



# Women's Christian College

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**ACADEMIC ACTIVITIES 2022-2023**

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DEPARTMENT OF PHYSICS



## Academic activities

2022-23

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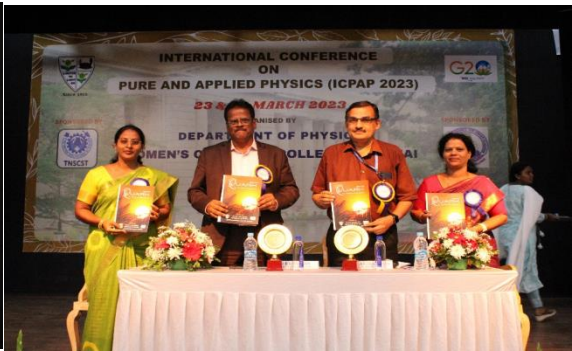
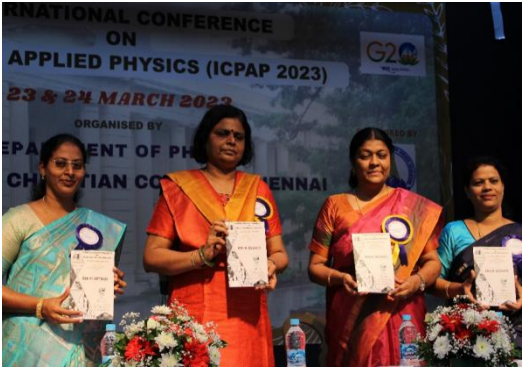
### **International Conference on Pure and Applied Physics (ICPAP)**

The International Conference on Pure and Applied Physics (ICPAP 2023) was organized by the Department of Physics, Women's Christian College on 23rd & 24th March 2023. In order to celebrate and commemorate 70 years of the B.Sc. Degree program in a unique and remarkable way, it was planned to invite distinguished alumnae of the department as resource persons for the conference. The invited speakers were from Yale University, USA, University of Cambridge, UK, University of Warwick, UK, Brandeis University, USA, CSIR-CLRI, Indian Institute of Technology Madras, Christian Medical College, Vellore and Symbiosis School for Liberal Arts, Pune. This event was a great opportunity for the present students to meet pioneering physicists who graduated from our department, and are now serving the scientific community as distinguished researchers, scientists and administrators.

Selvi Apoorva, IAS, Principal Secretary to Government, Housing and Urban Development Department, Tamilnadu who is an alumna of the college presided over the inauguration of the conference on 23rd March 2023 at 9 am. She also released the Book of Abstracts which was received by our Principal, Dr. Lilian I Jasper.

200 Participants from various parts of our country joined us in person and those from other countries attended the conference in online mode. Young scientists, students and faculty had the opportunity to interact with their peers, assimilate knowledge on current developments in physics-related fields, and present their recent innovative research through oral and poster presentations. Best paper presentations were awarded.

The valedictory program of our conference happened on the 24th March 2023 at 4 pm. Dr. R Ravanan, Joint Director of Collegiate Education, Chennai and Dr. S Balachandran, Head, Regional Meteorological Centre, Chennai graced the occasion as our chief guests and delivered inspiring speeches. The students' magazine 'Quark' published by the Physics Association was also released during this program. Awards were given for best oral and poster presentations. The program concluded with the National Anthem.



## **Industrial visit to Floranix Pvt. Ltd, Chennai**

An industrial visit was organized on 28th October 2022 for the III B. Sc. Physics students of the Core Elective course, 'Microprocessor and Microcontroller 8051' with an aim to enhance the practical knowledge and critical thinking in advanced technologies that have real time applications in industry and research. Twelve students accompanied by the course teacher, Dr. Hannah Ruben visited Floranix Pvt. Ltd., an electronics company in Adyar, Chennai. The students were given an exposure to develop software programs to interface Fludino with Microcontroller 8051 using C programming. In addition, the students were made to observe many working projects designed using embedded microcontroller system. The field visit to the company enhanced the technical knowledge and bench skills of the students.



## **Centre for Materials for Electronics Technology (C-MET), Hyderabad**

The physics department study tour was organized for the students of III B.Sc. Physics from 8th – 11st December 2022 to Hyderabad. Students were accompanied by two faculty members, Dr. Hannah Ruben and Dr. Sharmi Kumar. The objective of the industrial visit was to inculcate in students an aptitude for research and as well, to give an exposure of research activities that happens across the various national facilities. Hence the industrial visit was made to Centre for Materials for Electronics Technology (C-MET), Hyderabad on 9th December 2022.

C-MET carries research and development on electronic materials and their processing to keep in pace with the global competitions. Its most important leading project is Development of Indigenous Antennas for Navigation with Indian Constellation (NavIC). The flexible microwave substrates, the building block of global positioning systems were earlier imported, but are currently being developed at C-MET which is a big credit to our nation. The prototype Dual Band, Tri Band, L5 Band, S Band and Ceramic L5 Band Antennas were displayed and detailed explanation on the process of manufacture of the same were given to the students.

Later, they were taken to SiC centre to visualize the steps followed for purification of Hafnium metal sponge using Electron Beam melting, and preparation of hafnium metal targets and process for the growth of 6H SiC (undoped/ vanadium doped) single crystal for electronic applications. They also visited RoHS (Restriction of Hazardous Substances) laboratory that tests the concentration levels of harmful materials and substances that go into the production of electronics and related equipment. Finally, the students were made to understand the importance of renewal of e-wastes by witnessing various end products obtained from the processes. The industrial visit, thus gave the students an opportunity to visit the various laboratories in C-MET and gain knowledge about their current projects.

Students also visited various historical places in Hyderabad that have a unique charm of their own. The team visited Golconda Fort, Charminar monument and Chowmahalla Palace. These magnificent architectures not only provided a glimpse into the rich historical past, but also represented the great achievements made in art and architecture. Moreover, students were taken to Salar Jung Museum which is the third largest museum in the country. The museum exhibited a collection of 9,000 manuscripts, 47,000 books, 43,000 art objects and other artifacts that belong to Nawab Mir Yousuf Ali Khan, or Salar Jung III. The visit to various historical places in Hyderabad enabled students to know the rich heritage of their country. Truly the industrial visit to Hyderabad was memorable, and enhanced the students' interest towards higher education and research.



### **Visit to Mass Rover exhibit at the American Center - U.S. Consulate General Chennai**

The American Center at the U.S. Consulate General Chennai launched an exhibit of the full-scale model of NASA's Mars Rover. This model was built by Cornell University students and was previously displayed at the Smithsonian's Air and Space Museum in Washington D.C. and at the U.S. Pavilion during the 2020 World Expo in Dubai. The Mars Rover made several key discoveries during its mission, including evidence of the previous existence of water on Mars and conditions at that time could have been suitable for sustaining microbial life. The Rover explored the Martian terrain for almost 15 years, far outlasting her planned 90-day mission. Eighteen students from III B.Sc. Physics who had enrolled in the core elective course titled 'Astrophysics and Astronomy' and II year Non-major elective 'Astrophysics' students visited the exhibition on 20th December 2022 at 2pm. The students were accompanied by four staff members namely Dr. A. Christina Nancy, Dr. Hannah Ruben, Dr. Sharmi Kumar and Dr. I. Monica Chandramalar. The students also had the opportunity to view a documentary on Rover. The embassy has over 15,000 books and many journals. The students were allowed to have a look at the books in the library. A quiz on Mars Rover was conducted towards the end, and prizes were given to the winners. The visit provided a good insight on the Mars Rover, and the students got an opportunity to learn practically through interaction.



### **Educational Visit to Nanotechnology Research Centre, SRMIST, Kattankulathur**

The students of III. B.Sc Physics who are undertaking the core elective course on 'Nanoscience and Nanotechnology' visited the Nanotechnology Research Center at SRM Institute of Science and Technology on 23<sup>rd</sup> February 2023. The center has state-of-the-art facilities and equipment for research and development in nanotechnology. The research activities at the center include the synthesis and characterization of various nanomaterials, such as nanoparticles, nanotubes, and nanocomposites, for various applications in medicine, energy, electronics, and environmental remediation. The center also conducts research in nanosensors, nanobiotechnology, and nanoelectronics.

The research scientists and research scholars at NRC hosted our students by explaining about the working of various sophisticated instruments. The students learnt about fabrication techniques, designing, and synthesizing a diverse range of materials- polymers, inorganic nanocrystals and thin-films and characterization methods. The 12 students were accompanied by the faculty members Dr. Juanita Saroj J. and Dr. Hannah Priya, Department of Physics. The Nanotechnology Research Centre at SRMIST is a leading research center in India that is contributing significantly to the advancement of nanotechnology and its applications in various fields. The visit enabled the students to correlate their theoretical knowledge with the practical applications and to develop their interest in research.



### **Educational Visit to Birla Planetarium, Chennai**

Nineteen students from III B.Sc.Physics students who had enrolled in the core elective course titled Astrophysics and Astronomy students visited the Planetarium on 22<sup>nd</sup> February 2023 at 11.30am. The students were accompanied by three staff members namely Dr.A.Christina Nancy, Dr.Sharmi Kumar and Dr.I.Monica Chandramalar. The students had the opportunity to view the Periyar gallery, sky show, Earth sphere, Dr.Solomon vector heart museum, fun mirrors gallery. The night sky theatre gave new experience about solar system, moon, stars and etc.



### **The Subra Suresh Distinguished Lecture Series**

The Subra Suresh lecture was held at IITM Research Park, IIT Madras on 2nd March 2023. The speaker of the event was Professor Brian P. Schmidt, Nobel Laureate (2011, Physics), Vice-Chancellor & President, Australian National University. The lecture was titled “The universe from Beginning to End.” The lecture focused on the expansion rate of the universe that began after the big bang. He also explained the expansion rate of the universe with respect to its mass. The lecture provided deep information in a very simple language for easy assimilation.



### **Lily Pithavadian Endowment Lecture**

The annual Lily Pithavadian endowment lecture was organized by the Department of Physics (Shift 1) on 11th October 2022 during the assembly hour from 12.20 to 1.20 pm. Dr. Tune Usha, Scientist – G, National Centre for Coastal Research, Chennai, Ministry of Earth Sciences, Government of India was the guest speaker of the day. Major Victor, Ms. Lily Pithavadian’s son-in-law represented the family and the retired faculty of Physics were also present as special invitees. The entire undergraduate student community of Shift 1 along with the faculty members were the audience for the endowment lecture. The program started with a melodious invocation song rendered by the Physics Choir followed by the Welcome address by Vice-Principal, Ms. Lizzie Angelina.



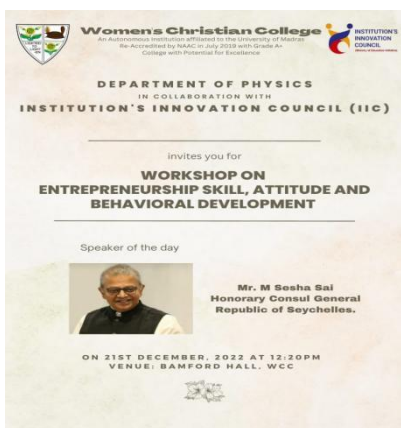
Dr. A. Christina Nancy, Head, Department of Physics spoke about the benefactor and the purpose of the endowment. Dr. T. S. Renuga Devi, Assistant Professor of Physics introduced the speaker. Dr. Tune Usha spoke on the topic, 'Geomatics on Coastal Hazards'. She gave an overview of coastal hazards and explained the need for information regarding weather and other coastal parameters. In addition, she pointed out the vital role of technology in prediction of natural hazards. The talk was informative and very interesting with videos and animations. She also gave insights about employment opportunities for various disciplines in the National Centre for Coastal Research. The lecture came to an end with the vote of thanks rendered by Dr. Han nah Ruben, Assistant Professor of Physics and the Alma Mater.



### **Workshop on Entrepreneurship, Attitude and Behavioral Development**

The Department of Physics in collaboration with Institution innovation Council (IIC) of Women's Christian college organized a one day workshop on December 21st, 2022, titled "**Workshop on Entrepreneurship, Attitude and Behavioral Development** in OFFLINE mode. It was well-received by more than 100 participants. Dr. A. Christina Nancy Assistant Professor and Head Department of Physics started the session with a warm welcome to all the attendees and also introduced the guest speaker. The session was taken over by the guest speaker **Mr.M.SESHA SAI**, Honorary Consul General, Republic of Seychelles for South India. The entire session was extremely an interactive session. He initially started off by defining the words Entrepreneurship and gave a clear idea of the same. "Entrepreneurship is not a career" he quoted and explained in detail how an individual can launch his/her start-up. MR.M.SESHA SAI boosted the confidence of all the attendees with his interactive presentation and encouraged them all to believe in

themselves. He stressed that Entrepreneurship cannot be viewed as a business purely, but as a rich legacy for generations to prosper. The workshop ended with a question and answer session. This event was a huge success with 100 participants. The vote of thanks was delivered by Dr. I. Monica Chandramalar, Assistant Professor in the Department of Physics.



## **Hi - Phy Intercollegiate Fest**

The Intercollegiate Physics Fest, HI-PHY'23 was held on 18<sup>th</sup> of February 2023. The inauguration ceremony started at 9 am in the Main Auditorium. The ceremony was presided by, Ms. Nikita Caron Grace. After seeking the blessings of God through a prayer song sung by the Department choir, Dr. Christina Nancy, the Head of the Department, welcomed the gathering. This was followed by the lighting of the lamp by the dignitaries. The ceremony was graced by the presence of our beloved principal, Dr. Lillian I Jasper, who specially addressed and motivated the gathering. The resource speaker of the day, Dr. Rita John, and the Principal were felicitated with mementos. This was followed by the presentation of the annual report of the activities and achievements of HI-PHY '23, presented by the secretary of the Hi-PHY club, Ms. Evangeline Jennifer. Ms. Lavanya, the president of the HI-PHY club, introduced and welcomed the speaker of the ceremony, Dr. Rita John, the Head of the Department of Theoretical Physics, University of Madras. Dr. Rita Johan addressed about the untold History of women in science and encouraged the students to have the perseverance for greater achievement in the field of Physics. Dr. T. S. Renuga Devi, the HI-PHY faculty in-charge, presented the vote of thanks. Later, the events and competitions were held at different venues at their designated timings. Many events like poster presentation, Adzap, Sci-Fi writing, Caption writing, Shipwreck were conducted. Students from different Chennai institutions such as Madras Christian College, Bharathi Women's College, Stella Mary's College, JBAS College, Ethiraj College, Meenakshi College, Presidency College participated in the competitions. The winners of each event were awarded certificates and cash prizes. The judges were also felicitated by Ms. Lavanya, the President of the HI-PHY club. The overall championship trophy was bagged by the students of Madras Christian College. The event ended with the National Anthem.



## **Summer Internship In Experimental Physics**

The Summer internship in Experimental Physics was organized by the Department of Physics from 24<sup>th</sup> -28<sup>th</sup> April 2023 to provide training in experimental physics to school children of classes 9 to 11. Twelve students from five schools namely Bala Vidhya Mandir, Hari Sri Vidyalayam, Holy Angels Anglo-Indian Girl's Higher Secondary School and Madras Christian College Higher Secondary School participated in the programme.

The programme started with a prayer song rendered by the students of the department invoking God's blessing. This was followed by the welcome address delivered by Dr. A. Christina Nancy, Associate Professor and Head to the gathering. The keynote address was delivered by Dr. K. Giridharan, Scientist F and Joint Director (Retd.), DRDO, Ministry of Defence. He is a Trainer - Innovative Teaching for Science & Engg. Chennai, Tamil Nadu, India. His talk focused mainly on motivating the students to learn Physics with curiosity and hands-on experiences. He also recommended improving critical thinking in students to understand the concepts studied in school rather than memorizing.

The first session of the Summer Internship Training Program was handled by Dr. T. S. Renuga Devi on the topic 'Light'. Starting from the definition, the behavior of light on various surfaces and the properties of light were explained with day-to-day examples and demonstrations. The students were also made to familiarize with convex and concave lenses, diffraction grating, prism, etc., and the concept of each was well received by the students. After a small tea break, the participants were taken to the Physics Laboratory. The students were excited on seeing the experimental set ups of Newton's rings with sodium vapour and mercury lamps, interference patterns produced by thin air wedge, dispersion of chromatic light by diffraction grating and prism, experimental procedure to determine the angle of the prism and the angle of minimum deviation, etc. The concepts and experimental procedures of each experiment were explained clearly by the resource person. Later, determination of focal length of convex lens and the combination of convex and concave lens were taught, and all students were made to do the experiment after which the accuracy of the readings were discussed.

The topic of the second day was 'Measurements & Measuring Devices used in Physics Laboratories'. Dr. A. Christina Nancy, Associate Professor and Head was the resource person of the day. The students were briefed on the importance of metrics and how measurement serves as the fundamental and essential process in all sciences. Without appropriate error analysis, no valid scientific conclusions can be drawn. Therefore, the need for evaluating errors or uncertainties associated with a measurement, and the precision and accuracy of the measurement were clearly explained. Basic measuring devices such as vernier caliper,

micrometer screw gauge, vernier/travelling microscope and spectrometer were demonstrated with necessary theoretical background. Afterwards, hands-on training was given to all the student participants. The students were very eager to use the apparatus on their own and the learning was exciting and highly beneficial to them.

The third day, Dr. Hannah Ruben introduced basic concepts of Electronics. The students were given an outline of closed circuits, purpose of various basic components used in the circuits. They were taught to determine the resistance values of resistors by decoding the various colour codes of the resistors used in the circuits. They were also briefed on p-n junction diodes and transistors. The significance of logic gates and working of basic logic gates were explained to students. Later, hands-on experience was given to the participants on how to use digital kits and students were trained to visualize the working of the various logic gates taught. They were very excited to design the circuit for logic gates and understand its working. The session was fruitful and beneficial to them.

The fourth day Dr. K. Giridharan, Scientist F and Project Director (Retd.), DRDO, Ministry of Defence, addressed the students with simple, low cost and innovatively designed working models to motivate them towards experiential learning in science and mathematics. Dr. Giridharan was felicitated by Dr. Kalavathy Santhi, Former Head, Department of Physics, WCC. This was followed by the lab visit to the Instrumentation Centre of WCC where Dr. Anchana, Assistant Professor, Department of Biotechnology explained the principle, working and applications of various instruments such as UV-Vis spectrometer, fluorescence microscope, etc., to the students. The day was very informative and valuable to the students.



The last day of the internship focused on experiments dealing with properties of matter briefed, by Dr. Sharmi Kumar. The concepts of elasticity, stress, strain, Young's modulus, bulk modulus, rigidity modulus, viscosity, and surface tension were taught to the students with day-to-day examples. Then the students were made to do experiments pertaining to Young's modulus – uniform bending, Young's modulus – Non-uniform bending, Cantilever, Determination of coefficient of viscosity, Determination of 'g' using Simple Pendulum. The participants were able to take readings and correlate the experiments to the theory learnt.

The internship programme came to an end by the valedictory address given by Dr. A. Christina Nancy. The oral and written feedback were received from the participants. The students expressed their sincere gratitude to the Department of Physics for having organized such a useful and knowledgeable event, and felt happy to have utilised their holidays in a very constructive manner.