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IIA Open day Visit organized by

Aerospace Department on 02/03/2025

Report on One-day Visit to Indian Institute of Astrophysics, Koramangala

About IIA Koramangala

The Astronomy club associated with Department of Aeronautical and Aerospace Engineering, MVJ College of Engineering organized an industrial visit to the Indian Institute of Astrophysics (IIA), a significant astronomy related facility operated by the Indian Institute of Astrophysics (IIA) on 02nd March 2025. The visit aimed to introduce 50 astronomy club students from aeronautical, aerospace, computer science, and electronics communication engineering along with Dr. Manikandan P to the field of astronomy/astrophysics and its importance in space research. The Indian Institute of Astrophysics (IIA) is a premier research institute in India dedicated to the study of astrophysics, astronomy, and related areas. The industrial visit provided an insightful experience into the vast field of astrophysical research, cutting-edge technology, and experimental methodologies. Students had the opportunity to explore the institute's state-of-the-art facilities, ongoing research, and hands-on demonstrations that are integral to the advancements in Indian astronomy and astrophysics.

Facilities and Instruments

The IIA is actively involved in research across various fields including solar physics, observational astronomy, theoretical astrophysics, and space science. The visit offered students an in-depth understanding of the following facilities:

1. **Research & Development Focus**: The institute houses several laboratories and research units dedicated to solar physics, planetary science, space sciences, and instrumentation. The research spans both theoretical aspects and practical, experimental endeavours in astrophysics, with cutting-edge projects in solar radiation, cosmology, gravitational waves, and high-energy astrophysics.

2. **All India Observatory Network**: The IIA operates a network of ground-based observatories across India, each dedicated to various aspects of astronomy. The visit included a briefing on the role of these observatories in collecting data on stars, galaxies, cosmic events, and celestial bodies, and how the data collected contributes to global astronomical research.
3. **Ultraviolet Imaging Telescope (UVIT)**: The students were introduced to the Ultraviolet Imaging Telescope (UVIT), an advanced telescope designed to study the ultraviolet spectrum of astronomical objects. UVIT plays a crucial role in understanding high-energy phenomena in the universe such as black holes, quasars, and stellar atmospheres.
4. **Launch Vehicles**: IIA's research extends to the development and testing of launch vehicles used in space missions. Students gained insight into how these vehicles are designed, tested, and used for launching satellites and other space missions. The visit included a tour of the vehicle assembly facilities where components are integrated

Fig 1: One day visit for astronomy club students to the Indian Institute of Astrophysics

Fig 2: One day visit for astronomy club students to the Indian Institute of Astrophysics.

Solar and Space Research Activities:

1. **Sunspot Viewing**: Students were introduced to the methods used for viewing and studying sunspots. Sunspots are areas of intense magnetic activity on the sun's surface. Through specialized telescopes, the students were able to observe sunspots in real-time, learning about their role in solar weather phenomena such as solar flares and coronal mass ejections.
2. **Solar Spectrum Viewing**: A demonstration of solar spectrum viewing was conducted where students observed the sun's light and its spectrum. This method provides information on the chemical composition, temperature, and dynamics of the sun's atmosphere.
3. **LIGO Interferometer**: The Laser Interferometer Gravitational-Wave Observatory (LIGO) is a state-of-the-art facility for detecting gravitational waves. Students learned about the groundbreaking work done by IIA and the global collaboration in detecting ripples in space-time, caused by events like the collision of black holes. The theory and the process of how gravitational waves are detected were explained in detail.
4. **Schlieren Imaging**: The schlieren technique was demonstrated as a method for visualizing changes in the refractive index of air. It is crucial for studying high-speed flows, such as those encountered in aerospace and space-related applications. Students had the chance to observe the setup and its applications in optics and fluid dynamics.
5. **Nasmyth Telescope**: The Nasmyth Telescope, an advanced instrument used for astrophysical observation, was showcased. Students were briefed on its design, which allows for detailed study of celestial objects by minimizing atmospheric distortions. The unique features of the Nasmyth mount were discussed, and its impact on the quality of astronomical images was explained.

Demonstrations and Interactive Sessions:

1. **Tethered Balloon Demonstration**: A tethered balloon demonstration was held to showcase atmospheric science and high-altitude research. The students learned how these balloons are used to carry scientific instruments into the upper atmosphere for measurements, aiding in meteorological and astronomical research.
2. **Optics Demonstration with Lasers**: An exciting optics demonstration involving lasers was conducted to demonstrate the fundamental principles of light, refraction, and reflection. The hands-on activity allowed students to interact with optics equipment and see firsthand how lasers are used in astronomical instrumentation and research.

Public Engagement and Knowledge Sharing:

1. **Public Talks on Indian Astronomy**: As part of the visit, students attended a public talk where IIA experts discussed the significant contributions of India to the global field of astronomy. The talk included information on major space missions like Chandrayaan, Mangalyaan, and future for exploring the moon, mars, and beyond.
2. **Ask an Astronomer**: An interactive session called "Ask an Astronomer" was held where students had the opportunity to ask questions to leading astronomers and astrophysicists. This session gave students the chance to clarify doubts and delve deeper into complex topics such as the expansion of the universe, dark matter, and black holes.

Fig 3. Experts Explaining about Indian Institute of Astrophysics Activities to the Students.

Conclusion

The industrial visit to the Indian Institute of Astrophysics was an enriching experience for the students. It provided a comprehensive view of the advanced research and technologies used in space science and astrophysics. The exposure to innovative demonstrations, world-class facilities, and expert knowledge gave students valuable insights into the workings of one of India's foremost institutions in the field of astronomy. The visit not only expanded their understanding of space research but also ignited curiosity and a passion for pursuing further studies or careers in space science and astrophysics.

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