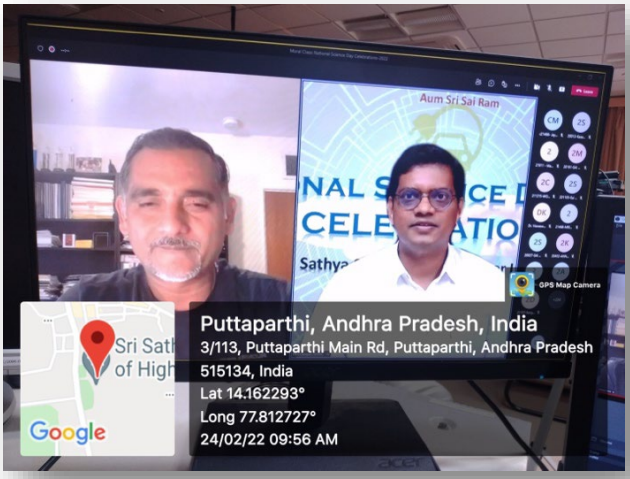
Proceedings of National Science Day - 2022 @ SSSIHL

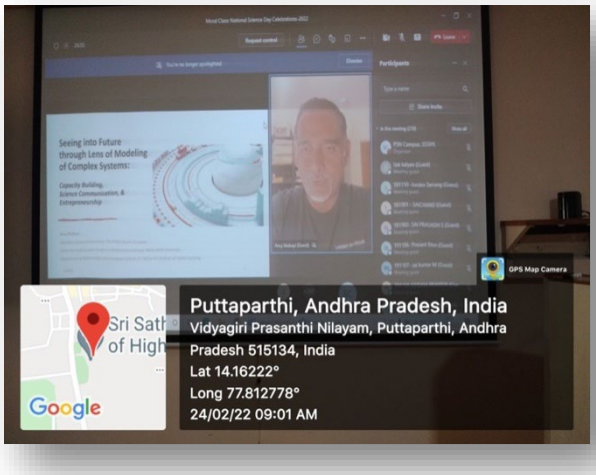
Inaugural National Science Day Session at SSSIHL

24 February 2022 / 09:00 AM

Dr. Anuj Mubayi

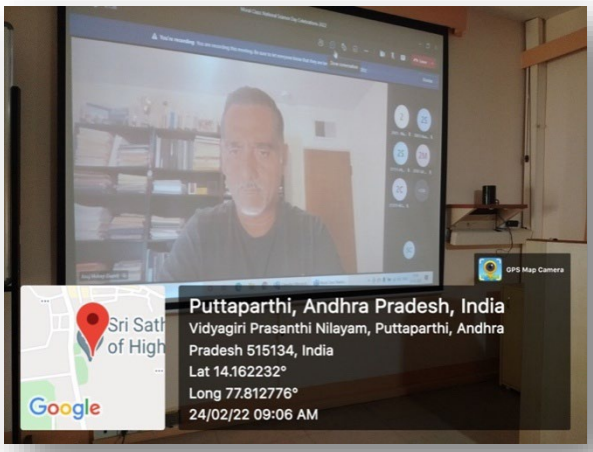


The **speaker for the inaugural session of National Science Day 2022 was Dr. Anuj Mubayi**. Dr. Anuj Mubayi is a **research scientist** and the **lead at the Infectious Disease Forecasting Group at The Public Health Company, a distinguished IBA fellow at Centre for Collaborative Studies in Mathematical Biology, Illinois State University**. He is a **former faculty member of Arizona State University.** Dr Anuj is an **Applied and Computational Mathematics Scientist** with more than **10 years of experience in disease modelling and health decision analysis**. His recent research interests include the development of new cost-effective tools for ameliorating the impact of infectious diseases while understanding the mechanisms that drive their prevalence and mitigating morbidity related consequences. His topic for the session was **'Seeing into the Future through the Lens of Modelling of Complex Systems'**.



Dr. Anuj initially proceeded to point out challenges that COVID-19 pandemic and highlighted policy making in healthcare, incorporation of new data and behavioral aspects of the individual and the society as a whole in modelling. He also emphasized on the need of entrepreneurship in all fields and disciplines, as he believes that entrepreneurship is the key to bringing innovative solutions to the table.

He also reminded us that we must develop newer methods and newer ways of thinking to solve future problems.



He then talked in brief about the UN Sustainable Development Goals as one of the future problems that we need to address. He also talked about the future of medicine and medical technology during which he talked about how the giant IT companies are a key player in the health technology and their progression towards being not just an IT company but also a health tech company. He also reminded us of the old adage 'Everything comes with a price' by placing it into the context of development of new technology. He also talked about the role of social media in data collection and how information can get mixed up with misinformation. He also brought forth another alarming problem that we could face in the future which is rare diseases and their treatment since the cost of developing medicine for rare diseases is extremely high, which means only the rich will be able to afford those medicines.

Dr. Anuj then discussed the challenges in addressing these future problems. Talking about this, he talked about public health data during pre-CoVID times which was slow and unreliable. He also delved into existing gaps in data systems owing to various factors such as disparities, laws that prevent data collection, etc. He also mentioned how this problem of data collection can be fixed: (1) by standardizing data collection and (2) periodic and regular collection of data. He also talked about the difference between data science and Big Data based on 3 factors: volume of data, velocity at which new data is being provided and the variety of data.

Dr. Anuj later proceeded to talk about health issues like tropical diseases that are being neglected. He then talked about various training programs which help students to enhance their thinking abilities in order to solve future problems. He also stressed about 'science communication': communicating high-level scientific concepts and ideas to the audience in a lucid manner. He briefly talked about novel approaches to study new data systems. He concluded his talk by bringing to light the skills the new generation of scientists need to develop learning skills, literary skills and life skills.

National Science Day at SSSIHL

28 February 2022 / 09:00 AM

Ceremonial Lamp Lighting and Veda Chanting

The event started with lighting the lamp and chanting Vedam, the very source of eternal knowledge.

Welcome Address

09:10 AM

Dr. D. K. K. Vamsi

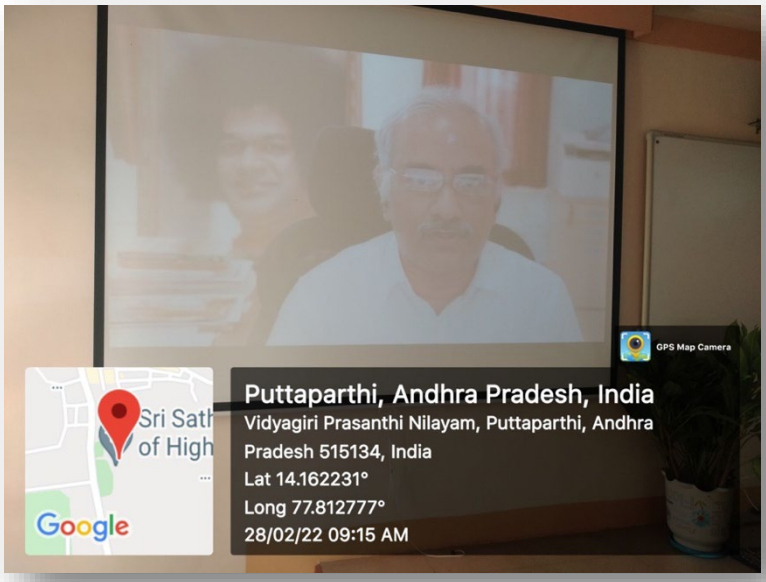
The ceremonial lamp lighting and vedam chanting was followed by the welcome address by **Dr. D.K.K. Vamsi, Associate professor, Department of Mathematics and Computer Science**. In his address, Dr. Vamsi recalled **the genesis of National Science Day in India and the eminent scientist Sir C. V. Raman and the work that won him the Nobel Prize in 1930 – The Raman Effect.** He then quoted the words of the revered founder chancellor Bhagawan Sri Sathya Sai Baba on the spirit of research and science; that is the scientific knowledge we acquire must be used for the benefit of our fellowmen. In addition, a brief overview of the National science day celebrations at Sri Sathya Sai Institute of Higher Learning (SSSIHL) was given.

Inaugural Address

09:20 AM

Prof. (Dr.) C. B. Sanjeevi

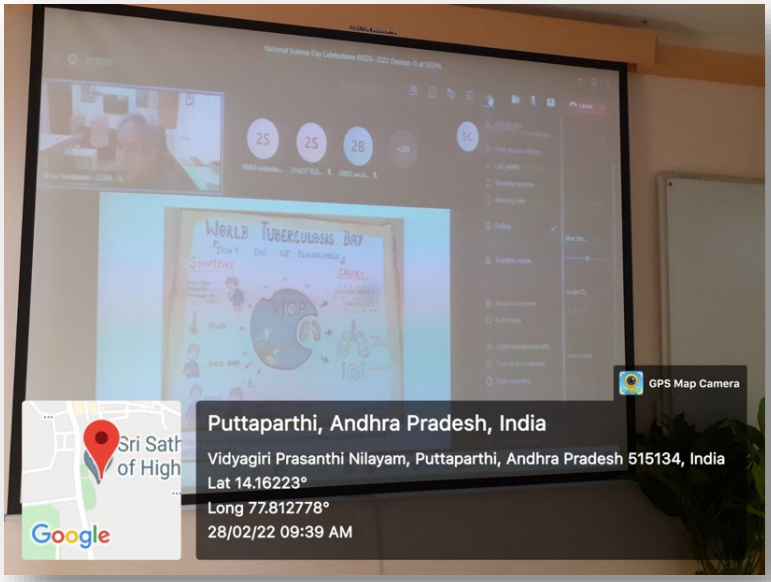
The welcome talk was followed by the inaugural address by **Dr. C.B. Sanjeevi, Vice-Chancellor, SSSIHL**. Dr. Sanjeevi as part of his talk spoke about **the Nobel Prize in medicine for the discovery of insulin.** He explained how the discovery of insulin had won the Nobel Prize for Dr. Banting and Prof. Macleod within a years' time. In the later part of his talk he explained the controversy that surrounded the awarding of the Nobel Prize to Dr.Banting and Prof. Macleod which did not acknowledge (rather ignored) the contributions of the co-workers such as Charles Best and James Collip. From the history of Nobel Prizes, we learn that the societies that have invested in research-based knowledge have prospered. Trying to achieve such knowledge must not be seen as a cost, rather considered as an investment, he remarked.



Popular Science Talk I - Evolution of resistance in pathogens

09:40 AM

Dr. Vinay K Nandicoori

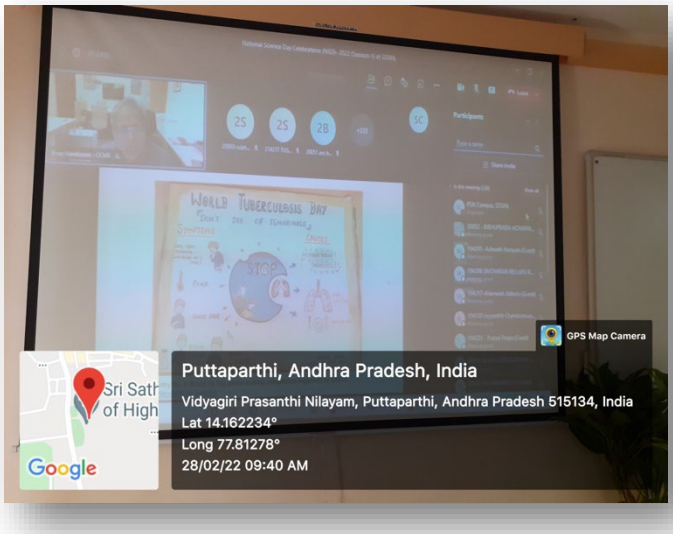


The Popular Science Talk-1 was given by **Dr. Vinay K Nandicoori, Director, CSIR-Centre for Cellular and Molecular Biology (CCMB), Hyderabad**, on the topic **"Evolution of resistance in pathogens"**.

He began with few alarming facts and statistics about Tuberculosis and went on to illustrate the stagewise infection of Mycobacterium Tuberculosis and the corresponding immune response system in the mammalian body.

He then spoke about the 3-type classification of TB- latent TB, transmissible or active TB and eradicated TB after which he elaborated on molecular mechanisms, mutation and novel therapy with respect to his lab's extensive work on the signaling system in M. Tuberculosis involving various Kinases.

He then talked about the standard 1st and 2nd line drugs prescribed to treat TB, wherein he made clear that due to people not taking the drugs as per prescription, pathogens become drug resistant. He explained that mutations come about in the pathogen when treated by antibiotics and that may lead to either multi drug resistant, extremely drug resistant or totally drug resistant bacteria classified based on the drugs that the pathogen is resistant to.



He gave details about the reactions of the drugs - Isoniazid and Rifampicin with enzymes causing mutation or resistance followed by statistics and demographics about drug-susceptible TB and drug-resistant TB. He then clearly categorized the strains of *M. tuberculosis* based on mutation, genome and resistance illustrating a table containing mutations, genes where the mutations take place and the antibiotics causing the mutation. He then spoke about the role of DNA repair pathways in genomic correction with examples and diagrams. In conjunction to this he also spoke about gene replacement mutants and mutation rate analysis for different pathways. He then showed the results of some of the experiments performed in his lab involving the evolution of the pathogen under *in vivo* and ex vivo conditions.

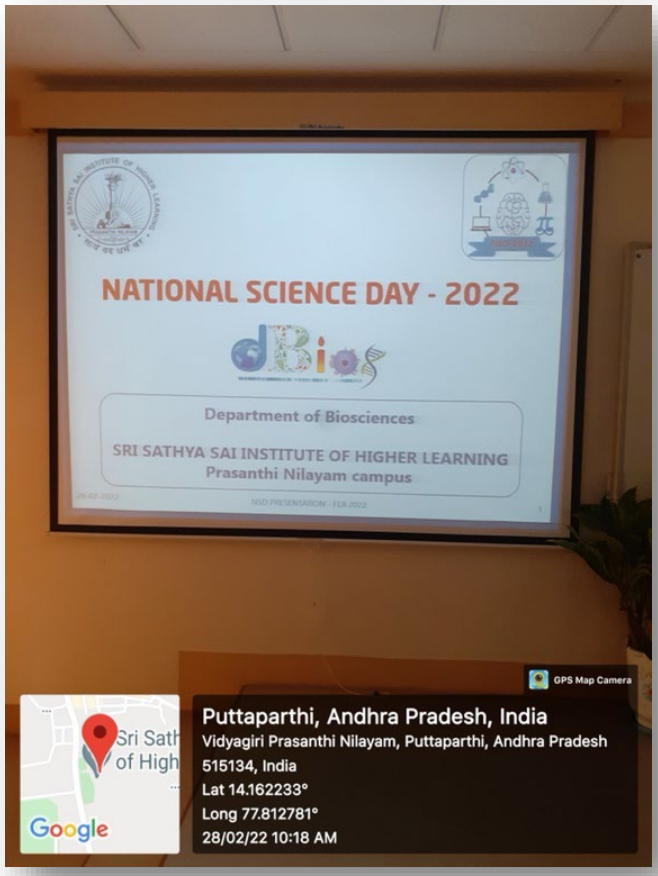
He concluded by making clear that one must take drugs as prescribed otherwise it leads to the contribution of drug resistance in pathogens.

Research Activities

10:20 AM

Faculty of Science Departments, SSSIHL

Department of Biosciences



HEALTH and ENVIRONMENT

- Disease Biology group.
- Infection Biology group.
- Microbial fuel cells for wastewater treatment.
- Regenerative medicine and Tissue Engineering.

MEDICINALLY ACTIVE NATURAL PRODUCTS

- Research on Fauna.
- Natural compounds that are isolated from Flora and Fungi

Disease Biology Group

Focuses on Metabolomics in disease system biology. They aim and analyze clinical samples, isolate and then analyze metabolomics to find out early detection biomarkers. It studies on

- Avascular Necrosis of femoral Head – AVNFH
- Rheumatoid Arthritis.
- Glaucoma.
- Multiple Sclerosis.
- Huntington's Disease.

ANTIMICROBIAL RESISTANCE LABORATORY

Focuses on Hetero-Resistance, Genetic make- up of rare pathogens, Outbreak analysis, Development of AMR prediction models using Artificial Intelligence and Machine Learning tools and mainly focusing on Genomic Analysis of Multidrug Resistant Bacterial Pathogens.

National colabs: - Tech Mahindra ltd, Infection control Academy of India, etc.

International colabs: - Prof. Benjamin Howden Director, Antimicrobial Resistance group, Public Health Laboratory, Peter Doherty Institute, Melbourne, Australia.

Agar arts by Dr. Balaram Khamari from AMR lab “The Microbial Peacock” has won 2nd prize in the International Agar Art Competition organized by American society of Microbiology (ASM), USA.

WATER LAB

Focuses on Wastewater analysis, treatment, and reuse.

Working with a sewage treatment plant in Prashanti Nilayam township as a model system.

It also focuses on, In Silico studies (Enhancing biofilm formation for biotechnological applications), Bio electrochemical systems (Designing and Developing a screening platform for components of microbial fuel cells.) and Ethnobotany.

PROTEIN STRUCTURE and FUNCTION LAB

Focuses on Type-III copper proteins (Hemocyanin), Computer aided Drug Discovery and Protein-Nanoparticle interactions (C60 Fullerenes with Hemocyanin)

Department of Chemistry

Prof. G. Nageswara Rao's Group

Potential biological activities such as, Anti-cancer, Anti- malarial etc

Colabs: - IIT Madras, National cancer Institute U.S.A, ICGEB new Delhi and VIT Vellore.

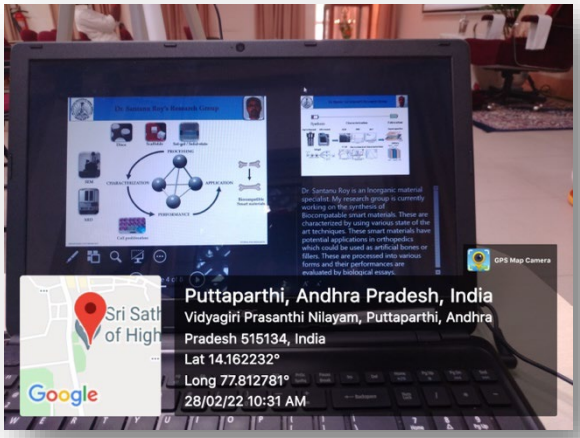
Dr. V V N Ravi Kishore's Research Group

Working on: - Organic molecules Design of Molecules, Identification of Secondary Metabolites Using Liquid Chromatography Mass Spectrometry

Colabs: - ORLN U.S.A, IIT Madras, SRM Chennai and Takasago Singapore.

Dr. Santanu Roy's Research Group (Inorganic specialist)

Working on: - Biocompatible Smart Materials.



Dr. Kumar Sai Smaran's Research Group

Working on: - Energy storage Devices.

Dr. Praphulla Chandra's Research Group

Focuses on: - Application of Liquid Chromatography

Working on: - Qualitative and Quantitative analysis of secondary metabolites.

Dr. Naga Sai Visweswar K's Research Group

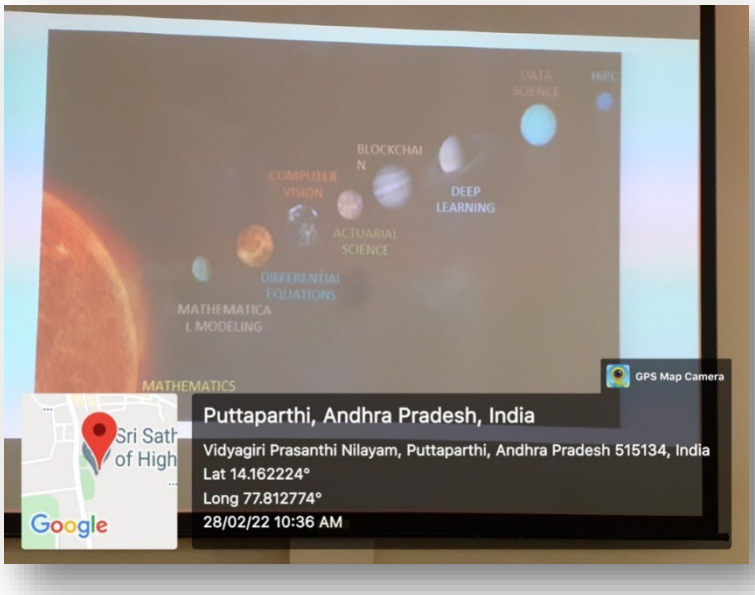
Working on: - Development of Medical Diagnostics using Novel nanomaterials, Microfluidic sensors and Device design.

Developed COVID-19 Rapid test kit. Received Funding from DST, DRDO, ICMR and TATA Trust.

Departments of Mathematics &Computer Science - (DMACS)

Research Area: -

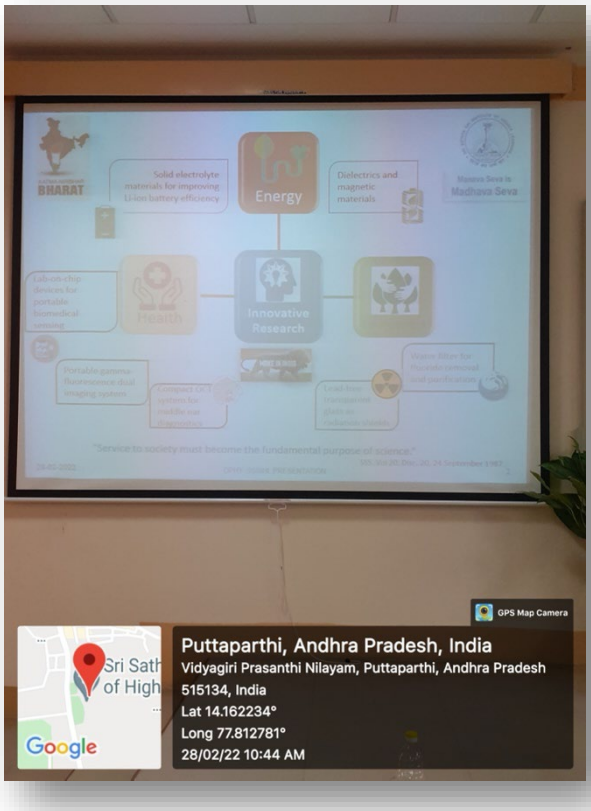
- Study of Differential Equations which model certain Physical Phenomena. (Mathematics of oil and Mineral Exploration and Transonic phenomena.)
- Automatically Detects Movement from a Video.
- Mathematical Ecology and Epidemiology.
- Complex Manifolds.
- Automatically Detecting Disease from Images.
- Deep Learning. (Compositional Deep Neural Networks)
- Actuarial science.



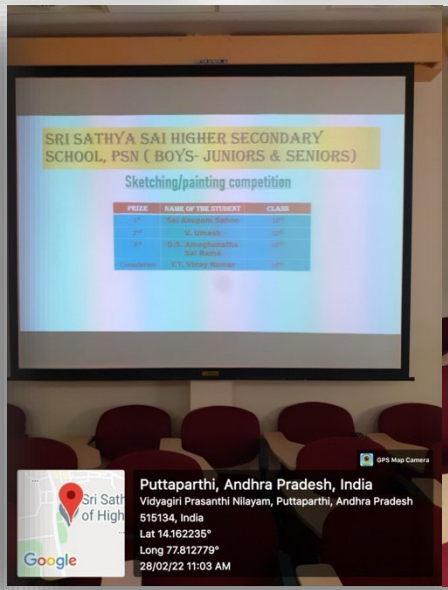
Department of Physics

Important Results and Research works

- Lab-on-chip platform for biomedical sensing.
- Design and Development of Mode Locked Femtosecond Fibre Lasers.
- Low-cost tomographic imaging for middle-ear diagnostics.
- Solid electrolytes: The battery technology could power the future.
- Nanomaterials for remediation of contaminants from water.
- Nanocomposite films for electromagnetic shielding applications.
- Dense lead-free glasses for radiation shielding applications.
- Multimodality intraoperative hand-held gamma probe.
- Novel Nuclear Medicine Imaging Modality.
- Electronic Structure Theory and Transport Calculations.
- Nuclear structure studies of doubly odd, deformed Nuclei.
- Novel materials for Capacitor and Varistor Applications.
- Studies on Multifunctional rare-earth orthoferrites for optical and magnetic properties.
- Metal nanocrystal embedded glasses for optoelectronic, photonic and biomedical applications.
- Raman spectroscopy as a tool for medical diagnostics.
- Development of biomaterials for medical applications.
- Optimization of DWDM Networks and C+L band Engineering.



Later, prizes were announced for various competitions held as part of the National Science Day 2022.



The morning session ended with the divine benediction of **Bhagawan Sri Sathya Sai Baba.**

Divine Excerpts on Science and Spirituality from discourse of Bhagawan Sri Sathya Sai Baba

11:15 AM

In the discourse, Swami said that it is important to acquire scientific knowledge, but one must also know how to make best use of this scientific knowledge for the benefit of the society. Science and spirituality must go hand in hand. Swami gave examples of several great scientists who laid great emphasis on spirituality in their lives. Swami considered them to be the modern-day SAPTARISHIS. They are NEWTON, EINSTEIN, HEISENBERG, SCHRÖDINGER, PAUL DIRAC, DE BROGLIE, AND FRITJOF KAPRA. All these scientists concluded that spirituality is the basis of everything. These scientists discovered things but they're aware of the fact that they were created by a supreme power. Swami said that Satsang or good company is essential for purifying the mind and heart. The society one lives in is a mere reflection of one's own life. That's why it is said, tell me your company and I shall tell you what you are. Swami also said that one should have control on his desires. Increase in the desires leads to decline in the intellectual abilities of the individual. In the end Swami concluded by saying that the essence of all the puranas written by Maharshi Vyasa is LOVE ALL, SERVE ALL - HELP EVER, HURT NEVER.

Popular Science Talk II - India's Space science missions

03:00 PM

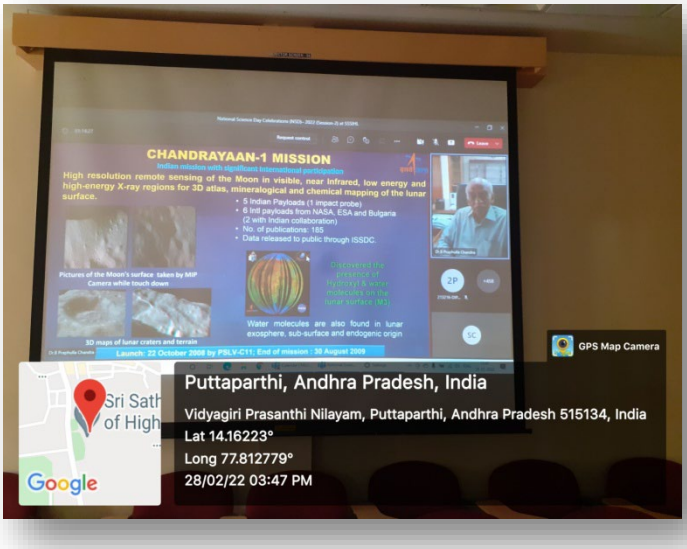
Padma Shri A. S. Kiran Kumar

The Popular Science Talk-2 was given by **Padma Shri A. S. Kiran Kumar, Former Chairman, Indian Space Research Organization (ISRO)**, on the topic **India's Space science missions.** He began his talk by discussing the evolution of the Indian Space Research Organization and its history. The discussion on the inception of ISRO was so engaging and inspiring. The landmark space missions of ISRO were discussed. Aryabhata - 1st Indian Satellite launched on April 19, 1975, and discussed the tech used in those days to make this mission successful.

Later, he elucidated on the conclusions made out of Chandrayaan - 1 mission. The way it brought a new perception about the Moon. He discussed how it marks the beginning of an era where we discovered new things and also made solid conclusions about the Moon, like the numerous publications made, its importance in validation of Lunar magma ocean hypothesis, evidence of volcanic vents and many more.

India being the first nation to reach Mars, he gave a very comprehensive description on Mangalyaan. He discussed how this mission was unique by itself by the trajectory the satellite has chosen.

The challenges faced in Mars orbit insertion maneuver, the precision to which the mission was done so that there is no failure, and a ton of other aspects were told. The discussion went on as Sir listed out the outcomes of the mission, like the presence and nature of the gases, eruptions, and other things in Olympus Mons- one of the volcanoes on Mars, craters, and other things. Also, out of this mission studies that were done on Sun were discussed like Comparison of Turbulence spectral index near solar coronal regions etc. Sir also talked about how the AstroSat mission has placed the researchers and other academic communities at a higher pedestal in terms of Data collections for specified celestial objects and the publications done were numerous using this collected data.



He discussed the Chandrayaan -2 and what improvements were done in this over Chandrayaan - 1 and how it's helpful , like its usefulness in getting data about the permanently shadowed regions on Moon .He later discussed about the instruments and other salient features in the upcoming Chandrayaan - 3 over the past Chandrayaan mission , later he told about the uses of Aditya mission for studying sun ,also the collaboration missions with JAXA and upcoming space missions to Venus also.

He concluded his talks by answering students' questions and, he encouraged students to come forward to work on scientific upliftment of the nation.

Vote of Thanks

03:00 PM

Dr. Sujith Kumar

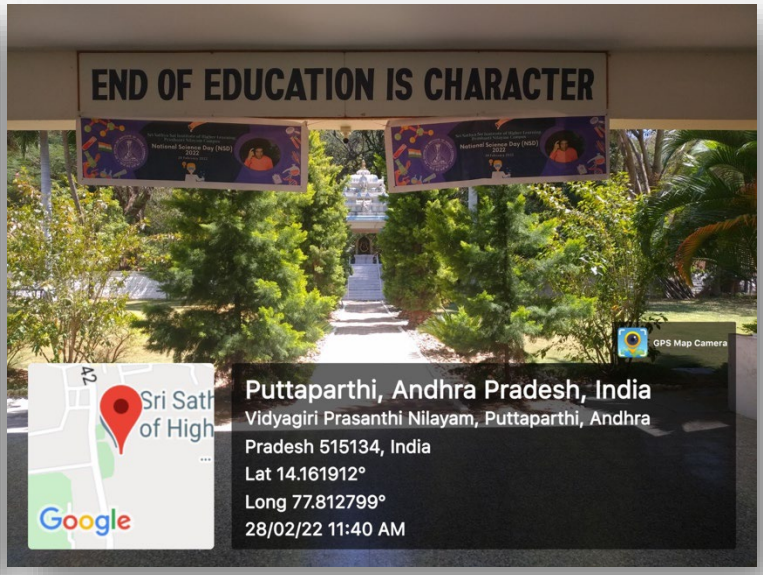
Dr Sujith, **Assistant Professor, DBIO, SSSIHL** started by thanking the Founder Chancellor Bhagawan Sri Sathya Sai Baba for making the day a memorable one. He then went on to thank the University administration, notably the Vice-Chancellor, Registrar and Director of the Prashanti Nilayam Campus for their constant and unwavering support for this session.

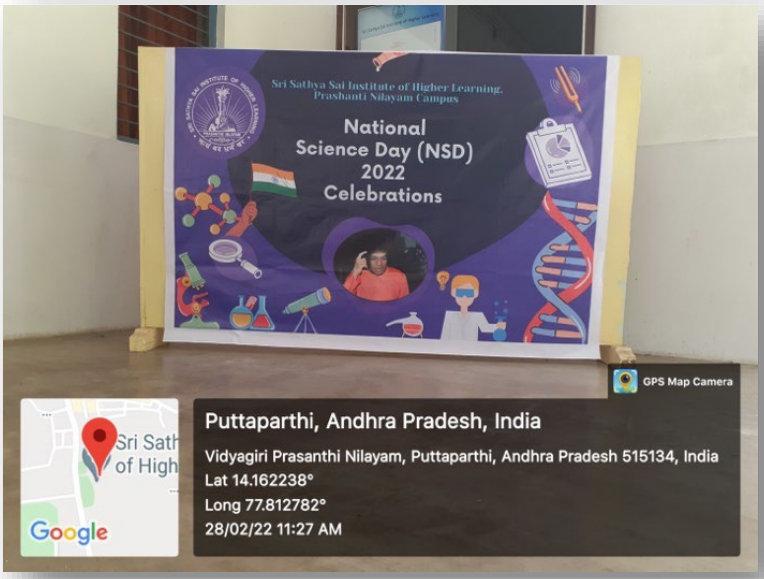
Moving on, he thanked the steering committee for NSD 2022, the technical team headed by Mr. Raghuram, Dr Vinay Kumar (Evolution of Drug Resistance in Pathogens), Padmashree A.S. Kiran Kumar Former Chairman, ISRO - India's Space Missions).

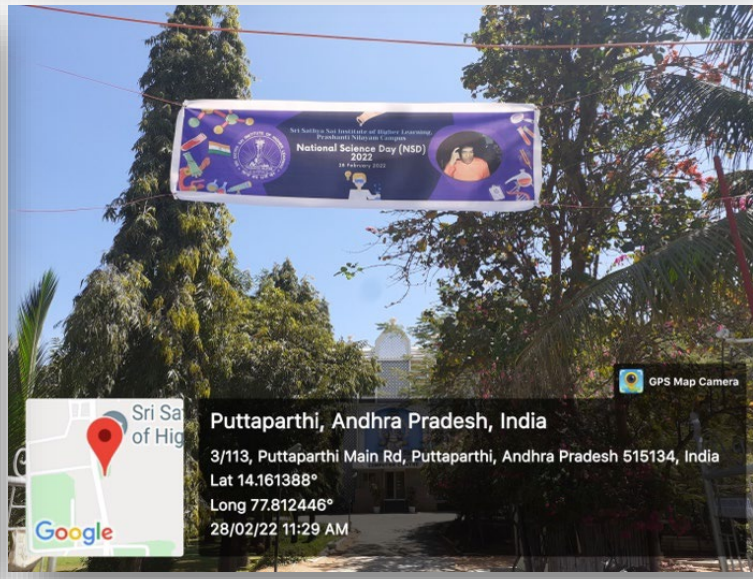
He went on to thank all faculty members of SSSIHL's science departments for giving presentations on various research activities. Also, participants from different schools and institutions for their participation in events held on the occasion of NSD.

Finally, he thanked Bhagawan Sri Sathya Sai Baba for His grace that allowed the successful execution of NSD- 2022.

PHOTO GALLERY





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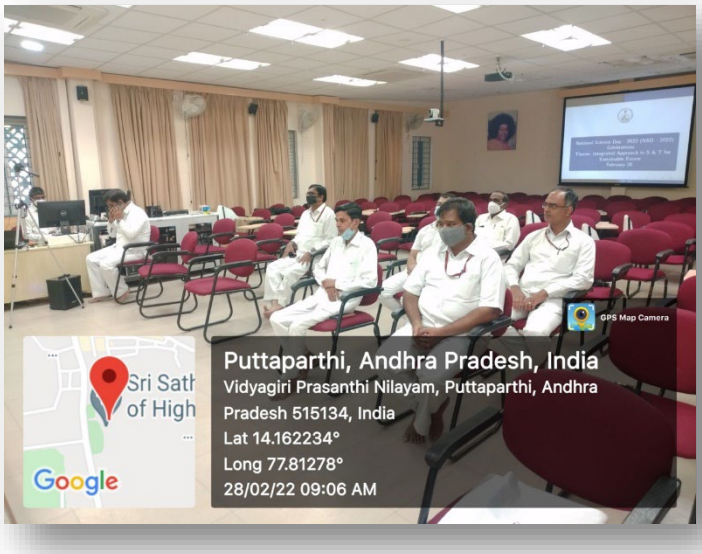
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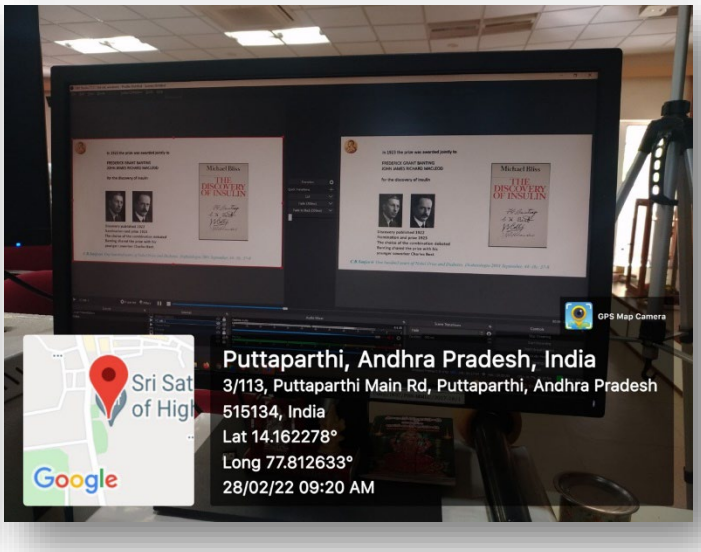
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