physics field is to develop devices that can measure the radiation doses with high accuracy and advanced techniques to deliver radiation precisely to the desired tissue location.

The concepts of physics like absorption of radiation, production of x-rays and radioactivity plays a central role in the application of radiation in medical diagnosis and treatment. In the field of imaging physics, the development and improvement of methods to image body structure and function are major research areas.

Physicists can contribute significantly to the

advancement of the radiation based diagnostic and therapeutic fields of medicine. They will continue to play primary role in the development of physical principles in medicine for the progress of medical physics field. In order to explore career opportunities in this field, Interested students may pursue M.Sc. Medical Physics or a Diploma in Radiological Physics after M.Sc. in Physics offered by various institutes in India.

Radiation Safety

Every cancer centre has a radiation safety officer whose responsibility is to prevent unnecessary exposure to radiation and to maintain necessary exposures as low as reasonably achievable. The Atomic Energy Regulatory Body (AERB) of India certifies qualified medical physicists as radiation safety officers for medical facilities

References :

(1) Yorke ED, Keall P, Verhaegen F. Anniversary paper: role of medical physicists and the AAPM in improving geometric aspects of treatment accuracy and precision. Medical Physics. 2008; 35(3):828-39.

(2) Bailey, D.L. Thirty years from now: future physics contributions in nuclear medicine .EJNMMI Physics 2014; 1(4): 1-8.

Useful Websites

(1) <https://www.aerb.gov.in/english/>

(2) <https://humanhealth.iaea.org/HHW/MedicalPhysics/TheMedicalPhysicist/RoleofaMedicalPhysicist/index.html>

(3) <https://cmpi.org.in/>



BATCH 2018-2021



HERE'S WHAT THEY ARE DOING

Name	Current Status
Ankita	M.Sc. Physics (D.U.)
Manju	M.Sc. Physics (D.U.)
Kashish Bhatia	M.Sc. Physics (D.U.)
Navita Yadav	M.Sc. Physics (Kurukshetra)
Laxita Lata	M.Sc. Physics (D.U.)
P. Manshika Devi	M.Sc. Physics (D.U.)
Ripundhi Lepcha	M.Sc. Physics (D.U.)
Preeti	M.Sc. Physics (D.U.)
Nikita Saini	M.Sc. Physics (D.U.)
Ayushi Choudhary	M.Sc. Physics (I.I.T. Kharagpur)
Kusum Seervi	M.Sc. Physics (N.I.T. Surathkal)



MESSAGE FROM THE BATCH

2018-21

We, the batch of 2018-21, had quite an unconventional run for college life. Each of us used this time to explore different interests or develop our academic skills further.

A few of us have decided to deepen our knowledge of Physics, and are in various fields doing our masters in Physics, Astrophysics, Photonics, etc. Some of us are preparing for Civil Services exams. A few of us have taken the critical thinking skills that physics provides and are applying it to other fields. Below you will find a few testimonies from the people of our batch pursuing their passion on different ends, our motivations and the process, and a few tips for juniors! We hope this is an enjoyable read for you.

Aditi Verma is our classmate preparing for the CSE. She says, "I have started my preparation for the Civil Services Examination (CSE) after graduating. I started with the basics like reading the newspaper, NCERT books, and focusing on my reading habit for the first 2 months. After having some sort of idea about the demand of the exam, I moved toward reading some of the standard books- and I'm still at this stage."

As for what drove her to this, "The question lies here: what was the driving force which made me study for CSE, is my inclination toward the society itself. Though the facts and mysterious stories about galaxies, supernovae, how the universe works, dark matter and a lot of stuff fascinated me a lot since 2008, but that was my individualistic approach toward life. Later on, I found what really makes me happy. The answer I found within was the satisfactory smile the people wore on their face because of my cooperation in their life and this was the socialistic approach, to the extent which I found feasible for society!"


Tanvi is also preparing for the CSE. On motivation, she says, "In college itself, I was associated with 2-3 NGOs and then and there I realised that this profession is apt for my personality and I really want to serve society. Another motivation factor would be the dynamism of the job, the challenges, and the discretion that the service provides. Being an applicant for the exam in itself broadens our horizons. "

Tanvi says, "Through the multi-dimensional approach that the exam demands, being a civil services aspirant, a person can understand the nuances of art, culture, traditions, society, ethics, geography."

Although the exam seems intimidating, Tanvi has a clarity about it. "As I read from Victor Frankl's book, 'Man's search for meaning', the one who has a Why to live for, can survive almost any How. The daunting factor of this exam is that it is highly competitive i.e. the number of seats are miniscule as per the number of applicants. So, if you are determined to take the challenges of civil services, prepare hard, the result will definitely be in your favour."

Prachi Rauthan is currently working as part of a global HR company. This testimony encapsulates her journey and her inspiration. She emphasises on networking, trying different internships and talks about the challenges that come with changing fields. She also provides a few pointers to people thinking of getting into this pursuit.

"Networking helped me land my first internship. One semester into the course, I realised that Physics invoked my curiosity but I wanted to explore different fields. I, then got into societies like AIESEC and the debating society. I delved into different fields and developed my profile in terms




of the work I was doing for organizations and the people I met. Something my professors and the college taught me: there is something to learn from everybody you meet, still keeps me going to this day. By the end of the second year, I decided that I would like to prepare for a Masters in Business Administration and started preparing for CAT. Unsure of the exact field I wanted to get into, I prepared for the exam while looking out for opportunities. The pandemic squashed out many of my schedules, and the office internship I landed through LinkedIn. Our college placement cell then helped me get another internship, which I did extensive research on, and went through the rounds of application. I made sure my interests aligned with theirs. Currently, I am at a global HR company, and my role caters to fulfilling all sales and marketing requirements. I love that this space is dynamic, challenging, and most importantly, collaborative. To juniors who want to explore different spaces: my one tip would be to explore the modular versions of them, be as active as you can on LinkedIn, stay updated on Placement cell postings.

What we study in Physics offers us a unique skill set in that we are able to look at problems with a logistical approach. But, when it comes to certain terminology or functionalities of the domain, you must broaden your knowledge."

Preeti is currently preparing for AFCAT along with pursuing her master's in Physics from Delhi University. "Do What You Love & Love What You Do!" is her motto. In response to how she started chasing this goal, she says "In my first year I enrolled myself in NCC as I want to join defense services. Sometimes we think that in graduation we should only focus on our studies, but I think extracurricular activities are as important as studies as it gives us a different environment in which we can explore ourselves. So whenever and wherever you get a chance to improve yourself you should go for it, this actually improves personality." Talking about her current situation, "For defense, I cleared the AFCAT examination 4 times and got recommended for Indian Air Force for Flying officer on my 3rd attempt. Unfortunately, I was not able to clear the merit list this time but I'm still preparing for the same. As for now, I am doing M.Sc. (Physics) from University of Delhi and simultaneously preparing for my goal. As life is a journey of ups and downs, so one should always keep smiling and keep learning lessons from it."

As for me, Ananya, I'm currently in Munich pursuing my Masters in Astrophysics at LMU. I have always had a fascination for physics, but the year it really struck me I wanted to get into Astronomy, was 2017 when gravitational waves were directly detected. At that point of time., I didn't have the accurate mathematical or theoretical knowledge to understand most of the discovery, but I knew I wanted to learn more. I took up a research project with Archana ma'am, which would have to be the most enlightening experience I had in college. In September 2020, I found an astrophysics research internship offered by SSERD. For 4 weeks, I had a steep learning curve in terms of coding, writing abstracts and reports, reading and organizing papers, and most of all, collaborating on a project with a team. I learned a lot, but most of all, I was now a step closer into knowing what field I'd like to get into: computational astrophysics. As for how I came to study at LMU, I took a lot of factors into account regarding academics, my budget, networking, and if partner institutes offered the chance of a PhD. I was unsure of the application process along every step of the way, but I connected to people studying here through LinkedIn, and received a lot of help. M.Sc. Astrophysics is a niche degree, but computational work has a lot of transferable skills. The only takeaways I would like to offer for juniors wanting to get into physics are: start networking! Either through LinkedIn or through Twitter.



Find out what you are interested in by taking up internships. Whether you like being in the lab or coding simulations or observing on telescopes, is something you will only know once you apply your skills to experiments. Lots of universities offer visiting students' programs, usually during the vacations. The applications begin and close almost 5-6 months before so make sure you are applying on time. There are also internships offered by CERN, DAAD, ESO and other international organizations. These will require more time dedicated to applications.

When applying to universities abroad, mail the admissions department as many queries as you have. There are requirements which have been waived due to the COVID circumstances in each country, it never hurts to ask about your eligibility. Universities generally ask for recommendation letters from professors: make sure you keep your professors informed about your interests and your accomplishments so that they can write a strong and detailed letter. Ask your professors well in advance of the application deadline.

I do not recommend applying to only one university- there are lots of eligibility criteria that may or may not be met by you. Prioritize at least 4-5 of them based on location, faculty, research interests, and apply accordingly. Attend summer and winter schools, apply to visiting students' internships. Focus on improving your skills, and on making yourself the best researcher you can be. Most importantly, rejections are a part of academia, do not let them define you!

I am Preetisha, and I'm going to begin my master's studies in Photonics this winter semester at the Abbe School of Photonics of the Friedrich Schiller University Jena, Germany. I will also be awarded a scholarship for 12 months. This is certainly motivating for me. During my bachelor's, I was fortunate to get the opportunity to be guided by Archana Ma'am on a research project on Density Functional Theory, through which Ananya and I gained a lot of experience and also got the opportunity of presenting research papers in national and international conferences. I was also fortunate to be a part of the Physikos team for 3 years and take up the role of Editor in my second year, all thanks to Vandna Ma'am. During the lockdown, I attended online summer schools, some of them even international ones (they have a selection procedure). These learning experiences have helped me a lot in deciding what I wanted to pursue further (it can be very confusing at times due to plenty of options).

Thorough research of each university and course is very important for anybody wanting to pursue higher studies abroad and one should start as early as possible. Focus on studies and grades but also land yourself internships, like working with a professor on a project for a few months, attend summer/winter schools as well as scientific conferences, participate in co-curricular activities/competitions like joining our department's magazine team Physikos or one of the many societies of our college. In a nutshell, engage yourself in activities that will help you reach a step closer to your goals while consistently maintaining your academics. Ananya has already mentioned some very important points about application procedures, networking, etc. Many aspects are important to consider before finalizing a particular university or course. For example, since I wanted to pursue optics and photonics, I searched for universities excelling in this field, that would provide me with many opportunities. Jena has many optical industries and renowned research institutes like the Max Planck School of Photonics, Fraunhofer Institute for Applied Optics and Precision Engineering, Leibniz Institute of Photonic Technology, Abbe Center of Photonics, etc. Most public universities in Germany do not charge tuition fees but a semester fee to cover administration and other costs. Education in Germany is certainly not free but cheaper

than in some other countries. Hence, students should also check if the universities/research centers of their choice are providing scholarships, along with other scholarships like that of DAAD, and must apply for them.

And lastly, I would like to suggest that if you are not sure of what to pursue after your bachelor's, do not dread the future, take your time, and explore all the possible options of your choice (but do not sit idle!).

I, Ayushi, am a 2nd year postgraduate student at IIT-Kharagpur currently pursuing an M.Sc. in Physics. In the initial years of the undergraduate program, I had no clue what I would be pursuing in the future, an MBA or M.Sc. Among all the deciding factors, lab experiments intrigued me the most, and I decided that I would be pursuing postgraduate studies in physics. Later, I started working in this direction. I attended a lot of seminars, started applying for internships, started preparing for the competition exam IIT-JAM and most importantly, I started working on the project under the guidance of Vandna Luthra Ma'am and Late Narender Sir from the Mathematics department. Working on the project was one of the most useful and beneficial step that I took in my graduation. There were many skills that I have inculcated while working on the project like data collection, data analysis, literature surveys, reading research papers ,writing reports, plagiarism analysis, team work and many more. I will be eager to utilize these skills and knowledge aptly.

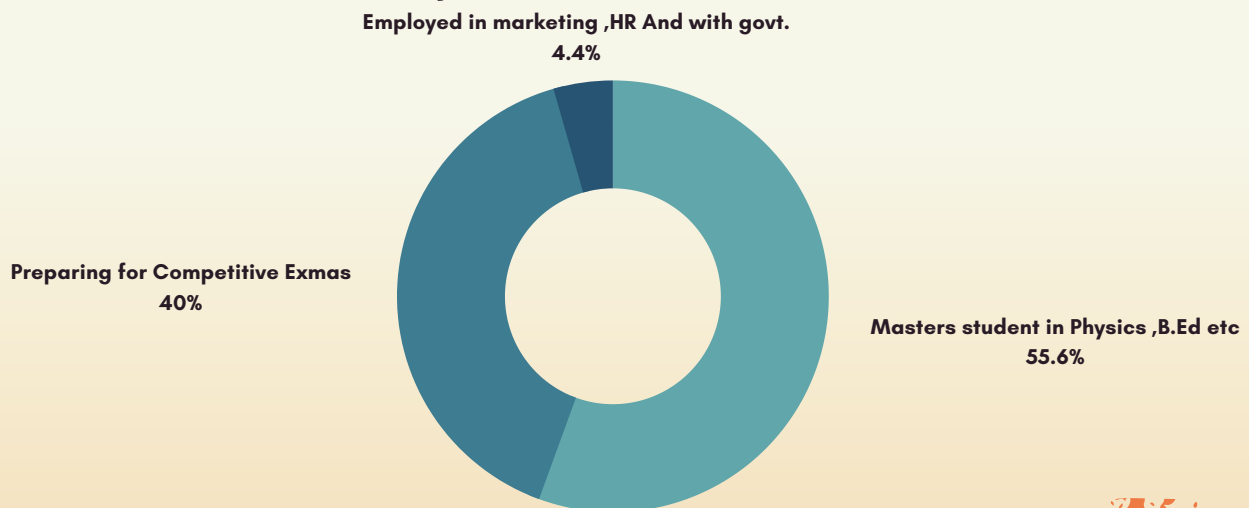
Below, we present a summary of our batch and what we have been doing a year after graduation.

Best wishes to one and all!!

Physics batch of 2018-21

”

Pie chart depicting Alumni 2018-2020





Students' Achievement

NAME	BATCH	ACHIEVEMENTS
Samiha Sehgal	2019-22	<ul style="list-style-type: none">• Received a certificate of Quantum Excellence for the summer school conducted by IBM on Quantum Machine Learning.• Completed a two month summer internship at DRDO.• Participated in a masterclass on the Big Analysis of Muons in the CMS experiment of CERN.
Shikha Gaur	2019-22	<ul style="list-style-type: none">• Was awarded the senior-most rank of 'Senior Under Officer' for the 'Rank Panel 2021-22'.• Attended the 'Prime Minister's House meet 2021'.• Attended the 'Prime Minister's Rally 2021'.• Attended the 'Ek Bharat Shreshtha Bharat Camp 2021'.• Performed the 'Guard of Honour' (as the guard commander) to the Group Commander in the CATC 2021-22.• Performed the 'Guard of Honour' on 'NCC day 2021 at National War Memorial'.• Attended the 'Army Day Parade 2022'.• Was involved in organising the 'Shaheedon ko shat shat naman'.• Independence Day 2022 event where the NOK of the martyrs were felicitated.• Won the 'Quarter Guard Competition' (as the commander) at Deshbandhu's Annual NCC fest - DESH 2022.• Recipient of 'Renu Sethi Trophy for Best Cadet in NCC, 2021-2022'.



NAME	BATCH	ACHIEVEMENTS
Tanishi Verma	2019-22	<ul style="list-style-type: none"> • Member of Quizzito. • 2nd Prize in the senior category at Vigyan Tarang (online model/simulation presentation competition) organised by Gargi College and NASI.
Arzoo Dagar	2019-22	<ul style="list-style-type: none"> • Internship at 'Helping Hand India' N.G.O. • Active GSS(Gargi social service) member. • Serving as Quasar president. • Volunteer in 'Desh-ke-mentor' program.
Anjali Rajput	2019-22	<ul style="list-style-type: none"> • Secured a rank in a national level quiz held on Plastic day. • Participated in IUAC science day program.
Gunjan Bisht	2019-22	<ul style="list-style-type: none"> • White Rose Club President
Anjali	2020-2023	<ul style="list-style-type: none"> • Participated in online quiz on Virology (Mandsaur University) in June 2021. • Participated in National Science day program by IUAC Gargi college. • Participated in stand up against street harassment training program.
Anshita Singh	2021-24	<ul style="list-style-type: none"> • Received a participation certificate from ISRO with the name of my inspirational guru, Dr K. Sivan. • Attended workshop on radio astronomy.

Star Achievers

BATCH 2018-2021

SHABANA
9.91

RITIKA
PANDEY
9.64

ANKITA
9.486

BATCH 2019-2022

POONAM
KUMARI
9.91

ARZOO
DAGAR
9.31

KHUSHI
BALIYAN
SEJAL GUPTA
9.31

BATCH 2020-2023

RITU SENGAR
ARCHITA
PRIYA RAJPUT
PRIYA KUMARI
9.91

AAYUSHI
NEHA CHOUDHARY
PRACHI BENIWAL
RIYA ROJRA
9.77

ANUSHA
MAHAPTRA
9.73

The Teaching Faculty



From left to right:

1st row: Mr. Munish, Dr. Supreeti Das, Dr. Anita , Dr. N. Chandrika Devi, Dr. Manvi, Dr. Archana Tripathi, Ms. Mansi Agrawal, Mr. Man Raj

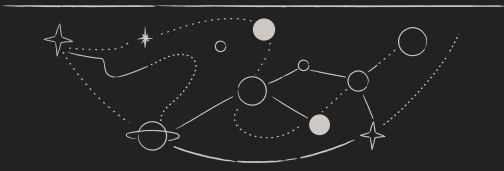
2nd row: Dr. Alka Garg, Dr.Hira Joshi, Dr. Vandna Luthra and Dr. Deepti Lehri

The Lab Faculty

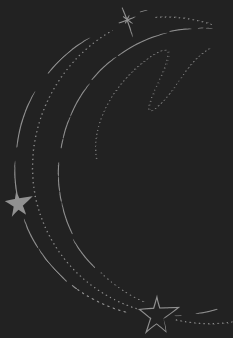


From left to right:

Mr. Shekhar Chand, Mr. Santosh, Mr. Sushil, Mr. Vinod Dubey, Mr. Sher Bhadur, Mr. Baleshwar Prasad, Mr. Hemraj, Mr. Sanjeev Kumar



"Astronomy compels the soul to look upward, and leads us from this world to another." - Plato



UNION MEMBERS



President - Arzoo Dagar



Vice-President - Neha Choudhary



Treasurer - Gursimran Kaur



General Secretary - Priya Rajput



Cultural Secretary - Priyal Keswani



Joint Secretary - Anwesha Bhattacharjee

NATIONAL CADET CORPS TEAM



SUO SHIKHA GAUR



**JUO DEVANSHI
SHARMA**



CDT PAYAL YADAV



CDT SAMYA SINGH



CDT SWATI BAJIA



CDT MILKY JOSHI

BATCH OF 2022



Aayushi Singh



Akshita Sharma



Anchal Chauhan



Anjali Rajput



Anjali Kumar



Arzoo Dagar



Bhawana Yadav



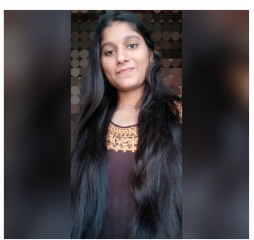
Chelsi Kothari



Devanshi Sharma



Gunjan Bisht



Khushi Baliyan



Mahe-noor Fatima

BATCH OF 2022



Meenakshi Joon



Megha M. Nair



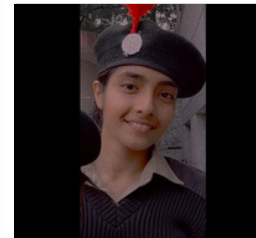
Namra Arya



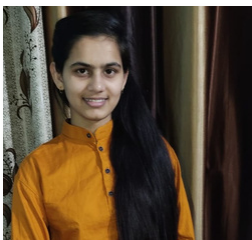
Navjeet Kaur



Nitya Kumar



Payal Yadav



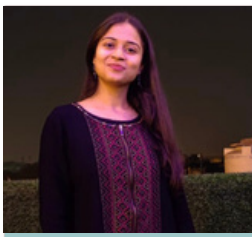
Poonam Kumari



Prachi Choudary



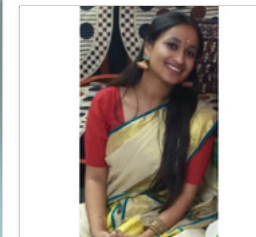
Priyanka Rajput



Priyanshi Mishra



Rakhi Sheoran



Revathi R Nair

BATCH OF 2022



Romanpreet Kaur



Sakshi Bhukkar



Samiha Sehgal



Sejal Gupta



Shikha Gauri



Shruti Rana



Tamanna Yadav



Tanishi Verma



Tanya Chauhan



Vaishali Bhaskar



Vanshika Kalra

Members of Physikos

2021-22



“ **Anwesha Bhattacharjee**
Co-editor
1st year

"Learning is the most important process in the journey of life!"
I am grateful to the teachers for giving me the opportunity to be a part of the Physikos Team. I express my gratitude towards my seniors who helped me go through the process and guide me in every way. The process of editing and designing enabled me to learn software such as Canva, it also taught me how to check plagiarisms and proof reading. Being a part of the team enabled me to learn how to build team efforts and encourage other people. It helped me gain knowledge about Astronomy and Space. It was a fun and enlightening experience.

“ **Anshita Singh**
Content Editor
1st year

I heartily express my gratitude towards the teachers and my seniors for providing me this golden opportunity. It was really a great experience while going through the extra knowledgeable contents and be guided by the great minds as well. Also working as a team builds up confidence and team work qualities that boosts up your desire to learn more. I got to know about the editing softwares like canva, and more that enhanced my designing skills, moreover the magazine itself was an amazing source of immense knowledgeable plus interest, one could grab a bunch of attractive things to learn about. I hope my contributions would continue there and would try to explore new area of research.



“ **Avantika Nikhrey**
Designer
1st year



At the beginning of 1st semester, we were given the link to access the softcopy of "Physikos". When I read it I knew that I had to be a part of it. Working alongside with the team, I have learned new skills and gained invaluable knowledge. I am grateful to the teachers and seniors for providing me with this once-in-a-lifetime opportunity. It was their guidance that made this experience more pleasant and fun.



“ **Kirti Pandey**
Content Editor
1st year

Tell me and I forget, teach me and I may remember, involve me and I learn."
I am very thankful to the teachers and my seniors for giving me this opportunity to be a part of this magazine.
This magazine gave me great educative values. It gave me the first exposure to college and encouraged me to think and write... I have gathered immense knowledge about astrophysics. I got to know about plagiarism check and learned to give credit to the source of information while working for this magazine. It has also taught me the value of team work that how it adds quality to your work. Best wishes to the #Physikos Team.

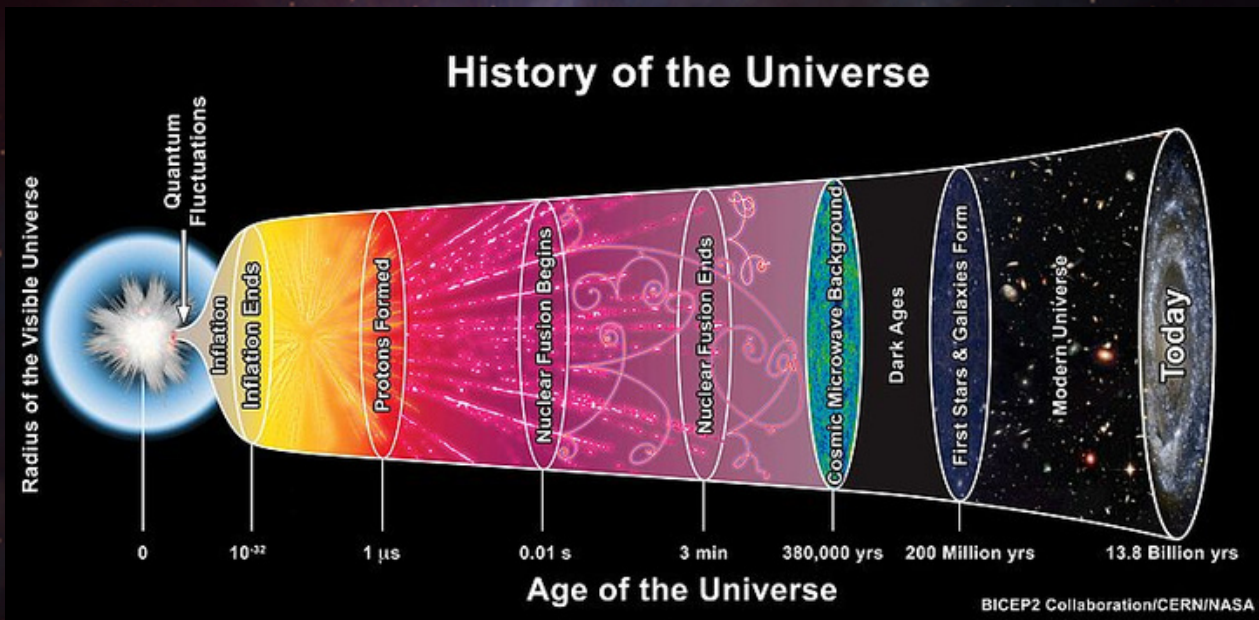
“ **Vaishali Bhaskar**
Designer
3rd year

Being a part of 'Physikos' was a great experience for me. I learned so many new things. Working together as a team was one of the best experiences. It was really fun to just be creative and do my best to present this magazine. I would also like to thank our editor who helped me throughout the process and Dr. Vandana ma'am for giving me this opportunity. I hope you enjoy reading it as much as we enjoyed creating it.





<https://images.app.goo.gl/QAWCk4R5ngLuSwuM8>



It All Started With A Big Bang

-The Big bang Theory theme song