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EDITORIAL NOTE

Dear Physics Department Community,

We are delighted to bring you the latest edition of our departmental newsletter, which is packed with exciting updates. As we reflect on the past months, it is remarkable to see the dedication and achievements of our faculty, students, and researchers in advancing the frontiers of physics knowledge. This edition showcases some of the extraordinary work within our department, highlighting the collaborative spirit and intellectual curiosity that defines us. We hope you enjoy reading this newsletter as much as we enjoyed putting them together, and we extend our heartfelt appreciation to all those who contributed. Together, we will continue to explore the wonders of the universe and push the boundaries of human understanding.

*Sincerely,
The Editorial Team*



**Suresh R, Rugmini R, Abdulkareem U,
Madhumathy R (Left to right)**

*Faculty
Advisors*

- DR K C SEKHAR
- DR MALAY DALUI
- DR SAMPURN ANAND

Editors

- ABDULKAREEM U
- RUGMINI R
- SURESH R
- MADHUMATHY R





THE HEAD SPEAKS.....



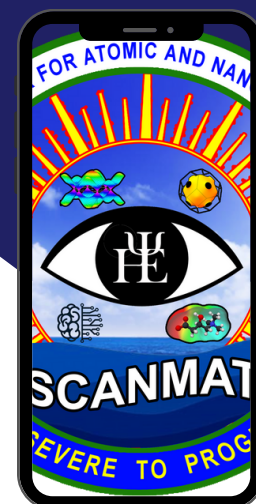
I am delighted to take a moment to express my appreciation and write this message for the 2023 volume 3rd edition of our department's newsletter "PHY-SCOPE". It brings me immense joy to reflect upon the accomplishments and milestones we have achieved in the month of May to June 2023. First, I want to thank the dedicated editorial team for my heartfelt appreciation. This newsletter not only reflects the growth of our department but will also serve as a platform for bright minds to voice their opinion or share their experiences.

I am happy to share that our final-year students have successfully completed their projects and graduated from our department. As they embark on the next chapter of their lives, we bid them a heartfelt farewell. To make our department equipped with world class facilities we have submitted the project proposal to DST-FIST and other government funding agencies. The record number of internships students currently doing research activities under our faculties and this indicates that we can bring this department to next level in all aspect of research and social activities. As we eagerly anticipate the start of another semester, I share in your hope for brighter days ahead.

Prof. P. Ravindran
Head of the Department
Department of Physics
Central University of Tamil Nadu

*Prof. P. Ravindran
crossed 10000+
citations in this
year January.*

*He is also among
top 1% in
International
Ranking of
Scientists list
released by
Stanford
University, USA in
2022 (Applied
Physics)&
13th Rank in Indian
level as per
SCOPUS ranking.*

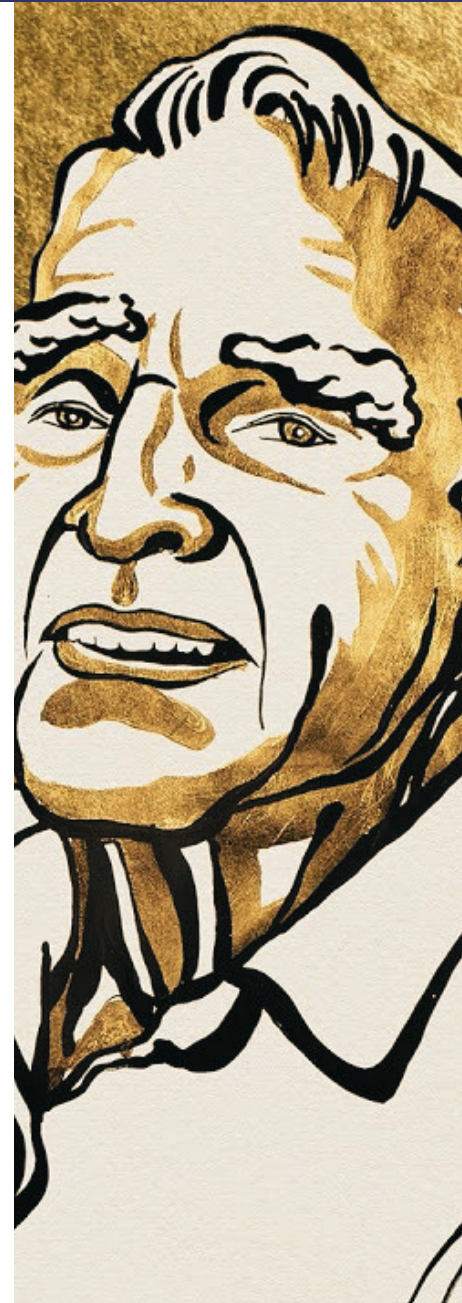


FAREWELL TO SCIENTIFIC LUMINARY

He is the oldest person ever to have been awarded the Nobel Prize.

The Royal Society of Chemistry granted a John B. Goodenough Award in his honor.

In loving memory of the late Professor Goodenough, we pay tribute to a remarkable individual whose brilliance illuminated the world of science. With his groundbreaking contributions to the field of materials science and the discovery of lithium-ion batteries, he revolutionized energy storage and paved the way for countless technological advancements. Beyond his exceptional intellect, Professor Goodenough's unwavering dedication to his research and his passion for knowledge inspired generations of scientists. His legacy will forever be etched in the annals of scientific progress, reminding us of the power of curiosity and the extraordinary impact one person can have on the world. Rest in peace, Professor Goodenough, your light will continue to shine brightly.



Professor John B. Goodenough

- Born on July 25, 1922
- BS (YALE University)
- MS, PhD (University of Chicago)
- Awards
- Japan Prize (2001)
- Enrico Fermi Award (2009)
- National Medal of Science (2011)
- IEEE Medal for Environmental and Safety Technologies (2012)
- Charles Stark Draper Prize (2014)
- Welch Award (2017)
- Copley Medal (2019)
- **Nobel Prize in Chemistry (2019)**



Kevin V Alex

Reg. No: R170402

Duration : 29-08-2017 to 7-04-2023

Supervisor: Dr. K. C. Sekhar

Thesis title: Development of Highly Efficient Photocatalysts Based on Semiconductor, Ferroelectric and Plasmonic Heterostructures

The objective of this study is to boost the photocatalytic activity of MoO₃ thin film by combining it with BTO and AgNPs. Through subsequent experimentation, we successfully increased the degradation efficiency of MoO₃ for Rhodamine B dye from 31% to 86%. Ultimately, we achieved a remarkable efficiency of 100%.

Publications:

- o Research articles : 9
- o Book chapters : 3
- o Conference proceedings : 1

Achievements: Best oral presentation award at International Workshop on Catalysis and Applications (IWCA) held at Mahatma Gandhi University, Kerala: 2020

Pre-PhD Seminar

S Kiruthika

Reg. No : R141403

Supervisor : Prof. P.Ravindran

Date : 10-05-2023

Title of the thesis :

A First principle studies on ammonia boranes and transition metal based complex hydrides for hydrogen storage applications



Kevin says

"Failures are quite normal in research. As some thoughtful mind once said "Failure is only a dress rehearsal for success". So failure should not be seen as the end of the task, rather a pavement to improve & achieve better. Fail, introspect, rectify and search again. That is the real scientific research"



DEPARTMENT NEWS

Two year M.Sc. Physics programme

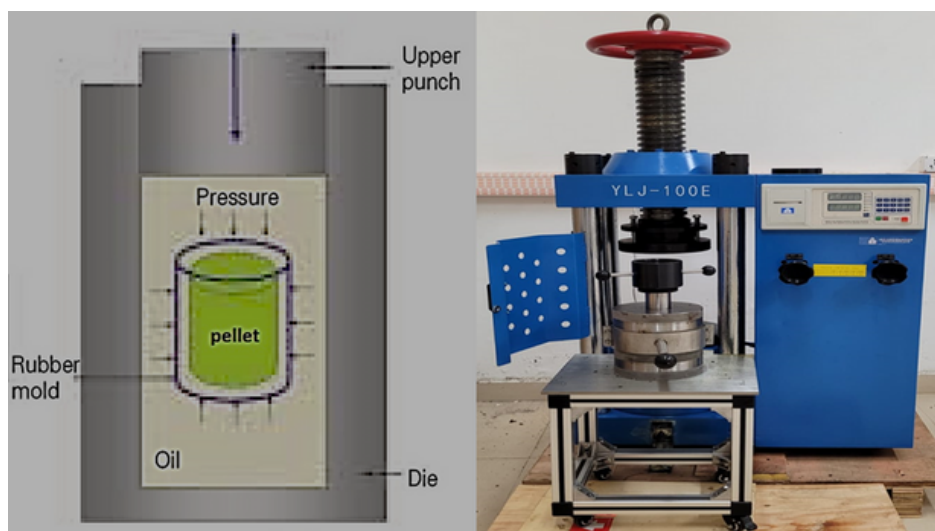
The department is introducing M.Sc. Physics [2 years] programme for the academic year 2023 – 2024. The candidates for this programme are selected through the nationwide Central University Common Entrance Test (CUET).

Important information:

- Last date for submitting application : 10/07/2023
- Date of entrance exam : Will be notified in CUTN website
- Website for submitting application : <https://cutnadm.samarth.edu.in/>
- Application Fee can be through : <https://www.onlinesbi.sbi/sbicollect/icollecthome.htm>
- Exam venue : Thiruvarur, Madurai, Trichy, Coimbatore, chennai, New Delhi, Mumbai and Kolkata.

This programme focuses on basic and applied sciences. It allows to understand physics from basic level and gives exposure to fields which are interdisciplinary in nature. It paves way to become a full time researcher in reputed institutes such as ISRO, TIFR, DRDO, BARC, PRL,IPO, IUCAA, IITs and many more.

ISOSTATIC PRESS: ENABLING CERAMIC PELLET MANUFACTURING



Isostatic Press (IP) is a recent addition to the Department of Physics' instrumentation facility. It involves subjecting the powder to equal pressure from all directions using a pressurizing medium, such as a liquid, to create uniform compaction. Advantages of this instrument include Consistent Density and Porosity, Enhanced Homogeneity, pellets with Complex Geometries, Versatile Material Compatibility. Isostatic Press is expected to contribute to further innovations in ceramic materials, pushing the boundaries of what is possible in various scientific and industrial fields.

Trivia

In a remarkable breakthrough, researchers have succeeded in producing a previously unknown atomic nucleus, 190 - Astatine of 85 protons and 105 neutrons. the nucleus is the lightest isotope of astatine discovered to date. This discovery was made by Master of Science graduate Henna Kokkonen, Finland as part of her thesis work, providing important insights into atomic nuclei structure and the boundaries of known matter.



DEPARTMENT ACTIVITIES

LECTURES FROM ALUMNUS

Special lecture-1

Our Alumnus **Dr. Loknath Patra** delivered a talk on the **Stability and mechanical properties of 2D materials** at the Department of Physics, Central University of Tamil Nadu (CUTN) on Wednesday, 01-03-2023. He currently working as Researcher at University of California, Santa Barbara.



Special lecture-2

Dr. Thejus R Kartha from uGDx Institute of Technology, Hyderabad, delivered a talk titled **"Understanding Musical Data and Music Producers: State-of-the-Art"** on Thursday, 30.03.2023, at Seminar Hall, First floor, Department of Physics.



Parents and Teacher Meeting

The Department of Physics organised a Parent Teachers Association Meeting on '28th Friday, 2023 at 10.30.a.m at the Department of Physics. The main aim of the meeting was to create an interaction between the teachers and parents of I.M.Sc Physics students. This meeting was coordinated by **Dr. R. Arun**.



Trivia

By combining artificial intelligence and data collected over the course of a decade with the IceCube detector in Antarctica, researchers have found the first evidence of high-energy neutrinos that originated from inside the Milky Way and mapped the particles onto an image of the galaxy's plane. It's the first time our galaxy has been imaged with anything other than light.



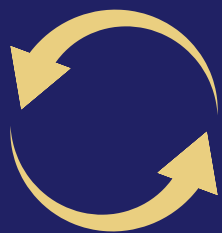
DEPARTMENT ACTIVITIES

Farewell Day

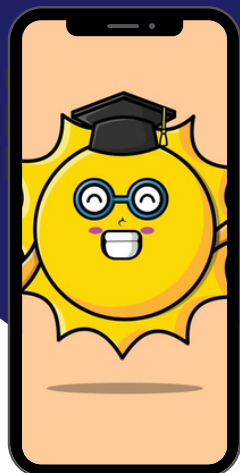
On 2nd May , 2023 ,the students of 4th year IMSc Physics arranged a farewell party titled "KAIROS" for the outgoing students of the department. The program commenced with an address by the Head of the Department Prof.P Ravindran, who spoke encouraging words of wisdom and motivated the students to stay inspired. Followed by this, other faculties took over the session, and wished them good luck for their future. The final year students, then came forward to speak about their experiences and to reminisce their memories. Later the cultural events began, and progressed with songs, games and dance performances. All the students showed active participation in the event. The program concluded with a dinner and a group photo session. This session was coordinated by **Dr. Nirbhay Kumar Behera**.

BAZINGA!!!!

*Why didn't
the sun go to
graduate
school?*



*Because it
already has
million degrees*



OUTREACH ACTIVITIES

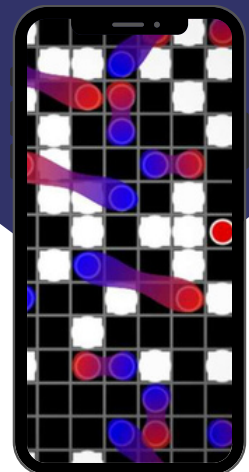
InSuMMER 2023

Centre for Materials Informatics, Anna University and Simulation Centre for Atomistic and Nanoscale MATerials (SCANMAT), CUTN conducted International Summer School on Materials Informatics & Biophotonics for Medical and Energy Research (InSuMMER-2023) from 29.05.2023 to 16.06.2023 at Dept. of Medical Physics, Anna University. More than 30 students from various institutes across India participated in this program. PhD scholars from our department delivered a talk and gave Hands-on sessions on Quantum Espresso software to the participants.



Trivia

MIT physicists have captured snapshots of fermions, pairing up in a cloud of atoms. This provides insights into electron pairing in superconducting materials. By using potassium-40 atoms to simulate electron behavior, the researchers developed a technique to observe particle pairing, even in close proximity. They observed patterns like checkerboards formed by pairs, which were disrupted by individual particles passing by.



Prof V Madhurima was invited as an expert to the resource generation camp of Homi Bhabha Center for Science Education and Research (HBCSE), Mumbai, conducted at NISER Bhubaneswar between 19-22 June 2023. This is the second time she has been invited for this program, with the previous one being between November 3 and 6, 2022 at HBCSE. You can read more about it at <https://vigyanpratibha.in/index.php/about-us/>



Trivia

Occasionally, significant discoveries have been made while studying unrelated phenomena. For instance, the cosmic microwave background radiation, a key piece of evidence for the Big Bang theory, was discovered accidentally in 1964 by Arno Penzias and Robert Wilson during experiments with a sensitive microwave receiver.



PUBLICATIONS

1. Structural phase stability and thermodynamical properties of transition metal complex hydrides $\text{Na}_2\text{MgTMH}_7$ (TM= Sc- Cu) for hydrogen storage applications.
S Kiruthika, P Sundar, P Ravindran
Journal of Solid State Chemistry 321, 123867 (2023).
2. Discerning the crystal structure and engineering the optoelectronic properties through substitution of divalent cations (M= Zn, N= Ge) in $\text{C}_3\text{H}_3\text{M}_x\text{N}_{1-x}\text{I}_3$ for solar cell applications
G Kruthika and P Ravindran
Materials Science in Semiconductor Processing, 160, 107449 (2023).
3. Porous polymer film formation by water droplet templating using polystyrene
PV Swathi and V Madhurima
The European Physical Journal E, 46 (4), 25 (2023).
4. Radial distribution and hydrogen bonded network graphs of alcohol-aniline binary mixture
U Abdulkareem, TR Kartha, V Madhurima
Journal of Molecular Modeling, 29 (5), 151 (2023).
5. Structural, optical, and surface modifications by varying precursor concentrations on spray deposition of In doped Co_3O_4 thin films for electro chemical application
SKJ Vijitha, **K Mohanraj** and RP Jebin
Chemical Physics Impact, 6, 100143 (2023)
6. Magnetic and electrochemical application of Ru doped Co_3O_4 thin films
SKJ Vijitha, **K Mohanraj** and RP Jebin
Chemical Physics Impact, 6, 100183 (2023).
7. Crystal growth and magnetic properties of the coupled alternating $S = 1$ spin chain $\text{Sr}_2\text{Ni}(\text{SeO}_3)_3$
R. Madhumathy, K. Saranya, K. Moovendaran, K. Ramesh Babu, Arpita Rana, Kwang-Yong Choi, Heung-Sik Kim, Wei-Tin Chen, **M. Ponmurugan**, R. Sankar, and I.Panneer Muthuselvam
PHYSICAL REVIEW B 107, 214406 (2023).

PUBLICATIONS

Trivia

A physics paper with 5,154 authors has broken the record for the largest number of contributors to a single research article.

Only the first nine pages in the 33-page article, published on 14 May, 2015 in *Physical Review Letters*, describe the research itself — including references. The other 24 pages list the authors and their institutions.



8. Liquid phase sintering of Nb-doped SrTiO_{3-δ} ceramics with enhanced thermoelectric figure of merit
Charan Prasanth S, A Vijay, R Jose and KV Saravanan
Ceramics International 49 (11), 19043-19053 (2023).
9. Enhancement in the electrical transport properties of CaMnO₃ via La/Dy co-doping for improved thermoelectric performance
A Vijay, Charan Prasanth S, R Jose and KV Saravanan
RSC advances 13 (28), 19651-19660 (2023).
10. Improvement of energy storage density and energy harvesting performance of amphoteric Pr ion-modified lead-free Ba_{0.85}Ca_{0.15}Ti_{0.9}Zr_{0.1}O₃ (BCZT) ceramics
J Kaarthik, C Kaushiga, G Sradha, Nayak Ram, Salla Gangi Reddy, **KC Sekhar**, Annapureddy Venkateswarlu
Journal of Alloys and Compounds, 943, 169069 (2023).
11. Effect of MgO doping on energy storage and electrocaloric properties of ferroelectric 0.6 Ba (Zr_{0.2}Ti_{0.8})O_{3-0.4} (Ba_{0.7}Ca_{0.3})TiO₃ ceramics
NSK Kumar, AR Jayakrishnan, JPB Silva and **KC Sekhar**
Materials Today Communications, 35, 105754 (2023).
12. Thickness-dependent microstructure, resistive switching, ferroelectric, and energy storage properties of pulsed laser deposited 0.85[0.6Ba(Zr_{0.2}Ti_{0.8})O_{3-0.4}(Ba_{0.7}Ca_{0.3})TiO₃]-0.15SrTiO₃ thin films,
Muhassinah Tasneem, Carlos RP Monteiro, **NS Kiran Kumar**, JPB Silva, **KC Sekhar**, K Kamakshi and M Pereira
Ceramics International 49 (12), 20756-20762 (2023).
13. Effect of SrTiO₃ buffer layer on electrical, ferroelectric memory, and polarization reversal studies of spin-coated ferroelectric 0.6Ba (Zr_{0.2}Ti_{0.8})O_{3-0.4}(Ba_{0.7}Ca_{0.3})TiO₃ thin film in MFIS structure
Muhassinah Tasneem, J Gokulakrishnan, **KC Sekhar**, S Sathish and Koppole Kamakshi
Current Applied Physics, 51, 91-97 (2023).

Cerulean canvas of Cutn

"The sky is a
canvas
where
physics
paints
its most
breathtaking
masterpieces"



EDITORIAL TEAM

