RIPPLES

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FRESHERS 2023

We're delighted to share the highlights of the fantastic Freshers Day celebration that recently unfolded in our beloved Physics Department. The day was nothing short of a magical journey, full of enthusiasm, camaraderie, and a genuine sense of excitement.

The function kicked off with a warm welcome from the faculty, who set the tone for the day by inspiring the freshers with tales of scientific exploration and discovery. Their words resonated with the spirit of curiosity that defines our field, sparking a collective eagerness to delve into the wonders of physics. First-year students got the lowdown on how things work around here, making them feel less lost.

First-year students got the lowdown on how things work around here, making them feel less lost. Then came the cake cutting – a sweet way to kick off the academic year. The event featured engaging icebreaker activities that encouraged the new students to connect with their peers and faculty members. These interactive sessions facilitated the formation of bonds that will undoubtedly blossom into enduring friendships over the course of their academic journey.

It was wrapped up with a big thank-you speech, giving a shout-out to everyone who made the day awesome. In a nutshell, Freshers Day was a great start to the school year. Here's to more fun and learning ahead!

Contents:

MILLETS COMPETITION

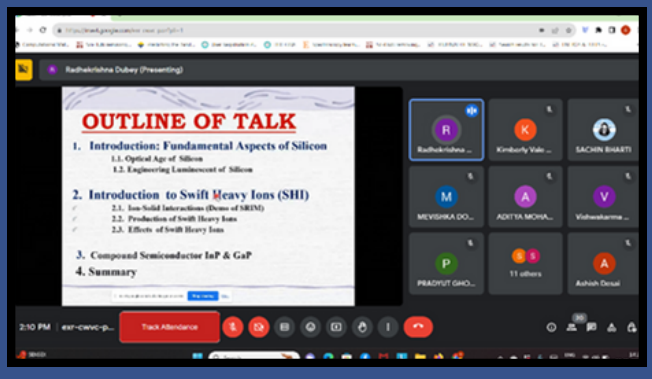
As we step into the International Year of Millets, we embark on a journey that celebrates not only a humble grain but also a sustainable and nutritious choice for our diets. Millets, often referred to as 'smart grains,' have been a staple in various cultures around the world for centuries, and this year marks a global recognition of their significance.

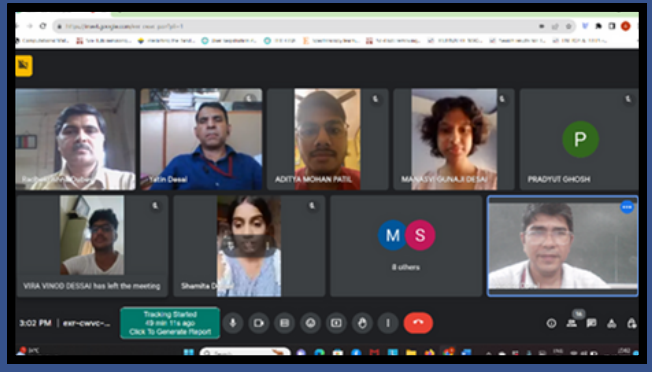
This year serves as a call to action to raise awareness about the nutritional benefits of millets and promote their inclusion in our diets. By incorporating millets into our meals, we not only contribute to our own well-being but also support sustainable agriculture practices and the livelihoods of farmers worldwide.

To commemorate the "International Year of Millets," an occasion designed to deepen students' knowledge of millets and their advantages, participants showcased their culinary skills in a recipe competition. Following the presentations, a quiz was conducted, blending gastronomic innovation with intellectual participation to foster a comprehensive learning encounter. The event was organized by Mrs. Malati Dessai in collaboration with the Sherlock Ohms club., took place on October 6, 2023.

TALK ON "MATERIAL MODIFICATION BY SWIFT HEAVY IONS"

The Department of Physics arranged an internet-based lecture concerning the modification of materials using Swift Heavy Ions. Dr.Radhekrishna Dubey, an Assistant Professor of Physics at St. Xaviers College Mumbai, served as the guest speaker for this event. The purpose of the lecture was to offer students and faculty a thorough insight into the realm of material science, specifically emphasizing the distinctive influence of swift heavy ions. The presentation aimed to elucidate the principles, techniques, and practical applications of material modification and took place on October 10, 2023.





ADVANCEMENTS IN PHYSICS

LASER-DRIVING A 2D MATERIAL

Engineers at Columbia and theoretical collaborators at the Max Planck for the Structure and Dynamics of Matter find that pairing laser light to crystal lattice vibrations can enhance the nonlinear optical properties of a layered 2D material.

Cecilia Chen, a Columbia Engineering PhD student and co-author of the recent paper, and her colleagues from Alexander Gaeta's Quantum and Nonlinear Photonics group used hexagonal boron nitride (hBN). hBN is a 2D material similar to graphene: its atoms are arranged in a honey-combed-shaped repeating pattern and can be peeled into thin layers with unique quantum properties.

Chen pointed out that hBN is exceedingly light and stable at ambient temperature due to the boron and nitrogen that make up its basic elements. This indicates that they vibrate rapidly.

Above absolute zero, all materials experience atomic vibrations. This motion can be quantized into quasiparticles known as phonons with specific resonances; in the instance of hBN, the researchers was interested in the optical phonon mode vibrating at 41 THz, which is equivalent to a wavelength of 7.3 µm, in the electromagnetic spectrum's mid-infrared region.

In the context of crystal vibrations, mid-IR wavelengths are regarded as short, or high energy. However, in the vast majority of laser-assisted optics research, the visible to near-IR range, which spans from 400 nm to 2 um, is considered very long, or low energy.

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Chen, along with fellow PhD student Jared Ginsberg (now a data scientist at Bank of America) and postdoc Mehdi Jadidi (now a Team Lead at quantum computing company PsiQuantum), were able to efficiently generate new optical frequencies from the medium by tuning their laser system to hBN's frequency corresponding to 7.3 μm. This is an essential goal of nonlinear optics.

The Max Planck group of Professor Angel Rubio conducted theoretical work that aided the experimental team in comprehending their findings. They investigated the phonon-mediated nonlinear optical process of four-wave mixing to produce light that was nearly equal to the harmonics of an optical signal using tabletop, commercially available mid-infrared lasers. Additionally, they saw a third-harmonic production rise of more than 30 times the amount that would be possible without phonon excitation.

Functional semiconductor made from graphene

Researchers at the Georgia Institute of Technology have created the world's first functional semiconductor made from graphene, a single sheet of carbon atoms held together by the strongest bonds known. Semiconductors, which are materials that conduct electricity under specific conditions, are foundational components of electronic devices. The team's breakthrough throws open the door to a new way of doing electronics.

In its common shape, graphene is not one or the other a semiconductor nor a metal, but a semimetal. A band hole may be a fabric that can be turned on and off when an electric field is connected to it, which is how all transistors and silicon hardware work. The major address in graphene hardware investigate was how to switch it on and off so it can work like silicon.

But to create a useful transistor, a semiconducting fabric must be enormously controlled, which can harm its properties. To demonstrate that their stage seem work as a reasonable semiconductor, the group required to degree its electronic properties without harming it. They put particles on the graphene that "give" electrons to the framework -- a method called doping, utilized to see whether the fabric was a great conductor. It worked without harming the fabric or its properties. The team's estimations appeared that their graphene semiconductor has 10 times more noteworthy portability than silicon.

The team's item is as of now the as it were two-dimensional semiconductor that has all the fundamental properties to be utilized in nanoelectronics, and its electrical properties are distant prevalent to any other 2D semiconductors as of now in advancement.

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