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## Indo-French Astronomy School (IFAS5) on Spectroscopy and Spectrographs

### Contents...

Reports of Past Events .....	1 - 5
Congratulations .....	3
Welcome & Farewell .....	6,7
Colloquia and Seminars .....	7
Public Outreach Activities.....	8 - 13
Obituary .....	14
Visitors .....	15,16



The IFAS5 (5th Indo-French Astronomy School) was held at IUCAA during August 16-24, 2019. This was the 5th in the series of IFAS which are alternatively held at IUCAA, Pune and Lyon, France. The topic of this school was Spectroscopy and Spectrographs. As was decided in IFAS4, the school was held for a longer duration which helped the participants to spend more time on the allotted projects.

The resource persons were Philippe Prugniel and Roland Bacon (CRAL, Lyon); Mohammad Akhlaghi (IAC, Tenerife); Ranjan Gupta, A. N. Ramaprakash, Ajit Kembhavi and Kanak Saha (IUCAA, Pune); Sunetra Giridhar (IIA, Bengaluru) and Harinder P. Singh (University of Delhi, Delhi). The topics covered ranged from Spectrographs and Spectra - Observation

and Data-reduction techniques; Spectroscopic analysis and Spectral classification; Integral field spectroscopy, the art to split the light into pieces; Gnuastro (tutorial) and principles of preparing 'reproducible research'; Polarimetry; Deep Learning Applications to Stellar and X-ray Binary Spectra and Extragalactic research by AstroSat. There were 7 projects given by the resource persons and the topics were: Automated Spectral Classification of Two Spectral Libraries; Extragalactic Fishing Experiment in the MUSE Hubble deep field; Find high redshift galaxies not even seen by Hubble; Identifying emission-line objects and understanding the detection limits; Stellar abundances using high-resolution spectra; Polarimetry Data Analysis; Determination of stellar atmospheric



parameters of globular cluster stars from MUSE observations and Pattern speed of bars in disk galaxies using IFU data. There were 22 PhD students from various Indian Institutes and Universities who attended the school and they spent all the afternoons and the last full two days on these allocated projects.

The lectures were scheduled in the morning hours. It is proposed that the next IFAS6 will be held again at Lyon, France in the summer of 2020. The school coordinators were Philippe Prugniel from France and Kanak Saha and Ranjan Gupta from IUCAA.

## North-East Meet of Astronomers (NEMA-V)

North-East Meet of Astronomers, initiated in 2015 by the Department of Physics, Tezpur University, and sponsored by IUCAA, is an annual meeting of astronomers in the North-Eastern part of India. These meetings aim to bring together

young and highly motivated students, researchers, college and university teachers of the region, working or intending to take up research in the field of Astronomy and Astrophysics and related topics, on a single platform to stimulate discussions and



collaborations. Four such meetings have been successfully organised by Assam University, Assam Don Bosco University, and Tezpur University. The Department of Physics, Tezpur University organised the 5th edition of this meeting during September 11 - 13, 2019. There were 60 participants from different colleges/universities/institutions of the North-Eastern states. There was a series of talks delivered by young researchers and faculty members, followed by extensive discussions. In addition, a poster session was included in NEMA for the first time. The talks/posters covered various

topics of astronomy, such as astrophysical plasma, black holes and compact objects, galaxies, active galactic nuclei, multi-wavelength observational astronomy, interstellar and cometary dust, cosmology, and neutrino physics. There were ample interactions among senior researchers and young participants on various scientific topics and collaborations during the meeting. Durgesh Tripathi and Kanak Saha (both from IUCAA) attended the meeting as invited speakers.

This Workshop was coordinated by Rupjyoti Gogol and Ranjeev Misra.

## Congratulations to . . .

- **T. Padmanabhan**, on being awarded the *M.P. Birla Memorial Award (2019)*.
- **Varun Sahni**, on being awarded *J.C. Bose Fellowship of the DST (2019)*.
- **Kandaswamy Subramanian**, on being elected as a *Fellow of the Indian National Science Academy*.

## Workshop on Engineering Applications in Astronomy



A workshop on Engineering Applications in Astronomy was organized by IUCAA in collaboration with Vishwakarma Institute of Technology (VIT), Pune, during August 19 - 24, 2019 at VIT campus, Pune. The workshop was partially sponsored through a grant from Infosys Foundation to IUCAA. This was the third in a series of workshops being organized with

the primary aim to create awareness among engineers about the field of astronomy and present the challenging opportunities available. Around 40 participants were selected from different branches of engineering and from different parts of the nation.

During the morning sessions, a series of lectures were given by A. N. Ramaprakash, Kaustubh Vaghmare, Somak Raychaudhury, Joydeep Bagchi, Durgesh Tripathi, Gualab Dewangan, Sanjit Mitra (all from IUCAA), Jayaram Chengalur, (from NCRA, Pune), and Avinash Deshpande (RRI, Bengaluru). The lectures dealt with the basics of astronomy and instrumentation techniques, in the context of the existing and upcoming major astronomical projects in Gravitational Waves, Radio Astronomy, AstroSat and Solar Physics. Also, a popular talk on Astronomy Mega Projects by Ajit Kembhavi (IUCAA) was organized for general public and students. A key feature of this workshop was the extensive hands-on sessions in which the students carried out various experiments in physics and engineering that have important applications in astronomy.

These were mentored by the members of Radio Physics Lab, Instrumentation Lab and Graduate Students of IUCAA. Participants also got an opportunity to visit the IUCAA campus, and participate in a demonstration of the hydrogen line experiment using the Horn antenna. The last session of the workshop was a panel discussion focusing on the upcoming mega projects as well as the related opportunities for the engineering students in Astronomy. Ramaprakash, Raychaudhury, Gupta and Shripad Bhatlawande were leading the panel. On the last day of the workshop, a visit to GMRT and IUCAA Girawali Observatory was organized.

The workshop was co-ordinated by A. N. Ramaprakash and Jameer Manur (IUCAA), and Shital Raut and Shripad Bhatlawande (Both from VIT).



## Workshop on Astronomical Data Analysis



The Department of Physics, Jagannath Barooah College (Autonomous), Jorhat, Assam, successfully organized the third Workshop on Astronomical Data Analysis (WADA - 2019), during September 17 - 19, 2019, in association with Department of Physics, Tezpur University, Assam. The workshop was a part of IUCAA Centre for Astronomy Research and Development (ICARD) activity. The workshop was intended for graduate and post-graduate students, research scholars and college/university teachers, who have been working in the area of astronomy and astrophysics. There were 57 participants from different parts of India. The resource persons of the workshop were: Ranjeev Misra (IUCAA), Gazi A. Ahmed, Pranjupriya Goswami, Rulaiya Khattoon, and Kabita Deka (all from Tezpur University). The workshop focussed on X-ray/Gamma-ray and IR data

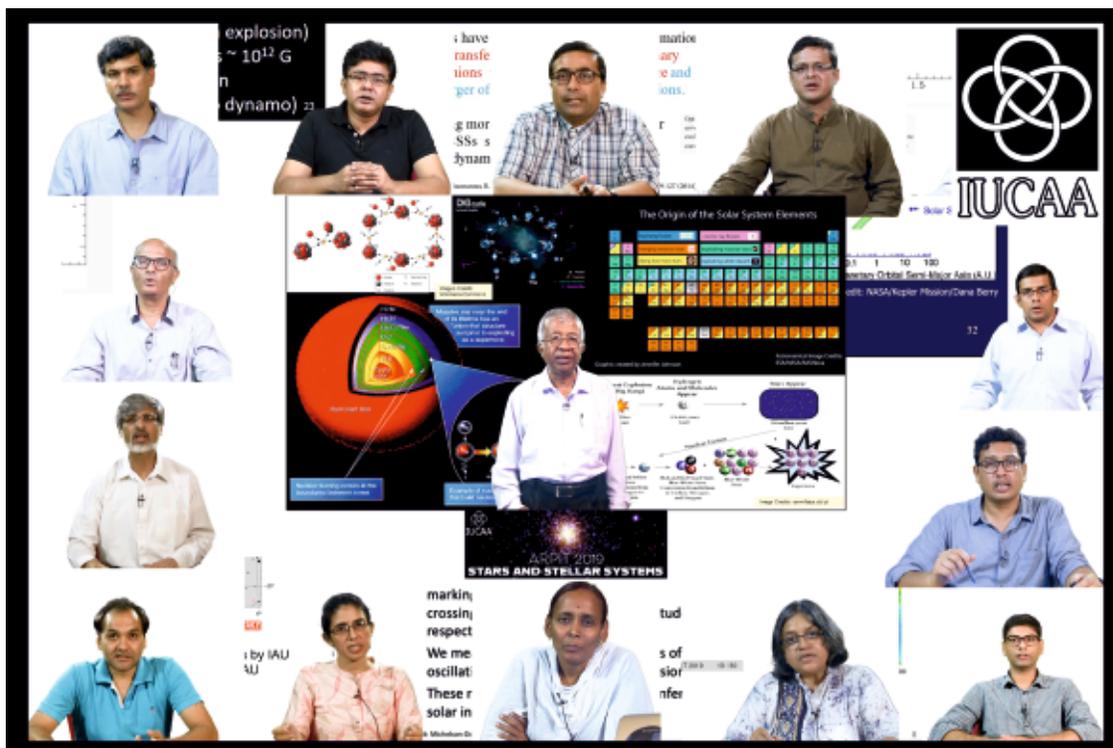
analysis. The programme consisted of mixture of practical hands-on data analysis sessions, exciting science talks, and complementary skills training. Priority was given to hands-on sessions of data-analysis. The outstation participants were provided with free accommodation during this workshop. The coordinators of the workshop were Ranjeev Misra, Gazi A. Ahmed, and Ankur Gogoi (Jagannath Barooah College, Jorhat).



## Astronomy Centre for Educators Annual Refresher Programme In Teaching (ARPIT) 2019

The National Resource Centre (NRC) for Astronomy and Astrophysics hosted by IUCAA has developed an online course titled 'Stars and Stellar Systems' for ARPIT 2019-20. The course consists of 36 videos spread across 10 modules, along with multiple-choice questions after each section for each video and suggestions for further readings. The modules covered a wide range of topics in the field ranging from basic properties of stars and stellar evolution to advanced topics of helio- and astro-seismology, and the exciting and rapidly developing field of exoplanets. These video presentations were made by 13 resource persons from 8 institutions of higher

education and research spread across the country. They have highlighted recent developments in the respective areas while also touching upon the basic required pedagogy, and emphasising emerging areas in the field. The image is a collage of the resource persons along with the Coordinator of the course. The ACE staff involved in making this online course are Prakash Arumugasamy, Manojendu Choudhury, Sushan Konar, and Dhruva J. Saikia (Coordinator), with Aniket Kadu and Shivraj Kshatriya as video editors. The videos were filmed at the Science Media Centre of IISER, Pune. These videos are presently available via the Swayam platform.



## Welcome to ...

### Nishant K. Singh



Nishant K. Singh, who has joined IUCAA in September 2019, as Assistant Professor, obtained his PhD in 2012 under the aegis of the Joint Astronomy Programme of the Indian Institute of Science, Bengaluru, and carried out the thesis work at the Raman Research Institute under the supervision of S. Sridhar. Singh did post-doctoral works at IUCAA (2012 - 2013), Nordic Institute for Theoretical Physics in Stockholm (2013 - 2016), and at the Max Planck Institute for Solar System Research in Goettingen, where he was a Max-Planck-Princeton-Center Fellow (2017 - 2019). He works in the areas of magneto-hydrodynamics, and astrophysical fluid dynamics. His current research includes, dynamo theory to understand the origin of cosmic magnetic fields; some aspects of solar physics, especially the sunspot formation and helio-seismology; and turbulent convection. He is also interested in the warm dark matter paradigm of galaxy formation.

### Tek Prasad Adhikari



Tek Prasad Adhikari, who has completed MSc in Theoretical Physics from the Tribhuvan University, Kathmandu, Nepal in 2011. He obtained PhD degree with distinction from the Nicolaus Copernicus Astronomical Center of the Polish Academy of Sciences (NCAC PAS) in Warsaw, Poland in 2018. During his PhD research, he was mainly involved in the study of the emission and absorption gas present in the vicinity of the super-massive black hole in the Active Galactic Nuclei (AGNs). In particular, his works have provided constraints on the density and ionization properties of emission and absorption matter in the AGN environment. Recently, his PhD thesis has been awarded with “Springer Thesis Award” by the Springer Nature Publication, Switzerland, and published as a book. After obtaining PhD, he continued working as a Post doctoral Fellow (PDF) for a year at the NCAC PAS before joining IUCAA in August 2019 as a PDF. In IUCAA, he is continuing research on AGN emission and absorption gas by using numerical techniques to model the process of photoionization operating in emitting/absorbing regions in AGN. He is interested to test his models using X-ray observations performed with instruments on board in X-ray satellites. Apart from the regular scientific works, he is also interested in studying the history of scientific developments and its popularization among the general public.

### Ramkishor Sharma



Ramkishor Sharma, who has completed BSc from the University of Delhi in 2012, MSc from Jawaharlal Nehru University, New Delhi in 2014, and PhD from the University of Delhi in 2019. He has joined IUCAA as a Post-doctoral Fellow in September 2019. His research interest lies in the general area of early universe cosmology, and he is interested in studying the primordial origin of magnetic fields and gravitational waves of cosmological origin. During his PhD, he has worked on inflationary generation of magnetic fields: both helical and non-helical, particle production via Schwinger mechanism in de Sitter spacetime. Currently, he is working on the generation of gravitational waves in the context of primordial magnetic fields generated in the model.

## Sajal Mukherjee



Sajal Mukherjee, who has joined IUCAA as a Post-doctoral Fellow in July 2019, has completed his Masters (2015), and PhD (2019), both from the Indian Institute of Science Education and Research (IISER), Kolkata. His primary research interest includes the study of binary systems with extreme or intermediate mass ratio and their astrophysical implications. During his PhD, he studied the motion of extended objects with higher order multi-pole structure, which serves as an important tool to probe these binaries analytically. His works can be useful to understand what additional features these objects bring into various well-known results in particle phenomenology. Presently, he is working on gravitational waves from eccentric binaries and testing general relativity with gravitational-wave astronomy.

## Welcome to...

**Partha Pratim Deka, Priyanka Gawade, Suprovo Ghosh, Tathagata Ghosh, Kishore Gopalakrishnan, Kavita Kumari, Sukanya Mallik, Ankush Mandal, Meenakshi, Bikram Keshari Pradhan, V. Premvijay, Yasa Shiva Rama Krishna Reddy, and Soumya Roy,** who have joined IUCAA in July 2019 as Research Scholars.

## Farewell to . . .

- **Konstantinos Kolokythas**, who left IUCAA at the end of his tenure as a Post-doctoral Fellow.
- **Yogesh Chandola**, who left IUCAA to join the Purple Mountain Observatory, Nanjing, China .
- **Sreenath V.**, who left IUCAA to join the National Institute of Technology, Suratkal.
- **Sk. Javed Rana**, left IUCAA at the end of his tenure as a Research Scholar.

## Colloquia

- 04.07.2019: R. Srikanand, on *Quasar spectra as a probe of high-z galaxies*.
- 18.07.2019: Nissim Kanekar, on *Cold gas at high redshifts*.
- 01.08.2019: Debarati Chatterjee, on *Theoretical modelling: An essential tool for confronting neutron star observations*.
- 13.08.2019: Abhay Ashtekar, on *Loop quantum gravity: Basics and some recent advances*.
- 22.08.2019: Roland Bacon, on *Galaxies at high z: The MUSE revolution*.
- 18.09.2019: Luciano Rezzolla, on *The first image of a black hole*.
- 26.09.2019: S. Sridhar, on *Theory of spiral structure in disc galaxies*.

## Seminars

- 10.07.2019: Ramya Anche, on *Optical polarimetry using next-generation 30 m class telescopes*.
- 24.07.2019: Bhooshan Gadre, on *Building faster models for gravitational waves from precessing binary black hole mergers*.
- 31.07.2019: Ritam Mallick, on *Gravitational waves from phase transition in neutron stars*.
- 07.08.2019: Prakash Gaikwad, on *Effect of non-equilibrium He II reionization on IGM at  $2 \leq z \leq 4$* .
- 14.08.2019: Sonali Sachdeva, on *Formation of disc galaxies around redshift 2*.
- 21.08.2019: Avinash Deshpande, on *The attempts to detect the global spectral signature of the cosmic dawn*.
- 28.08.2019: Basundhara Ghosh, on *Loop contributions to angular power spectra*.
- 25.09.2019: Rana Nandi, on *Journey through a neutron star: From crust to core*.

## Public Outreach Activities

### Events at IUCAA

#### Moon Landing Anniversary

On the occasion of the 50th anniversary of first human landing on the Moon, IUCAA SciPOP organised a special event for school students on July 20, 2019. About 60 students from low profit/under privileged schools visited IUCAA, and learnt about the Apollo missions, India's own Chandrayaan missions, and had fun with activities like crater making, a photograph with the picture of first human footprint on the moon.



#### Teachers Training for Rural Schools near IGO

A two day workshop for secondary school teachers from rural area in and around IUCAA Girawali Observatory was held during July 29 - 30, 2019. On the first day, there were demonstrations of science toys along with hands-on activities related to the topics: sound and light. This was followed by introduction to optics and telescopes with an evening sky-watching session. On the second day, there were lectures on textbook astronomy, hands-on astronomy, and role plays. The workshop was coordinated by Rupesh Labade and Sonal Thorve.



## Teaching with Science Toys

A full day science toys workshop for volunteers was held on August 22, 2019. All the volunteers were given material kits to make 10 toys. The topics: sound, optics, electricity, motion, force, work and energy were covered in the session. Demonstrations of 20 to 25 toys were given with a brief instruction on how to use these toys in teaching textbook science and even more. The selected toys were connected with the existing science curriculum of the classes 8, 9 and 10, which would be helpful for the teachers and the volunteers in the classroom. The workshop was coordinated by Shivani Pethe and Rupesh Labade.



## Events outside IUCAA



### Science Toys Demonstration

IUCAA SciPOP personnel organised a Science Toys Demonstration at Devrukh on July 25, 2019. Shivani Pethe coordinated and conducted the demonstration.

### Teachers' Training Programme, at Satara

IUCAA SciPOP personnel, with the help of Rayat Shikshan Sanstha, Satara region, organised a teachers' training programme during August 26 - 27, 2019, at Satara for science teachers from Zilla Parishad schools. About one hundred teachers from different talukas of district Satara participated enthusiastically in the training programme. These teachers discovered how basic concepts of Physics and Astronomy could be taught using simple hands-on activities. Sonal Thorve coordinated the programme. Rupesh Labade, Shivom Gupta and Maharudra Mate were the resource persons.



### Teachers' Training Programme, at Pimpri

IUCAA SciPOP personnel, with the help of Pimpri - Chinchwad Science Park, organised a teachers' training programme at Pimpri - Chinchwad Science Park, Pimpri, on August 29, 2019, for science teachers. Sixty teachers from different Zilla Parishad and Municipal Corporation schools participated enthusiastically in the training programme. These teachers discovered how basic concepts of Physics and Astronomy could be taught using simple hands-on activities and role-plays. Rupesh Labade and Sonal Thorve coordinated and conducted the training.



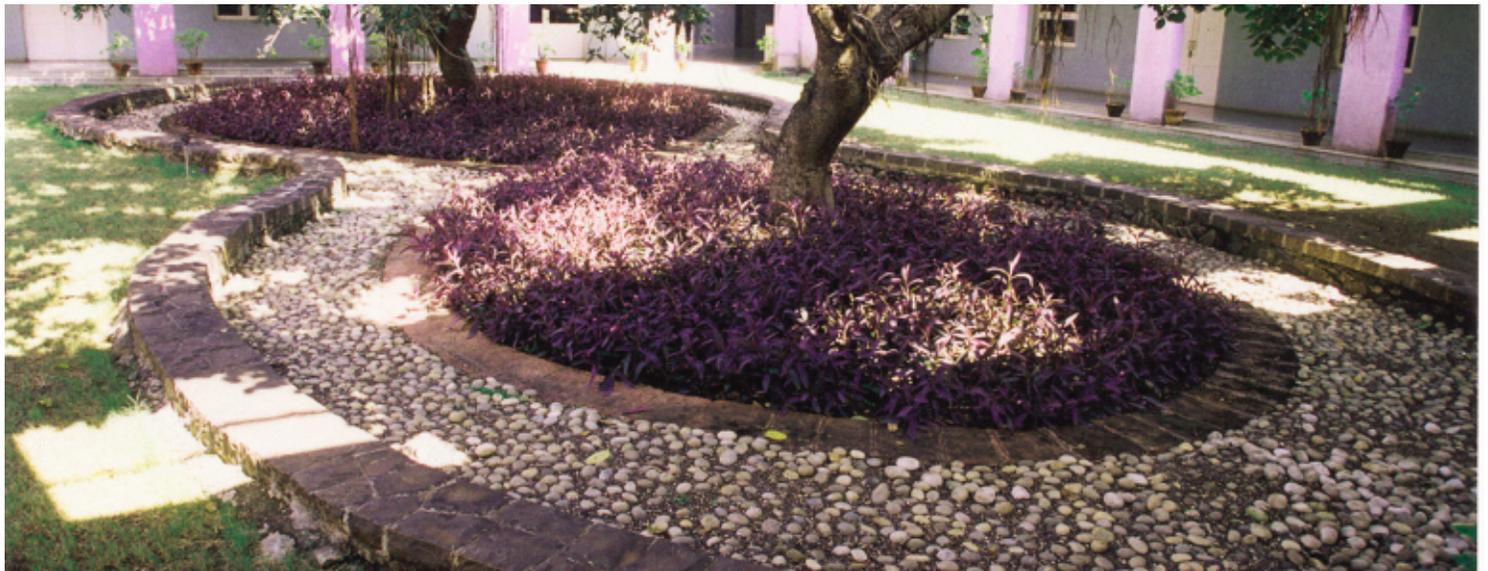
## Workshop on Annular Solar Eclipse

On the occasion of upcoming solar eclipse on December 26, 2019, that will be visible from most parts of India, a workshop was organised during September 27 - 28, 2019, by KPRIET, Coimbatore in association with Galileo Science Club and IUCAA SciPOP. During the workshop, a guest lecture on 'Solar Eclipse and How to Observe it Safely' was delivered by Sonal Thorve. About 200 college students of the Science Club attended the talk and enthusiastically participated in the interactive session.

On September 28, the programme included various talks, and activities for school students and teachers. About 350 students from classes 5 to 12, from government schools in Tamil Nadu participated in the training and enjoyed the day. Following the talks on 'Solar Eclipse 2019' and 'Wonders of Universe', school students were indulged into different



activities. The activities involved: understanding Moon's phases and eclipses using role-play, understanding time-zones using role-play, making of a ball-mirror projector to observe the Sun safely. Observing the Sun using other projection methods was also demonstrated.



## Telescope Making Workshops

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IUCAA SciPOP in collaboration with Vigyan Prasar, New Delhi, conducted a Telescope Making Workshop at Navodaya Vidyalayas, Hyderabad, during July 5 - 22, 2019. Tushar Purohit was the resource person. Totally 41 large (5 inch) reflecting telescopes were made by school teachers and students.

## LIGO - India and TMT Outreach Week

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The team of outreach personnel from IUCAA were representing the LIGO-India and the Thirty Meter Telescope (TMT) projects at the Vigyan Samagam Science Mega projects exhibition at Bengaluru. With 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 demonstrations have been put together by them. These are now a part of a grand pavilion showcasing Mega projects having India in a major partnership. Many volunteers have also been trained to explain the posters and exhibits to all visitors.

The special Outreach Week of LIGO-India, during August 13 - 17, 2019, was coordinated by Vaibhav Savant with Ankit Bhandari and Rameshwar Bankar. The events included 5 talks for the general public and students by several scientists. Live/interactive demonstrations like Space Quest, Black Hole Pong, Stretch and Squash, LIGO-in-your-hands were arranged. Also, other interferometers were arranged for the visitors.

For celebrating the TMT Outreach Week, during September 17 - 21, 2019, Samir Dhurde (as coordinator), Shivani Pethe and Rupesh Labade performed a special themed play combined with science demonstrations. 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!

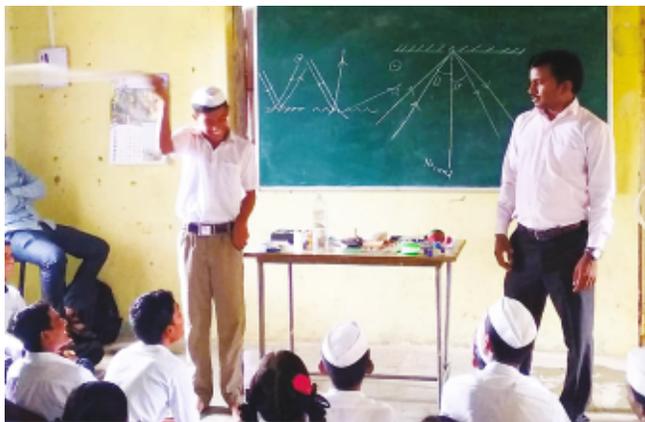


## Rural Outreach Events

During July - September 2019, science toys demonstrations and workshops were conducted at different schools in different places, nearby IGO. These schools were at Kanhur-Mesai, Nirgudsar, Pargaon, and Manchar. Around 500 students from rural schools enjoyed learning science through toys. All the events were coordinated and conducted by Rupesh Labade.

On September 3, 2019 a special session was conducted at Annasaheb Awte College, Manchar. The topic was Unravelling Science through Experiments and Models. About 130 BSc students were present for this session. This session was arranged by the college under Rayat Inspire Scheme. Rupesh Labade coordinated and conducted the session.

IUCAA Rural Outreach team was invited to give a talk and demonstrations on Chandrayaan - 2 on September 7, 2019 at C.T. Bora College, Shirur. The talk included information about IUCAA Activities, Guidance on Careers in Astronomy, and Exchange of Ideas with the students about the Chandrayaan - 2 landing and future missions of India. About 200 students, teaching and non-teaching staff were present. Models designed and built by Jyotirvidya Parisansta, Pune were used for demonstration purposes. Rupesh Labade coordinated the event with the help of Atharva Pathak.

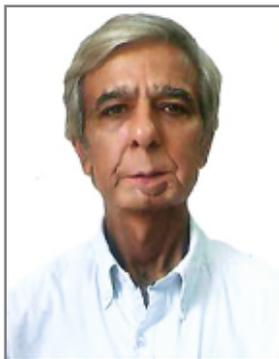


## Other Regular Events

- The IUCAA Public Outreach team has conducted 3 science toys workshops, 2 basic astronomy workshops and 10 campus visits with an approximate reach to about 750 people.
- Second Saturday Lecture Demonstration Programme : July 13: Jayant Narlikar (IUCAA) on Why Study Astronomy?
- All talks are available at our YouTube channel: <https://www.youtube.com/user/IUCAASciPOP/>

## Obituary

### Professor Pran Nath Pandita



Professor Pran Nath Pandita, who was a Visiting Associate of IUCAA from 1999, passed away on June 12, 2019 at Pune, at the age of 70, following a long illness. He and Mrs. Pandita have for long been familiar faces in IUCAA. They visited frequently, were always pleasant and courteous to everyone, but largely kept to themselves. He spoke only when he had to, in his characteristic gravelly voice, always with authority and conviction. He worked very hard and fruitfully, even through his long illness, as can be seen from his many publications, visits, talks and other academic activities, and the many recognitions he received.

I first met Professor Pandita when I was a research student at TIFR, Mumbai, and he was a Visiting Fellow there, I believe, with Professor Virendra Singh. He came to TIFR after his PhD and post-doctoral work in Srinagar, Jammu and Kashmir, in particle physics. After spending two years in TIFR, Professor Pandita got a faculty position in North Eastern Hill University (NEHU) in Shillong, which was then a new university, where he remained until retirement. After that, he was first a Raja Ramanna Fellow, and then an INSA Senior Scientist, until his passing away, at the Centre for High Energy Physics (CHEP) at the Indian Institute of Science, Bengaluru.

Professor Pandita was a very accomplished and productive physicist. His early work was on scattering phenomena in particle physics, which was very much in vogue in those years. He later switched to supersymmetric theories, in which he worked for many years, making notable contributions. He has also made important contributions to statistical physics and Higgs physics (A summary of Professor Pandita's research can be found in his obituary by Professor B. Ananthanarayan in Current Science, July 10, 2019, Vol. 117, p 150). Professor Pandita's contributions are all the more remarkable considering that he worked in relative isolation in NEHU. He had a good network of colleagues and collaborators, of course, and he travelled widely. Nevertheless, the volume and quality of work he did from NEHU should provide inspiration to all those who work away from the main research centres.

Professor Pandita was a highly dedicated and excellent teacher and a very good speaker. He was a member of various important national and institutional committees, including the Scientific Advisory Committee of IUCAA. He was well recognised for his work, receiving the Humboldt Fellowship, the J. C. Bose Fellowship, and the Raja Ramanna Fellowship amongst several other honours and awards. He was a Fellow of all three national academies in the country. In Professor Pandita's passing away, IUCAA has lost one of its most dedicated and productive Visiting Associates.

**Ajit Kembahvi**  
Former Director, IUCAA

## Visitors (July - September 2019)

Reena Ahuja, Mohammad Akhlaghi, Aryan Amar, Ramya Anche, Warren Anderson, G.K. Ankush, H. M. Antia, Akash Anumarlapudi, G.C. Anupama, K.G. Anusree, K. Aravind, Raghav Arora, Abhay Ashtekar, Abdul Aziz, Roland Bacon, Kalyani Bagri, Priyadarshini Bangale, Sudhanshu Barway, Swetha Bhagwat, Arun Bhardwaj, Anusha Bhasari, Naseer Iqbal Bhat, Sajad Ahmad Bhat, R. C. Bhatt, Parag Bhattacharya, Sudip Bhattacharyya, Arun Kumar Bidhan, K.G. Biju, Aparna Bisht, Nikhil Pratap Bisht, Promila Biswas, Ritabrata Biswas, Suparna Biswas, Sonali Borah, Anshuman Borgohain, Koushik Chakraborty, Nabajit Chakravarty, Debarati Chatterjee, Asis Kumar Chattopadhyay, Ayesha Chaudhary, Robin Choudhary, Kishalay Choudhury, Tanushree Chowdhury, Mamta Dahiya, Swagat R. Das, Bipash Dasgupta, Sukanta Deb, Deepak, Saloni Deepak, Avinash Deshpande, Sapam Gayatri Devi, Kallol Dey, Prasun Dhang, Suraj Dhiwar, Payaswinee Dhoke, Rahul Dhurkunde, Suprio Dubey, Jayanta Dutta, Rebecca Fairbairn, Bhooshan Gadre, Prakash Suryakant Gaikwad, Rafael Antonio Garcia Mar, Akash Garg, Suyog Garg, Basundhara Ghosh, Bidisha Ghosh, Sabyasachi Ghosh, Sumit Ghose, Sushant G. Ghosh, Tuhin Ghosh, Gourab Giri, Sunetra Giridhar,

Dhruba Jyoti Gogoi, Pranjudpriya Goswami, Umananda Dev Goswami, Aruna Govada, Milind Gowardhan, Ajesh Gulati, Brajesh Gupta, Rahul Gupta, Saumya Gupta, Shraavan Hanasoge, Manish Hiray, Jyotishree Hota, Nikhil Hulke, Nazma Husain, K. Indulekha, Joe Jacob, Dhairyashil Jagadale, Bithika Jain, Nandita Kalita, Sanjeev Kalita, Nissin Kanekar, Shreejaya Karantha, Krishnaswamy Kasturirangan, Sanika Khadkikar, Rukaiya Khatoon, Gopal Krishna, Dilip Krishnaswamy, Lokesh Kumar, Prayush Kumar, Saurabh Kumar, Kerdaris Kurbah, Santosh Kushwaha, Ioannis Kypriotakis, Madan Lal, Ashwini Lalke, Clarisa Grijalva Lugo, Raghu Prasad M., Sreelakshmi M., Zahoor Ahmad Malik, Gitika Mall, Ritam Mallick, Chatriksingh Mangat, Micheal Andrew Manske, Aaqib Manzoor, Sashank Mishra, Shrish Misra, Arabinda Mitra, Anupama Mohanan, Satyanarayan Ray Pitambar Mohapatra, Sneha Prakash Mudambi, Arghya Mukherjee, Ramesh Nagare, Sachindra Naik, Vishnu Namboothiri, Dibyendu Nandi, Rana Nandi, Ankur Nath, Shefali Negi, Evelyn Northover, Kevin Northover, Devendra Ojha, Jishnu P., Arathy Palackal, Sourav Palit, Dimple Panchal, Divya Pandey, Ruchi Pandey, Shravani Pandit, Devendra Pareek, Pardeep Paryani, Sonal Patel,

K.D. Patil, Rohan Pattnaik, Devraj Pawar, Maya Prabhakar, Ananta Charan Pradhan, Ankul Prajapati, Samrit Pramanik, Mahaveer Prasad, Marina Prokopieva, Philippe Prugniel, Annmaria J. Puthur, Frederick J. Raab, Farook Rahaman, M. C. Ramadevi, Rambir, V. Koteswara Rao, Hemant Rathore, B.T. Ravishankar, Divya Rawat, Saibal Ray, Shankar Ray, R. Rayappa, B. Esvar Reddy, Luciano Rezzolla, Sonali Sachdeva, Ram Sagar, Anirban Saha, Sanjay Kumar Sahay, Prasant Kumar Samantray, Saumyadip Samui, Biplob Sarkar, Suchira Sarkar, Abhilash Sarwade, Somasri Sen, Lydia Serto, Vipin Kumar Sharma, Sherehan Shehata, Shraavan Kumar Shetty, Anvar Shukurov, Apurva Singh, Gyan Prakash Singh, H.P. Singh, Jasbir Singh, K. P. Singh, Manvinder Pal Singh, Ashi Sinha, Avinash Sontakke, H. Sree Kanth, S. Sridhar, Mudit Srivastava, Annapurni Subramaniam, Rajalakshmi T.R., Amina Thekkoth, Sivarani Thirupathi, Neal Thomas, Mark Thomson, Ashutosh Tripathi, Anisul Ain Usmani, Raja V., Vanzarmawii, Akant Vats, Sesha Vempati, Murli Manohar Verma, Aditya Vidhate, Sarita Vig, Aditya Vijaykumar, K. VijayRaghavan, R.G. Vishwakarma, Rahul Kumar Walia, Bal Krishna Yadav, and Lalthakimi Zadeng.

## Visitors Expected

### October 2019

Gazi Ameen Ahmed, Tezpur University; Arunima Banerjee, IISER, Tirupati; Souradeep Bhattacharya, ESO, Garching, Germany; Swadesh Chand, Guru Ghasidas Central University, Bilaspur; Kabita Deka, Tezpur University; Prabir Gharami, Jadavpur

University, Kolkata; Koushik Ghosh, The University of Burdwan; Pranjudpriya Goswami, Tezpur University; Atanu Guha, BITS-Pilani, Goa; Safiqul Islam, Home Department, Government of West Bengal, Kolkata; Annu Jacob, IIA, Bengaluru; Joe

Jacob, Newman College, Thodupuzha; Mehedi Kalam, Aliah University, Kolkata; Sheeraz Ahmad Khanday, University of Kashmir, Srinagar; Nitesh Kumar, University of Delhi; Ashish Mahabal, Caltech, USA; Soma Mandal, Government Girl's General Degree

College, Kolkata; Shivam Munshi, Neotech College of Applied Science and Research, Vadodara; Masum Murshid, Aliah University, Kolkata; P. R. Neha, Baselius College, Kottayam; Mahadev Pandge, Dayanand Science College, Latur; Amit Pathak, BHU, Varanasi; B. C. Paul, North Bengal University, Siliguri; Nupur Paul, Jadavpur University, Kolkata; Devraj Pawar, RJ

College, Mumbai; Raj Prince, Raman Research Institute, Bengaluru; Nilofar Rahman, Aliah University, Kolkata; Shantanu Rastogi, DDU Gorakhpur University; B. S. Ratanpal, The MS University of Baroda, Vadodara; Margarita Safonova, IIA, Bengaluru; Gokul Saha, Gokhale Memorial Girls College, Kolkata; Asoke Sen, Assam University, Silchar; Vishant Shah, The

MS University of Baroda, Vadodara; Ranjan Sharma, Cooch Behar Panchanan Barma University, Cooch Behar; Rajalakshmi T. R., Mahatma Gandhi University, Kottayam; Madhavan Varadarajan, RRI, Bengaluru; Pawan Vynatheya, IISER, Kolkata; and Paul Wiita, The College of New Jersey, USA.

## November 2019

G. Ambika, IISER, Tirupati; Tomaso Belloni, INAF-Brera, Italy; Mahasweta Biswas, IEST, Shibpur; Mahesh Chandna, BN University, Udaipur; Philip Charles, University of Southampton, UK; K.P. Harikrishnan, The Cochin College, Kochi; Rinku Jacob, Rajagiri School of

Engineering and Technology, Kakkanad; Rutu Kale, NCRA, Pune; Sujay Mate, IRAP Toulouse, France; Ashish Meena, IISER, Mohali; Manjusha P.V., Government College, Madappali; Gabriele Ponti, INAF-Brera, Italy; Prajesh Purohit, BN University, Udaipur;

Pooja Singh Rathore, BN University, Udaipur; Jean Surdej, University of Leige, Belgium; Arman Tursunov, Silesian University in Opava Czech Republic; and Vanzarmawii, Mizoram University, Aizawal.

## December 2019

Gargee Chakraborty, Amity University, Kolkata; Goutami Chattopadhyay, University of Calcutta, Kolkata; Surajit Chattopadhyay, Amity University, Kolkata; Broja Gopal Dutta, Rishi Bankim Chandra College, East Kantalpara; G. K. Goswami, Kalyan P. G. Autonomous College, Bhilai; Soumen Mondal, Jadavpur University, Kolkata; Nikhil Mukund, AEI, Hannover, Germany; B. C. Paul, North Bengal

University, Siliguri; Anirudh Pradhan, GLA University, Mathura; R. P. Prajapati, Guru Ghassidas Vishwavidyalaya, Bilaspur, Chattisgarh; Anisur Rahaman, Hoogly Mohsin College; Chayan Ranjit, Egra SSB College, Purba; Sujata Kundu Ranjit, Narula Institute of Technology, Kolkata; Prabir Rudra, Asutosh College, Kolkata; Umesh Kumar Sharma, GLA University, Mathura; Vikram Soni, Jamia Millia

Islamia, New Delhi; Vandna Srivastava, MIET, Meerut; Alexei Starobinsky, Landau Institute for Theoretical Physics, Moscow, Russia; Alexei Toporensky, Moscow State University; Gunjan Varshney, GLA University, Mathura; Gautam Venugopalan, Caltech, USA; and R. G. Vishwakarma, Universidad Autonoma de Zacatecas, Mexico.

## Long Term Visitors

Ajesh Gulati, TMT Project Office, USA; Ninan Sajeeth Philip, Artificial Intelligence Research and Intelligence Systems, Theliiyoor; Adarsh Ranjan, Pune; A. R. Rao, Mumbai; and Sravani Vaddi, Pune.

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