



IUCAA
ISSN 0972-7647

A quarterly bulletin of the
Inter-University Centre for Astronomy and Astrophysics
(An Autonomous Institution of the University Grants Commission)

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Available online at <http://publication.iucaa.in/index.php/khagol>

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Refresher Course in Astronomy and Astrophysics

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The Refresher Course in Astronomy and Astrophysics for College and University Teachers was held at IUCAA, during May 13 - June 14, 2019. There were 24 participants, who came from different parts of India. The course contained a balance of introductory Astronomy and Astrophysics lectures along with a sprinkling of current topics and ideas at the forefront of research. The participants were also introduced to the astronomical facilities available to them in India, and the astronomy-related mega-science projects that India is part of. The lectures were delivered by academic members of IUCAA and NCRA. There were special hands-on sessions conducted to give the participants some experience in handling of astronomical data and software. There were special lectures

given by staff members of the Astronomy Centre for Education (ACE) at IUCAA, regarding science education, and from the IUCAA SciPop team regarding public outreach, and about the use of scientific toys in education. The participants were taken to a tour of the IUCAA Girawali Observatory as well as the GMRT facility. The active participation of the attendants during the lectures and the question and answer sessions was crucial to the success of the refresher course. The entire staff at IUCAA was helpful in the organization of the course. In particular, Santosh Khadilkar took care of the administrative requirements, and Senith Samuel looked after the visitor services. The faculty coordinators for the Refresher Course were Aseem Paranjape and Surhud More.

Vacation Students' Programme



The annual Vacation Students' Programme (VSP) was held during May 13 - June 28, 2019 at IUCAA. There were 14 students from various colleges/universities/institutes. The selectors had a tough task to select the participants from a large number of online applications. Along with lectures on basic and advanced astronomy (held in common with the Refresher Course in Astronomy and Astrophysics (for College/University Teachers)), the students worked on individual projects with faculty members and post-doctoral fellows of IUCAA, with topics covering a broad range of subjects across observational, instrumental and theoretical aspects of Astronomy and Astrophysics. The students were also taken a tour to the IUCAA Girawali Observatory (IGO) and Giant Metrewave Radio Telescope facility. The students enthusiastically participated in the programme and presented their project work in seminars held at the end of the session. Gulab C. Dewangan was the faculty coordinator of this programme.



Addition to the IUCAA family

IUCAA extends a warm welcome to the new Visiting Associates of the thirtieth batch joining us for a tenure of three years, beginning August 2019.

New Visiting Associates

Sheelu Abraham, Department of Physics, Mar Thoma College, Chungathara, Kerala.

Aru Beri, Department of Physics, IISER, Mohali.

Biju K.G., Department of Physics, WMO Arts and Science College, Muttill PO, Wayanad.

Moon Moon Devi, Department of Physics, Tezpur University, Napaam, Assam.

Ankur Gogoi, Department of Physics, Jagannath Barooah College (Autonomous), Jorhat, Assam.

Aruna Govada, Department of Computer Engineering, Government Polytechnic, Daman, U.T. of Daman and Diu.

Mamta Gulati, School of Mathematics, Thapar Institute of Engineering and Technology, Patiala.

Rinku Jacob, Rajagiri School of Engineering and Technology, Kakkanad, Kerala.

M. Chrisphin Karthick, Department of Physics, Loyola College (Autonomous), Nungambakkam, Chennai.

V. Madhurima, Department of Physics, Central University of Tamil Nadu, Thiruvarur.

Mubashir Hamid Mir, Department of Physics, Government Degree College, Bandipora, Jammu and Kashmir.

Aditya Sow Mondal, Department of Physics, Siksha-Bhavana, Visva-Bharati, Santiniketan.

Prince P.R., University College, Thiruvananthapuram, Kerala.

R.P. Prajapati, Department of Pure and Applied Physics, Guru Ghasidas Central University, Bilaspur, Chattigarh.

Md. Anisur Rahaman, Department of Physics, Hooghly Mohsin College, Chinsurah, West Bengal.

Biplob Sarkar, Faculty of Science and Technology, The ICFAI University, Agartala, Tripura.

Tamal Sarkar, High Energy and Cosmic Ray Research Centre, University of North Bengal, Rajarammohanpur, Darjeeling.

L. Sriramkumar, Department of Physics, Indian Institute of Technology-Madras, Chennai.

Nilkanth Dattatray Vaghshette, Department of Physics and Electronics, Maharashtra Udayagiri Mahavidyalaya, Udgir.

Lalthakimi Zadeng, Department of Physics, Mizoram University, Aizawl.

Extension of Associateship to the twenty-seventh batch of Visiting Associates.

G. Ambika, Department of Physics, IISER, Tirupati.

Tanwi Bandyopadhyay, Department of Mathematics, Adani Institute of Infrastructure Engineering, Ahmedabad.

Debbijoy Bhattacharya, Department of Physics, Manipal Centre for Natural Sciences, Manipal University.

Subenoy Chakraborty, Department of Mathematics, Jadavpur University, Kolkata.

Raghavendra Chaubey, Department of Mathematics,
Banaras Hindu University, Varanasi.

Bhag Chand Chauhan, Department of Physics and
Astronomical Sciences, Central University of
Himachal Pradesh, Dharamshala.

Himadri Sekhar Das, Department of Physics,
Assam University, Silchar.

Abhirup Datta, Centre of Astronomy, IIT, Indore.

Kanan Kumar Datta, Department of Physics,
Presidency University, Kolkata.

Sukanta Deb, Department of Physics, Cotton College
State University, Guwahati.

Gurudatt Gaur, Institute of Advanced Research,
Gandhinagar, Gujarat.

Sushant G. Ghosh, Centre for Theoretical Physics,
Jamia Millia Islamia, New Delhi.

Sutapa Ghosh, Department of Physics,
Barasat Government College, Kolkata.

Rupjyoti Gogoi, Department of Physics,
Tezpur University, Tezpur.

Umananda Dev Goswami, Department of Physics,
Dibrugarh University, Assam.

Shivappa B. Gudennavar, Department of Physics,
Christ University, Bengaluru.

K.P. Harikrishnan, Department of Physics,
The Cochin College, Kochi.

K. Indulekha, School of Pure and Applied Physics,
Mahatma Gandhi University, Kottayam.

Md. Mehedi Kalam, Department of Physics,
Aliah University, Kolkata.

Sanjeev Kalita, Department of Physics,
Gauhati University, Guwahati.

Ram Kishor, Department of Mathematics,
Central University of Rajasthan, Ajmer.

Nagendra Kumar, Department of Mathematics,
M.M.H. College, Ghaziabad.

Shiva Kumar Malapaka, International Institute
of Information Technology, Bengaluru.

Bivudutta Mishra, Department of Mathematics,
BITS - Pilani, Hyderabad.

Barun Kumar Pal, Department of Physics, Netaji Nagar
College for Women, Kolkata.

Madhav K. Patil, School of Physical Sciences, Swami
Ramanand Teerth Marathwada University, Nanded.

Devraj Damaji Pawar, Department of Physics,
R.J. College, Mumbai.

Anirudh Pradhan, Department of Mathematics,
G.L.A. University, Mathura.

Rajesh S.R., Department of Physics, S.D. College,
Alappuzha, Kerala.

Biplab Raychaudhuri, Department of Physics,
Visva-Bharati University, Santiniketan.

Anirban Saha, Department of Physics,
West Bengal State University, Kolkata.

Sudipta Sarkar, Department of Physics, IIT,
Gandhinagar.

Anjan Ananda Sen, Centre for Theoretical Physics,
Jamia Millia Islamia, New Delhi.

Harinder Pal Singh, Department of Physics and
Astrophysics, University of Delhi, Delhi.

Surendra Nadh Somala, Department of Civil
Engineering, Indian Institute of Technology, Hyderabad.

Anisul Ain Usmani, Department of Physics,
Aligarh Muslim University, Aligarh.

Murli Manohar Verma, Department of Physics,
University of Lucknow, Lucknow.

Jaswant Kumar Yadav, Department of Physics,
Central University of Haryana, Mahendergarh.

Advanced B.Sc. (Physics) Summer Programme - 2019



The Advanced B.Sc. (Physics) Summer Programme was started by the joint efforts of the Gujarat Science Academy, and Vikram A. Sarabhai Community Science Centre (VASCSC), Ahmedabad in 2003, under the guidance of experts from Institute for Plasma Research (IPR), Physical Research Laboratory (PRL), Indian Space Research Organization (ISRO), etc. This year, it was conducted during May 11 - June 1, 2019, at St. Xavier's College (Autonomous), Ahmedabad, with the support from IUCAA, under the IUCAA Centre for Astronomy Research and Development (ICARD). Thirty five students were selected from about 300 applications received from the colleges of Gujarat on the basis of a test, their school and college performance, an essay on why they wish to participate in this programme, and from other details in the application. The course consisted of lectures in Electromagnetism, Quantum Mechanics, and Experimental Physics. The courses were taught by faculties from PRL, IPR, and Ahmedabad University.

The Astro-Night of the Programme was successfully conducted on May 13, 2019. All 35 students of the programme along with a few astro-enthusiasts of the city, participated in this event. A dark site, about 40 km away from the city, was identified to avoid light pollution. Vishal Joshi (Astronomy and Astrophysics Division, PRL) led the activities with the support of 3 amateur astronomers from the VASCSC. Three telescopes with apertures of 4 to 8 inch, and two binoculars were used for observations. The event began after dinner at around 10 p.m. and continued for the next 5 hours. Students

were introduced to basic astronomical concepts like, the motion of stars in the sky, measuring the latitude of the site from the elevation of the Pole Star, motion of the Sun at poles, reasons for seasons and zero shadow day, magnitude system, etc. Various constellations like Ursa Major, Ursa Minor, Bootes, Hercules, Virgo, Scorpio, etc. were identified along with a discussion on the scientific aspects of the bright stars of these constellations. Students were amazed to watch Jupiter, Saturn, binary stars, open clusters and other deep sky objects. Most of the students were observing these objects for the first time through a telescope. Several students also cheered some 'shooting-star' events during the observing session. Students were found to be very interactive in the discussions during the observations. They asked various questions on astrophysics and cosmology. The Astro Night was concluded with the awesome view of the Milky Way. All of the students had seen it for the first time.

R. Rangarajan (Ahmedabad University) delivered a special lecture on Astro-Particle Physics, on May 14, 2019, and A.R. Prasanna (formerly from PRL) gave a special lecture on Gravitational Waves and Black Holes: Dominant Features of Modern Astrophysics, on May 20, 2019. Avik Dasgupta (VASCSC) delivered a lecture on Astronomy, on May 27, 2019 at VASCSC, during the students' visit to the centre. The valedictory function was conducted at the Institute for Advanced Research (IAR), Gandhinagar, and Gurudatt Gaur (IAR) was the coordinator of the programme.

Astronomy Congress - 2019



The IUCAA Centre for Astronomy Research and Development (ICARD) initiated its activities in the Department of Physics, University of Calicut, Kozhikode, by joining hands with the Kerala Sastra Sahitya Parishad, to conduct the Astronomy Congress - 2019, during April 27-28, to commemorate the 50th anniversary of first landing on the Moon. The fully residential programme, hosted about 150 participants including over 100 students from schools in the districts of Kozhikode and Malappuram. The Hon'ble Vice Chancellor, K. Mohammed Basheer inaugurated the congress. Soon after, the participants were split into 3 parallel groups to

conduct day time astronomy experiments, which were to find due north, to understand the precession of the Earth, observation of the Sun, and to mimic eclipses. There were demonstrations and presentations by K. Pappooty, P. T. Ramachandran, Jiji Varghese, V. V. Manikandan, C. Subramanian, P. Sajin, Ilyas Perumbilam, Ananthamurthy, P. Sudhir, A. Sreedharan, and Ravikumar C.D. In addition, a night sky watch was also conducted. Ravikumar C.D. was the coordinator of the congress.



Colloquia

13.05.2019: **Luca Cortese** on *Galaxy transformation in the local Universe*.

17.06.2019: **Sunil Kumar** on *Laboratory astrophysics using radio-frequency ion traps*.

Seminars

03.04.2019: **Pratyush Pranav** on *Algebraic topology and its application to cosmological data sets*.

24.04.2019: **Sambaran Banerjee** on *Star clusters: A versatile laboratory for astrophysical phenomena*.

15.05.2019: **Mukul Bhattacharya** on *Source properties and spatial distribution of fast radio bursts*.

Workshop on Data Analysis and Machine Learning



Data science is now recognized as a new discipline, that deals with the acquisition, storage, retrieval, processing, and analysis of data. With the realization that knowledge lies mostly in data, the demand for scientists who are trained in data analysis is increasing. Many research areas like LHC, radio astronomy, genomics, molecular simulation, organic synthesis, climate science, etc. rely greatly on data and data analysis. With increase in the size of data, so called big-data, data science has moved into the realm of computer science, algorithms, and machine learning, that rely on statistics and several other mathematical techniques. Realising the relevance of data science, the Indian Institute of Science Education and Research (IISER) Tirupati, jointly with IUCAA, conducted a Workshop on Data Analysis and Machine Learning, during May 24 - 28, 2019.

The workshop was at an introductory level, meant to train young researchers and students in the recent techniques of data analysis. The lecture sessions handled by 10 resource persons introduced statistical analysis, non-linear time series analysis, recurrence networks, Bayesian approaches, and machine learning algorithms. In addition, there were hands-on sessions every day, conducted by 11 researchers and experts, who trained the participants in the use of data sets from various research areas like astrophysics, cosmology, experiments, physiology, climate, etc. Around 50 participants of PhD students, post-doctoral fellows, post-graduate, and advanced under-graduate students from institutes, universities and colleges in India attended this workshop,

which was coordinated by G. Ambika, and Arunima Banerjee (both from IISER, Tirupati), and Ranjeev Misra (IUCAA).



National Conference on Recent Trends in the Study of Compact Objects: Theory and Observation



IUCAA organized the fourth National Conference on Recent Trends in the Study of Compact Objects: Theory and Observation (RETCO) during April 17 - 20, 2019. The conference brought together researchers from all over India to discuss the recent theoretical and observational progress made in understanding the physics of accreting compact objects with special emphasis on the results from the AstroSat mission. The conference discussed: (i) Observational studies of accreting compact objects such as XRBs, AGNs using AstroSat and other observatories, (ii) Numerical and theoretical studies of compact astrophysical systems, (iii) Out bursting and transient astrophysical phenomena, and (iv) Instrument development and future missions. The meeting provided ample opportunity for young researchers, who presented their work. Every participant presented a talk or a

poster, and contributed in organizing the conference. The scientific programme was very tight, and consisted of 4 invited reviews, 21 invited talks, 54 contributed talks, and 24 posters. Gulab C. Dewangan was the coordinator of the conference.



IUCAA - National Admission Test (INAT- 2019)

Applications are invited from highly motivated students for a research scholarship to pursue a Ph. D. degree at the Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune (an Autonomous Institution of the University Grants Commission).

Prospective applicants should complete their B.Sc./M.Sc./Integrated M.Sc. degree (in Physics, Electronics, Astronomy or Applied Mathematics) or B.E./B.Tech./M.E./M.Tech. degree (in any branch) by July 2020, with 55% marks or more. More details regarding eligibility for selection for different programmes at IUCAA, including information for walk-in candidates, are available at <http://inat.iucaa.in/>. Candidates should apply online at this website

The last date for the online submission of application is **September 12, 2019**.

The last date for the online submission of the assessment forms is **September 19, 2019**.

The selection for the Ph.D. Programme will be through a written test on **Thursday, December 5, 2019**, and two interviews on **December 5, 6 and/or 7, 2019** (Thursday, Friday, Saturday), all to be held at IUCAA, Pune.

Public Outreach Activities

Global Astronomy Month

On the occasion of the Global Astronomy Month (GAM), April 2019, IUCAA SciPOP team organised themed public sky-gazing events on April 11 and 18, 2019. The theme of GAM - 2019 was 'Spirit of Apollo', celebrating the 50th anniversary of Apollo 11 mission. Around 300 enthusiastic adults and students attended the evening events, which were coordinated by Sonal Thorve. A brief video composed by Ishan Shinde of Global Star Party at IUCAA can be found in: <https://youtu.be/N9ISedebrCU>.



Neem Seminars

28.05.2019: **K. Indulekha** on *Binaries of the Orion nebula cluster*.

04.06.2019: **Suresh Chandra** on *Molecules in interstellar medium*.

04.06.2019: **Devraj Pawar** on *Observations of X - ray binary systems*.

11.06.2019: **Sunil Kumar Tripathy** on *Bouncing models in extended gravity theory*.

11.06.2019: **Nishikanta Khandai** on *The population of galaxies that contribute to the Hi mass. function*.

18.06.2019: **Sanjay K. Sahay** on *Multi-server authentication*.

18.06.2019: **Sonal Patel** on *Performance of the G-APD (SiPM) based imaging atmospheric Cherenkov Gamma-Ray Telescope*.

Zero Shadow Day

On May 14, 2019, the Zero Shadow Day for Pune was celebrated in IUCAA. Along with the members of IUCAA, the students of the Summer School and Vacation Students' Programme, and college/ university teachers of Refresher Course enjoyed, and observed the shadows of themselves and objects around disappear beneath their feet.



School Students' Summer Programme and Astronomy Camp

The annual School Students' Summer Programme and Astronomy Camp was conducted during May 6 - 31, 2019, at IUCAA. Thirty two students of classes VIII, IX and X, from schools of Pune as well as from rural areas near IUCAA Girawali Observatory (IGO) were invited to this programme at Mukhtangan Vidnyan Shodhika, IUCAA. Research Scholars, Scientific Staff of IUCAA, and SciPOP team volunteered to guide batches of 3 - 6 invited students, on some focussed scientific projects. Each batch of students spent one week by interacting with the volunteers, and used the facilities. This year Pranoti Panchbhai, Sujatha Ramakrishnan, Yash Bhargava, Siddharth Maharana, Niladri Paul, Bhushan Joshi, Sonal Thorve, and Shivom Gupta, along with the help of Shreeya Nadgowda, Bhavesh Rajput and Ishan Joshi provided their wholehearted guidance and valuable time to the students.

Starting on Mondays, the invited students worked with their volunteer guides throughout the week. There were a variety of



project topics, ranging from the study of apparent motion of the sun to the making of a motorised mirror polishing machine. The IUCAA main library, and the facilities of the Mukhtangan Vidnyan Shodhika, like the library, computer section, and workshop were made available to the students, who themselves built the equipments using tools from the workshop under the guidance of Maharudra Mate. On Fridays, the batches concluded their week with well designed presentations, which were attended by other students and IUCAA academics.

Special Events Outside IUCAA



Inclusive Astronomy Workshop, at Smt. Patashibai Lunkad Blind School, Bhosari, Pune

On April 26, 2019, a workshop on basic astronomy was conducted at Smt. Patashibai Lunkad Blind School, Bhosari, Pune. About 40 blind students from classes VI to VIII enjoyed learning about our solar system and the universe. They could visualise the scales of the planet sizes using inclusive model of the solar system. Neha Deshpande and Sonal Thorve were the resource persons.

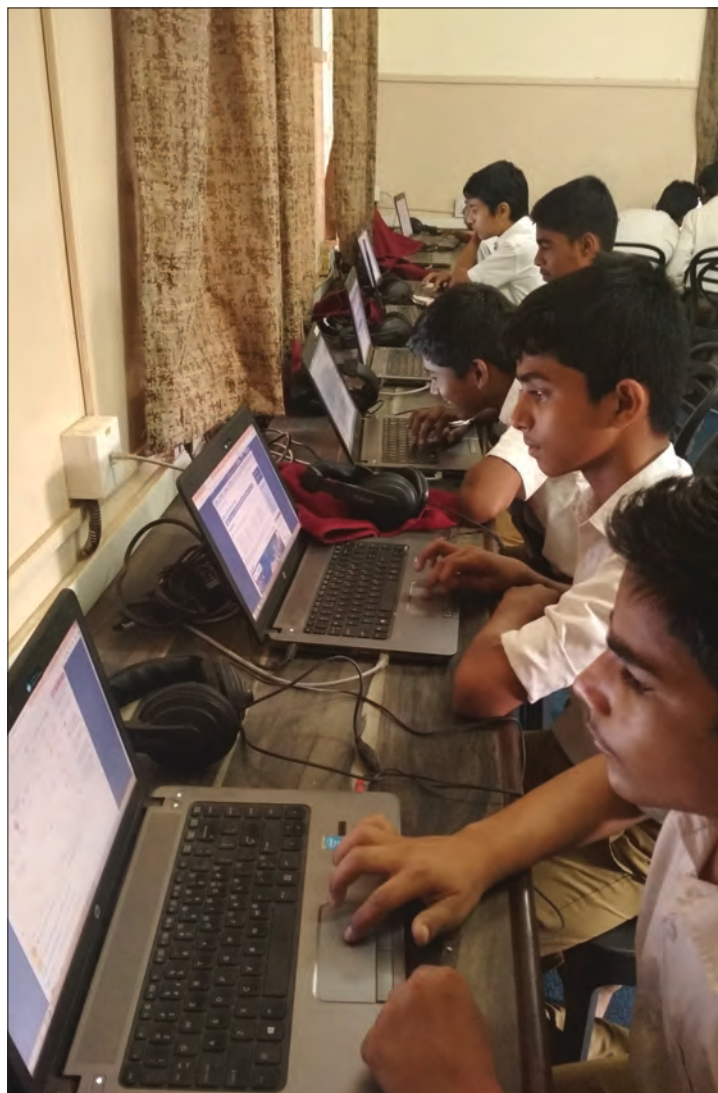
Workshop on Basic Astronomy for Educators, at Agastya Foundation, Kuppam, Andhra Pradesh

During the two-week long training programme for educators at Agastya Foundation, Kuppam, Andhra Pradesh, a two day Workshop on Basic Astronomy was organised during May 10-11, 2019. About 50 educators in and around Mumbai were invited to participate in the programme. Sonal Thorve, Tushar Purohit, Rupesh Labade and Maharudra Mate were the resource persons. In this workshop, there were hands-on sessions on basic astronomy concepts, and the participants learnt about our universe. They made hands-on astronomy models like sundial, CD-spectroscope to learn and teach the concepts of time, and light. Along with the properties of light, and how to demonstrate these using simple, readily available low-cost materials, they also learnt the basics of telescopes.



Sally Ride Earth KAM, at New English School, Tilak Road, Pune

Following the enthusiastic response from school students last year, the IUCAA SciPOP team participated in the Sally Ride Earth KAM (Earth Knowledge Acquired by Middle School Students), run by NASA this year too, during May 10 - 12, 2019. The programme invited students and teachers around the world to explore the earth from the perspective of the International Space Station (ISS). The camera onboard the ISS has a dedicated time slot for capturing the pictures of geographical locations requested by the participants. Thirty students from the New English School, Tilak Road, Pune, took part in the programme, and successfully received the images of different parts of the globe with various geological features. The programme was coordinated by Shivom Gupta.



Science Toys Workshops, at Ghodegaon, and at Vidnyan Ashram, Kothrud

A Science Toys Workshop for school students was held on May 6, 2019, at the New English School, Ghodegaon. Around 150 students enjoyed learning basics of science with simple toys and experiments. Rupesh Labade coordinated and conducted the workshop.

On May 21, 2019, a similar workshop, a session on telescopes and hands-on astronomy was organised at Vidnyan Ashram, Kothrud, Pune. This was conducted by Rupesh Labade and Tushar Purohit.

Lecture on Celestial Sphere and Sky Map Reading, at Muktangan Exploratory

As part of the summer camps organised by Muktangan Exploratory, Pune, a lecture on Celestial Sphere and Sky Map Reading was delivered on May 21, 2019, by Samir Dhurde. About 50 school students attended and enjoyed the session.

Telescope Making Workshops

IUCAA SciPOP in collaboration with Latur Science Centre, conducted a telescope making workshop during April 15 - 18, 2019. Totally 195 small refracting telescopes were made by students of classes VI to XII under the guidance of Tushar Purohit, who was the resource person from IUCAA.

During April 27 - 28, 2019, a similar telescope assembly workshop was organised at Pandit Deendayal Petroleum



University Astronomy Club, at Gandhinagar. The students assembled 15 reflecting telescopes.

During June 19 - 23, 2019, a telescope making workshop was organised at Kendriya Vidyalay, Bhopal, in collaboration with Vigyan Prasara. Twenty larger (5 inch) reflecting telescopes were made by school teachers.



Astronomy Lecture, at Jyotirvidya Parisanstha

As part of the summer astronomy camp organised by Jyotirvidya Parisanstha, Pune, a lecture on Multi-wavelength and Multi-messenger Astronomy was delivered by Samir Dhurde on May 3, 2019. On May 16, 2019 Shivom Gupta delivered a lecture on Exoplanets. Around 50 participants attended the camp.

TMT Outreach Week, at Vigyan Samagam, Mumbai.

The IUCAA SciPOP personnel were representing the LIGO-India and the Thirty Meter Telescope (TMT) projects at the Vigyan Samagam Science Megaprojects exhibition held at Mumbai during May 27 - June 9, 2019. With the guidance from project leaders, over the past few months, a set of ten posters, a collection of short films as well as some interactive and live demos have been put together. These are now a part of a grand pavilion showcasing



megaprojects in India. Many volunteers have also been trained to explain the posters and exhibits to all visitors.

The special outreach week of LIGO-India was coordinated by Vaibhav Savant, with Ankit Bhandari and Rameshwar Bankar. The events included 14 talks for the general public and students by several scientists. Live / interactive demos like "Space Quest", "Black hole Pong", "Stretch and Squash", "LIGO-in-your-hands", and other interferometers were also arranged for the visitors.

For celebrating the TMT outreach week, Samir Dhurde (as coordinator), Sonal Thorve, Shivani Pethe and Rupesh Labade conducted various activities to showcase optical astronomy and large telescopes. These included talks, skits, live demos and telescope making sessions. A special themed play combined with science demos was scripted by them and was piloted at this event. It highlighted the developments since the time of Galileo Galilei in a lucid and attractive manner via DIY optics experiments. Everyone in the audience, especially school students, delved into the wonderful world of light and its properties with Galileo himself joining them!



Other Regular Events



During April, May and June 2019, the Public Outreach team has conducted 2 science toys workshops, 1 basic astronomy workshop, and 9 campus visits, with an approximate reach to about 400 people.

Public Talk

May 22, 2019: **Puragra Guha Thakurta** (University of California, Santa Cruz) on *Galaxies, Dark Matter, and Life on Earth*.

All talks are being made available at our YouTube channel: <https://www.youtube.com/user/IUCAASciPOP/>

Visitors

April - June 2019

Linn Abraham, Sheelu Abraham, Oluwashina Adegoke, Md. Ramiz Aktar, T.N. Aneruddh, G.K. Ankush, G.C. Anupama, C.V. Anusree, K.G. Anusree, Anil Aria, Raghav Arora, Tanwi Bandyopadhyay, Anuvab Banerjee, Sambaran Banerjee, Srimanta Banerjee, Priyadarshini Bangale, Samuzal Barua, Prasad Basu, Dipanjali Behera, N. S. Benerji, Varun Bhalerao, Harshitha Bhat, Tabasum Bhat, Ayan Bhattacharjee, Mukul Bhattacharya, Subhra Bhattacharya, Dipanweeta Bhattacharyya, Maitraya Kanta Bhattacharyya, Sudip Bhattacharyya, Dilipkumar Bhosale, Yashpal Bhulla, G.R. Bhuvana, Nikhil Pratap Bisht, Kamal Bora, Sandip Chakrabarti, Manoneeta Chakraborty, Samarjit Chakraborty, Sumanta Chakraborty, Swadesh Chand, Anirban Chanda, Suresh Chandra, Arka Chatterjee, Debjit Chatterjee, Kaustav Chatterjee, Ritaban Chatterjee, Sangita Chatterjee, Indranil Chattopadhyay, Tanushree Chowdhury, Luca Cortese, Dennis Coyne, Mamta Dahiya, Abhishek Das, Santabrata Das, Shyam Das, Patrick Dasgupta, Raya Dastidar, Sudeb Ranjan Datta, Subhadeep De, Sukanta Deb, Dipak Debnath, Saloni Deepak, Kabita Deka, P. Deneshan, Shantanu Desai, Reshma Raut Dessai, Sagar Dey, Prasun Dhang, Payaswinee Dhoke, Indu Kapla Dihingia, C.G. Divyarani, Suprio Dubey, Broja Gopal Dutta, Anjasha Gangopadhyay, Edgar Gasperin Garcia, Akash Garg, B.R. Geethika, Koushik Ghosh, Subham Ghosh, Tathagata Ghosh, Joseph A. Giaime, V. Girish, G.K. Goswami, Milind Gowardhan, Sarbari Guha, Raja Guhathakurta, Shivangi

Gupta, David Hilditch, Jyotishree Hota, Josef Huber, K. Indulekha, Bhola Ishwar, Joe Jacob, Deepak Jain, Himani Jain, Priyanka Jalan, Arghajit Jana, K. Jeena, A. S. Joshi, Arti Joshi, Kanti Jotania, Minu Joy, Shubham Kala, Mohan Kale, Surajit Kalita, H. Sree Kanth, Shreejaya Karantha, Vinay Kashyap, Sanika Khadkikar, Nishikanta Khandai, Shashaank Khanna, Rukaiya Khatoon, Yogesh Rajesh Khemka, Pransh Khubchandani, Ram Kishor, K.V. Krishnapriya, Arun Kulkarni, Nagendra Kumar, Rajesh Kumar, Rajiv Kumar, Rakesh Kumar, S. Sunil Kumar, Kavita Kumari, Neeraj Kumari, Michael Landry, Kinjalk Lochan, Rabindra Mahato, Amit Kumar Mandal, Samir Mandal, Soma Mandal, Vivek Mandot, Arun Mangalam, Chatriksingh Mangat, P.V. Manjusha, Arijit Manna, Ashish Mhaske, Aditya Mani Mishra, Bivudutta Mishra, Sashank Mishra, Tanmaya Mishra, Shrish Misra, N.P.S. Mithun, Nishant Mittal, P.N. Naseef Mohammed, Soumen Mondal, Tushar Mondal, Norbert Mueller, Arghya Mukherjee, Purba Mukherjee, Banibrata Mukhopadhyay, Nikhil Mukund, Masum Murshid, Sachindra Naik, Anuj Nandi, Prantik Nandi, Susanta Kumar Nandi, Udit Narain, Nimmi Narayanan, Shefali Negi, P.R. Neha, Vineet Ojha, Indrani Pal, Arathy Palackal, M. C. Panda, Divya Pandey, Ruchi Pandey, S.K. Pandey, Sanjay Pandey, Mahadev Pandge, Shravani Pandit, Rutu Parekh, Sonal Patel, Amit Pathak, Kishor D. Patil, Madhav K. Patil, Bikash Chandra Paul, Biswajit Paul, Nupur Paul, Devraj Pawar, K. Pradeesh, Ananta Charan Pradhan, Anirudh Pradhan, Ankul

Prajapati, Samrit Pramanik, Pratyush Pranav, Annmaria J. Puthur, Abdul Quddus, R. Radhakrishnan, Haqnawaz Rafiq, Farook Rahaman, M. Xavier James Raj, T.R. Rajalakshmi, Mainpal Rajan, Anjali Rameja, Prerna Rana, Sandeep Rana, Vikram Rana, Priyanka Rani, Ragini Rani, A.R. Rao, Shantanu Rastogi, B.S. Ratanpal, Hemant Rathore, Divya Rawat, Saibal Ray, Sananda Raychaudhuri, Vijay Raykar, B. Eswar Reddy, Soumya Roy, Sanjay Kumar Sahay, Sunder B. Sahayanathan, Nidhi Saini, Prasant Kumar Samantray, Saumyadip Samui, Sriram Sankar, Kishan Hasumukhbhai Sankharva, Piklu Santra, Revanta Sarabhai, Biplob Sarkar, Shilpa Sarkar, Sudipta Sarkar, B. Satheesh, Richard Savage, S. Seetha, Somasri Sen, Anand Sengupta, Lydia Sertho, Nigar Shaji, Saran Shaju, Joginder Sharma, Prateek Sharma, Mayur Shende, Shravan Kumar Shetty, Apurva Singh, K. P. Singh, Kuldeep Singh, Manvinder Pal Singh, Sparsh Singh, Ashi Sinha, Sekhar Sinha, Suraj Kumar Sinha, Vikram Soni, Avinash Sontakke, P. Sreekumar, C. S. Stalin, Ravi Subrahmanyam, Annapurni Subramaniam, Vipin Sudevan, Tomomi Sunayama, Prayas Sutar, Subhashree Swain, Mohd. Talha, Pranav Tiwari, Praveer Tiwari, Shruti Tripathi, S.K. Tripathy, Kanshokmi Tuithung, Paniveni Udayashankar, Santosh Vadawale, Deepak Vaid, Bhargav Pradeep Vaidya, R. Vaisakh, Manoj Varma, Vijay Varma, P. Venkatakrishnan, Srinatha Venkatesha, Aditya Vidhate, R.G. Vishwakarma, Mukesh Kumar Vyas, and J. S. Yadav.

Visitors Expected

July 2019

Satadru Bag, Pune; Parag Bhattacharya, Assam Don-Bosco University, Guwahati; Arun Bidhan, Jamia Millia Islamia, Delhi; Promila Biswas, The University of Burdwan; Ritabrata Biswas, The University of Burdwan; Nabajit Chakravarty, Positional Astronomy Centre, Kolkata; Prasun Dhang, IISc, Bengaluru; Jayanta Dutta, IISER, Mohali; Garcia Raphael, University of Arizona, USA; Akash Garg, Jamia Millia Islamia, Delhi; Sushant Ghosh, Jamia Millia Islamia, Delhi; Gourab Giri, IIT, Indore; Dhruba Jyoti Gogoi, Dibrugarh University; Umananda Dev Goswami, Dibrugarh University; Nitin Hulke, Visvesvaraya NIT, Nagpur; Nazma Husain, Jamia Millia Islamia, Delhi; Dhairyashil Jagadale, Hyper-Ions Research Labs, Pune; Nandita Kalita, Girijananda Chowdhury Institute of Management and Technology, Guwahati; Sanjeev Kalita, Gauhati University, Guwahati; Sheeraz Khanday, University of Kashmir, Srinagar; Ashwini Lalke, Visvesvaraya NIT, Nagpur; Ritam Mallick, IISER, Bhopal; Kishor D. Patil, BD College of Engineering, Wardha; Rohan Pattnaik, International Institute of Information Technology, Bhubaneswar; M. Sneha Prakash, Christ University, Bengaluru;

Mahaveer Prasad, Pune; Sanjay Kumar Sahay, BITS-Pilani, Goa; Vipin Kumar Sharma, University of Lucknow; Sherehan Shehata, National Research Institute of Astronomy, Egypt; Gyan Prakash Singh, Visvesvaraya NIT, Nagpur; Neal Thomas, Christ University, Bengaluru; Anisuk Ain Usmani, Aligarh Muslim University; Rahul Kumar Walia, Jamia Millia Islamia, Delhi; and Bal Krishna Yadav, University of Lucknow.

Ahmedabad; Satyanarayan Mohapatra Ray Pitambar, MIT, USA; and Marina Prokopyeva, St. Petersburg State University, Russia.

Long Term Visitor

Ajesh Gulati, TMT Project Office, USA

August 2019

Abhay Ashtekar, Pennsylvania State University, USA; Roland Bacon, Centre de Recherche Astrophysique de Lyon, France; Basundhara Ghosh, University of Geneva, Switzerland; Kanti Jotania, The MS University of Baroda, Vadodara; and Sambit Panda, BITS, Pilani.

September 2019

Warren Anderson, University of Wisconsin, Milwaukee, USA; Kallol Dey, IISER, Thiruvananthapuram; Scott Koranda, University of Wisconsin, Milwaukee, USA; Michael Manske, University of Wisconsin, Milwaukee, USA; V. Raja, INFLIBNET, Ahmedabad; Yatrik Patel, INFLIBNET,

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