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The 29th Foundation Day Lecture

IUCAA Foundation Day Lecture was delivered on Friday, December 29, 2017, by Professor Partha P. Majumder, Distinguished Professor at the National Institute of Biomedical Genomics, Kalyani, West Bengal. Professor Majumder has an illustrious scientific career shaped largely at the Indian Statistical Institute (ISI), Kolkata, where he completed his B.Sc., M.Sc., and then obtained a Ph.D. degree in Statistics in 1982. After a few stints abroad, he then returned to ISI as Professor, and later Head of the Anthropology and Human Genetics Unit. He is an internationally recognised expert, whose research interests focus on human genome variation and statistical genomics. He is a Fellow of all the three major Indian Scientific Academies and has won several awards, including the New Millennium Research Medal, awarded by the Indian Science Congress Association and the CSIR; the TWAS Prize in Biology awarded by The World Academy of Sciences for the advancement of science in developing countries, Trieste, Italy; the Society of Biotechnologist's M.V. Pylee Lifetime Achievement Award for original contributions to Biotechnology, among many others. Professor Majumder was the Director of the National Institute of Biomedical Genomics, during 2010 - 2016, and continues there as a Distinguished Professor.

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Congratulations to...

Sanjeev Dhurandhar on being *awarded NASI-Senior Scientist Platinum Jubilee Fellowship (2018).*

Arvind Gupta on being *conferred the Padma Shri by the Government of India.*

Varun Sahni on receiving the ***Homi Jehangir Bhabha medal*** from the President of the Indian National Science Academy on December 27, 2017.

Varun Sahni on being elected as a ***Fellow of The World Academy of Sciences (TWAS).***

Jayant Narlikar on being conferred with the ***Bharat Asmita Vigyaan - Tantragyaan Shreshtha Award 2018*** by MIT World Peace University, Pune.

Professor Majumder's lecture was titled, **"Our Footprints on the Sands of Time"**. Traditionally human evolution was reconstructed using fossil evidence. Recent advances in molecular and statistical genetics have enabled the reconstruction of human history by studying the DNA of living human. DNA evidence has complemented fossil evidence to show that humankind evolved in Africa. DNA studies have also enabled tracing of human migrations and timings of major migration events. These studies have revealed that one of the earliest migrations out of Africa was into India, and India, therefore, occupies a centre-stage in human evolution. There have been subsequent migrations into India that have resulted in social and ethnic sub-structuring. Naturally, therefore, it is of interest to estimate the number of ancestral populations that have admixed to result in contemporary diversity of Indian peoples. Professor Majumder presented recent results on DNA evidence gathered by his own research group, which reveal four such ancestral populations, contrary to the previous notion that there were only two. Moreover, he showed that, by analyzing DNA of modern and archaic (e.g., Neanderthal) human, it has been possible to test some hypotheses pertaining to extinction of archaic human. He presented arguments favouring the hypothesis that the Neanderthal population integrated into the modern human population through mating rather than conflict. He ended his lecture with a lively question-and-answer session with the audience.

International Workshop on Post-Planck Cosmology: Enigma, Challenges and Visions

We stand at a very historic stage in cosmology. Exquisite cosmological measurements, in particular, of the CMB anisotropy and its polarisation have converged, rather robustly, onto a concordance cosmological model. The model, however, is enigmatic, with many unknowns. It raises more questions, many of which can be answered decades of much deeper quest employing the best of theoretical and experimental prowess at our disposal. A range of exciting observational frontiers with great promise have become available to push our understanding of the cosmos to even deeper levels. An international workshop, titled, 'Post-Planck Cosmology: Enigma, Challenges and Vision' was conducted at IUCAA during October 9 - 11, 2017. The workshop was aimed to bring together researchers to carefully assess our current status and deliberate on various aspects of this basic theme.

There were about 70 participants, consisting of Indian researchers, together with a large number of very renowned international scientists across the spectrum of cosmology. The workshop began with an opening talk by Francois Bouchet (IAP, Paris) on the status of post-Planck cosmology. Next generation cosmology missions stand on the shoulders of the current knowledge and promise to bring the unexplored scientific knowledge and fortify the understanding of the Universe. Jacques Delabrouille (APC, Paris) outlined the requirements and promises of future CMB space missions. The ground based effort pave the technology that can be employed in future CMB missions. Zeeshan Ahmed (Stanford University) reviewed the ongoing highly sensitive ground based CMB observations and plans for the CMB Stage-4 concerted effort from the ground in the field. Rishi Khatri (TIFR, Mumbai) provided an overview of the rich cosmological information that can be gleaned from CMB spectral distortion measurements.

Ground based efforts in India related the CMB spectral distortion measurement pursued at Raman Research Institute, Bengaluru was presented by Ravi Subrahmanyan and other group colleagues in a set of talks. Tirthankar Roy Choudhury (NCRA, Pune) covered the status of our understanding of the epoch of reionization in the universe. Carlo Baccigalupi (SISSA) talked about the observations of diffused polarised foreground that challenge the future measurements of cosmic signals. Tuhin Ghosh (NISER, Jatni, Odisha) reviewed the observation and understanding of the polarised dust emission gathered from the Planck observations. Exciting developments with advance inference techniques applicable to the CMB and large scale structure observation featured in an exciting remote presentation by Benjamin Wandelt (IAP, Paris). There were talks on the enigmatic anomalies seen in the Planck CMB maps and

other observable exotic effects. There were many shorter and contributed talks on aspects of CMB science, large structure studies and the understanding of t he early universe.

Local large structure observations leading to exciting new discovery of a massive supercluster was presented by Somak Raychaudhury (IUCAA). The meeting featured Roy Maartens (University of Portsmouth) on the promise of 21cm cosmology with the Square Kilometre Array under construction. Renan Barkana (Tel Aviv) reviewed the theoretical promise of 21cm cosmology as a probe of the first stars in the universe. Chris Messenger (Cardiff University) talked about the promise of the new born gravitational wave astronomy for cosmology. There were also talks on the status of inflation by L. Sriramkumar (IIT Madras), with some string theory motivated aspects covered by Koushik Dutta (SINP, Kolkata). Bharat Ratra (Kansas State University) and Paul Steinhardt (Princeton University) (remote presentation) provided balance to the meeting by putting forward in very thought provoking talks on shortcomings and alternate points in the majoritarian view of current status of cosmology. The path of the future missions is promising, but extremely challenging, and hence requires sophisticated scientific tools, data analysis techniques, and theoretical understanding to reach the next landmark of our understanding of the Universe. There were a number of shorter talks on various aspects of the same.

The meeting lived to its promise of covering a broad range of very contemporary topics at the forefront of current cosmology. It also featured a panel discussion on the future of CMB related studies and efforts that could be taken in that direction. The workshop was co-organised by Suvodip Mukherjee (Centre for Computational Astrophysics, New York) and Tarun Souradeep and Sanjit Mitra (IUCAA).

Professor K.S.V.S. Narasimhan Memorial Award

Professor K.S.V.S. Narasimhan was a frequent visitor at IUCAA. He had deep interests in Astronomy and Astrophysics and taught Mathematics and Statistics for three decades at The New College in Chennai. After his sad demise, his family has left a generous endowment for deserving students to help them embark on a research career and in this way contribute to the field he loved so much.

Applications are invited for the Professor K.S.V.S. Narasimhan Memorial Award from an Indian University student for financial support to attend International Astronomy meetings. The support will be limited to about Rs.70,000/- towards international travel/accommodation and/or registration fee. The student should have an invitation to either speak or give a poster presentation at the meeting, and be registered for a Ph.D. in Astronomy and Astrophysics (or related areas) with an Indian University.

The application should consist of: (i) Bio-data with communication e-mail address, (ii) Proof of acceptance of presentation, (iii) Abstract of the talk/paper/poster to be presented, (iv) Estimate of the total cost, (v) Other sources of funding, if any, and (vi) A letter of recommendation from the Ph.D. thesis supervisor. Applications will be considered twice a year with deadlines March 31, and June 30, and should be sent by e-mail to The Administrative Officer (Core Programmes), IUCAA (aocp@iucaa.in).

International Workshop on AstroSat View of AGN Central Engines

Active Galactic Nuclei (AGN) are truly multi-wavelength objects. A long quest of AGN studies has been to measure the Spectral Energy Distribution (SED) and variability of AGN in different bands. The Indian multi-wavelength satellite AstroSat with broadband spectral coverage from Optical/UV to hard X-rays is observing bright AGN, and making significant contribution to AGN physics. An International Workshop on AstroSat View of AGN Central Engines was organised at IUCAA during December 18 - 21, 2017.

The workshop gathered experts in AGN physics and AstroSat. Nearly 70 participants, including 15 from outside India, and 12 from Indian Universities attended the workshop. There were a total of 42 talks, including 10 review talks, which dealt with the current status of

our understanding of AGN physics and contribution of AstroSat to AGN science. The meeting discussed physics of accretion disk/corona, relativistic jets based on broadband spectroscopy, and multi-wavelength variability. Four special talks on the analysis of data obtained from AstroSat observations were also arranged. A number of participants presented their results based on AstroSat observations. The workshop also discussed AstroSat observation strategies, and analysis tools relevant to the AstroSat mission. Gulab C. Dewangan was the coordinator.

International Workshop on QSO Absorption Lines

The technique of using quasar absorption lines has emerged as a powerful tool to probe gas in galaxies and address several fundamental questions related to the evolution of galaxies over cosmic time. A three-day International Workshop on QSO Absorption Lines, to discuss the recent advancements in the field and various fundamental questions that can be answered through this technique, was held at IUCAA during December 12 -14, 2017. It was seventh in the series of such workshops, and the venues for the previous meetings were Chicago, Marseille, Paris, Pittsburgh, Colorado and Pune. The workshop returned to Pune after five years and was attended by about 50 researchers.

As Pune is near the Giant Metrewave Radio Telescope (GMRT), which is very important to the detection of neutral hydrogen, the most abundant element in the interstellar medium, the workshop also had several presentations on using HI 21 cm line and the rotation measure technique to probe cold gas content and the strength of magnetic fields in galaxies.

This workshop and the public lectures were jointly organized by IUCAA and the University of Chicago Center at Delhi. To engage with the wider audience, especially undergraduate and school students, two public lectures were organised, one by Raghunathan Srianand, on "Dark Probes of Observable Universe" at IUCAA, on December 12, 2017, and the other by Hsiao-Wen Chen, on "Exploring the Dark Universe" at the University of Chicago Center at Delhi, on December 16, 2017. The workshop was coordinated by Neeraj Gupta, Raghunathan Srianand, Hsiao-Wen Chen and Donald York.

IUCAA-NCRA Radio Astronomy Winter School

Radio Astronomy Winter School (RAWSC) has been organized every year jointly by IUCAA and NCRA. The school is largely meant for under-graduate students in science pursuing B.Sc. (Physics/ Electronics/Astronomy) and Engineering (B.E./B.Tech.). Through lectures and hands-on radio astronomy experiments, the school exposes participants to astronomy in general and radio astronomy in particular. The school has been immensely popular, and so far nine such schools have been organized since 2008. The schools such as this are extremely important for attracting bright students to astronomy, particularly in the wake of Indian astronomical community embarking on several mega-projects such as SKA and TMT.

This year. the 10th RAWSC was organized during December 18 - 26, 2017. There were 30 students from various colleges across the country participated in the school. The school was inaugurated by Somak Raychaudhury, Director, IUCAA. The main focus of the school was the hands-on experiments set up at IUCAA and NCRA Radio Physics Labs: (i) Observations of the Sun using the 4 m telescope to determine the antenna power pattern, (ii) Observations of HI 21 cm line to observe neutral hydrogen from the Galaxy (using 4 m telescope and horn antenna), (iii) Characterization of super-heterodyne receiver, and (iv) Understanding noise fundamentals through Johnson noise. For these experiments, the students were split into five groups. The school also had lectures on astronomy by Joydeep Bagchi (Active Galactic Nuclei), Manjari Bagchi (Pulsars), Sukanta Bose (Gravitational Waves), Jayaram Chengalur (Fundamentals of Radio Astronomy), Yashwant Gupta (SKA), Ruta Kale (Cluster of Galaxies), Divya Oberoi (Sun), Aseem Paranjape (Statistical Methods), Subhashis Roy (HI in the Galaxy, and Interstellar Medium), and Raghunathan Srianand (Galaxy Evolution).

On the last day of the school, the students have presented results from their experiments. The presentations were organized in such a way as to allow exhaustive discussions on the methods used to carry out the observations/experiments and derive the results and errors. A quiz competition, to test the overall understanding of astronomy and astrophysics was also organized. From the feedback of the students, we believe that students thoroughly enjoyed their first exposure to "serious" observing and experimentation!

The highlight of the school, of course, was the trip to the Giant Metrewave Radio Telescope (GMRT), and a special session with Professor Govind Swarup, which was organized specially to celebrate the 10th anniversary of the school, which was coordinated by Neeraj Gupta (IUCAA) and Subhashis Roy (NCRA).

North East Meet of Astronomers (NEMA - III)

The meet of North East Astronomers, jointly organized by Assam Don Bosco University (ADBU), Guwahati, and IUCAA, was held at St. Anthony's College, Shillong, during October 5 - 7, 2017. The aim of the meet was to bring young and highly motivated students, researchers, and teachers of colleges and university from North East region, working or intending to take up research in the field of Astronomy and Astrophysics, and related topics. There were 41 participants from Assam University, Cotton College State University, Tezpur University, Gauhati University, Manipur University, Rajiv Gandhi University, Indian Institute of Technology (Guwahati), North Eastern Hill University, Hojai College, and Assam Don Bosco University.

After the inaugural session and welcome by Albert L. Dkhar, Principal, St. Anthony's College, Monmoyuri Baruah, Head of the Department of Physics, ADBU, gave an overview of NEMA - III, and Ranjeev Misra, from IUCAA, explained the aim and objectives of the series of these meetings.

There were 5 technical sessions, and at the end, a feedback session was conducted by Misra. He also guided the participants on how to prepare an effective presentation. The participants expressed their satisfaction about the meet, and a few post-graduate students mentioned that they were interested to pursue their career in Astronomy and Astrophysics. Baruah and Misra were the conveners of the meeting.

Seminar

04.10.17 Nishikanta Khandai, on **Cosmological hydrodynamical simulations of galaxy formation;**

15.11.17 M. Sami, on **Quintessential inflation;**

22.11.17 Steven Janowiecki, on **Gas-rich and star-poor: Star formation and gas in galaxies across different environments;**

06.12.17 Swetha Bhagwat, on **Can we probe the strong field gravity with black-hole ringdowns?;**

19.12.17 Frank H. Shu, on **Six decades of spiral density-wave theory;**

20.12.17 Joseph Kuruvilla, on the **Streaming model for redshift-space distortions;** and

21.12.17 Andrew C. Fabian, on **X-ray reflection and reverberation around luminous accreting black holes.**

Colloquium

05.10.17 Shravan Hanasoge, on **The impact of rotation on large-scale convection in the solar interior**;

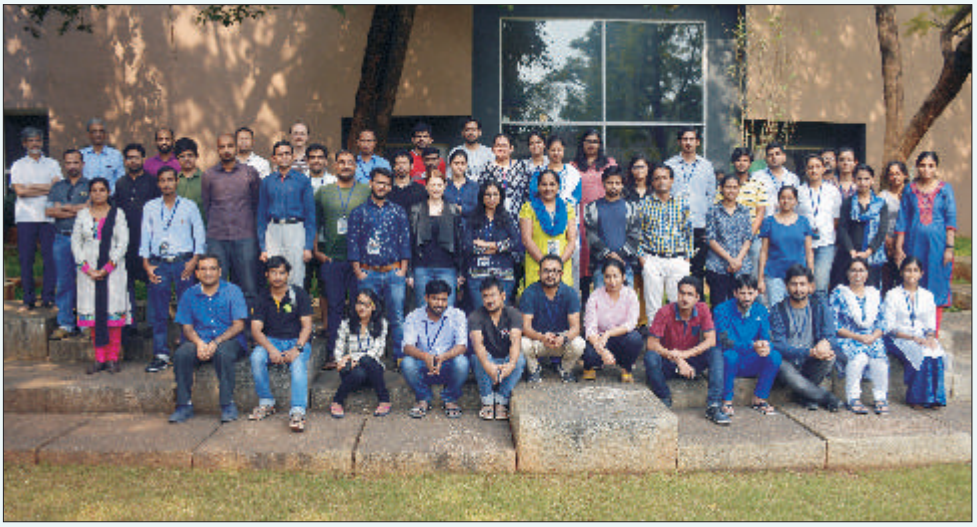
02.11.17 Alex Vano-Vinuales, on **Numerical relativity in the era of gravitational wave astronomy;**

05.12.17 P. Venkatakrishnan, on **Electric currents in emerging flux regions: Observations vs Simulations**;

14.12.17 Jonathan Linton, on **Extracting additional value from fundamental science – understanding and exploiting dual use opportunities;** and

15.12.17 Neal Katz, on **Making galaxy formation great again.**

Workshop on AstroSat Data Analysis



The ISRO sponsored AstroSat Science Support Cell, ASSC (http://astrosat-ssc.iucaa.in/) held an intensive workshop at IUCAA during November 13-26, 2017. The focus of the workshop was on analysis of data from the four pointing instruments on board AstroSat namely, UVIT, SXT, LAXPC and CZTI. Along with lectures on the instruments and their Science goals, the primary part of the workshop was hands-on data analysis sessions where participants analyzed data under the supervision of experts. The workshop was targeted towards Ph.D students, postdocs, faculty members and scientists who plan to analyse AstroSat data. More than 50 participants attended the workshop from different parts of the country as well as from abroad. The participants also provided feedback on AstroSat software and suggestions for improvement.

Workshop on Multi-wavelength Observations Using AstroSat

The workshop on Multi-wavelength Observations using AstroSat was conducted at the Department of Physics and Electronics, Christ University, Bengaluru, during December 14 - 16, 2017, and was mainly intended to young researchers and students, who were interested to pursue Astronomy and Astrophysics as their future career. There were 70 participants, consisting of B.Sc. and M.Sc. students, research scholars and faculty members, of whom 30 were from outstation.

The first talk of the workshop was delivered by Annapurni Subramaniam (IIA, Bengaluru) on Introduction to UVIT, explaining the basic design and performance of UVIT onboard AstroSat. After the tea break, the next talk was given by Snehalata Sahu (IIA) on Study of Globular Clusters using UVIT, and another talk by Chayan Mondal, (IIA) on Study of Star Forming Galaxies using UVIT. The afternoon and evening sessions were dedicated to data analysis using UVIT. The participants were given the opportunity to perform photometry of the galaxy NGC 1851 using UVIT data.

The second day of the workshop was mainly concentrated on talks by Koshy George (IIA) on Science with UVIT, and Ranjeev Misra (IUCAA) on AstroSat: A New Era of Timing Studies. These talks were followed by data analysis sessions using LAXPC payload onboard AstroSat. These sessions were conducted by Misra and Anjali Rao (both from IUCAA). The last talk of the day was on Astronomy Outreach Activities in the Era of Mega Projects, by Joe Jacob (Newman College, Thodupuzha, Kerala), who introduced the participants to the new existing and upcoming mega projects like TMT, SKA, LIGO-India, etc. He insisted on the involvement of students and researchers into outreach activities so that we can build necessary manpower to work with such new mega projects and enjoy their benefits.

The last day of the workshop was dedicated to data analysis sessions using LAXPC. The last talk of the workshop was delivered by C. S. Stalin (IIA) on Observing with UVIT: How to Submit Proposals. There was a brief valedictory function, which was chaired by George Thomas, Head of the Department of Physics and Electronics, Christ University. Misra conducted an interactive session with the participants to get feedback and innovative ideas to conduct similar workshops in future. The feedback received from the participants suggested that the conference was a great success. Misra and Paul K. T. (Christ University) were the coordinators.

Workshop on Blackholes: From Classical to Quantum Gravity

A workshop titled, Blackholes: From Classical to Quantum Gravity was held in honour of the eminent relativist Professor C.V. Vishveshwara, at IIT, Gandhinagar's campus by the Sabarmati, during December 15 - 19, 2017. The workshop was successful in bringing the leading experts like Sanjeev Dhurandhar (IUCAA), Ajith Parameswaran (ICTS-TIFR, Bengaluru), Amitabh Virmani and Alok Laddha (CMI, Chennai), Gautam Mandal and A. Gopakumar (TIFR, Mumbai), who have been working in various aspects of relativity theory, to deliver lectures for Ph.D. student and post-doctoral fellows from various Universities and Research Institutes in India. The academic programme of this workshop had a strong focus on contemporary topics in black hole physics, both theoretical and observational, and included topics such as Blackholes from group theory, Geometry and Symmetry in Gravitational Waves data analysis, Soft Graviton Theorems, and Physics and Astrophysics of blackholes using Gravitational Waves observations. The schedule of lectures was designed to promote a wide range of discussions between the participants and experts. A special lecture on the life and works of Professor Vishveshwara was delivered by Naresh Dadhich (IUCAA). The workshop was made possible by the generous financial support from IUCAA, and Science and Engineering Research Board, and was coordinated by Sudipta Sarkar and Anand Sengupta (IIT, Gandhinagar).

Website: http://events.iitgn.ac.in/2017/blackholes/programme.php

Public Lectures

A public lecture was delivered by **Professor Frank Shu** of UC San Diego and UC Berkeley, titled ***"Two Planets: Challenges of Living and Prospering on Earth and Mars".***

As the challenges of living sustainably on Earth grow ever more dire because of environmental constraints on unlimited growth of population and demand for energy and material resources, many visionaries promote the idea of a new start for a subset of humans by colonizing Mars. But is getting to Mars and living there as feasible as portrayed by certain captains of industry and directors of science-fiction movies? Using basic concepts from undergraduate physics and chemistry, this eminently engaging talk described how access to ample nuclear heat and electricity can help terraform Mars to be more like Earth. For example, the speaker discussed how the soil of Mars could be detoxified using porous charcoal made by the rapid immersion of biomass under hot (non-radioactive) molten salt that is a by-product from running a molten-salt nuclear reactor. Thus, the speaker argued that the same technologies that can make an inhospitable planet like Mars habitable could also, in principle, reverse the lasting industrial damage from modern economies that now threatens a habitable planet like the Earth. The talk was followed by a lively question-and-answer session.

Biography:
Professor Frank Shu is perhaps best known to astronomy enthusiasts and students across the world for his commonly used text book 'Physical Universe: An Introduction to Astronomy', as well as the more advanced 2-volume 'The Physics of Astrophysics'. He is known for his pioneering theoretical work in a diverse set of fields, including the origin of meteorites, the birth and early evolution of stars, the process of mass transfer in close binary stars, and the structure of spiral galaxies. He is also a champion of research in reversing climate change economically. Professor Shu has served as Chair of the astronomy department at UC Berkeley and also holds the post of distinguished Professor at UC San Diego. In 1998, Professor Shu was awarded the title of University Professor in the UC system, which is reserved for scholars of international distinction who are also recognized and respected as exceptional teachers.

Professor Mark Birkinshaw, from the University of Bristol, U.K., gave a Public Lecture at IUCAA, on January 17, 2018, titled, ***Ancient Light: "The Microwave Background Radiation and Cosmology."*** This lecture was jointly organised by the British Council in India and IUCAA.

The discovery of the microwave background radiation in the 1960s provided cosmology and astrophysics with an exceptionally powerful tool for investigating the history of the Universe and the nature of massive objects within it. This lecture gave the story of the microwave background radiation, from the original idea in the 1940s up to the most recent measurements from satellites in orbit and telescopes in Antarctica, and shown what we have learned from the increasing degree of precision with which we can study the radiation.

Biography:
Professor Mark Birkinshaw is well-known for his work on structures in the microwave background radiation created by clusters of galaxies, on relativistic effects that distort the appearances of distant objects, and on the interactions between outflows from active galaxies and the diffuse gas around them. He has published more than 400 papers. He has been a Harvard University Professor in the Department of Astronomy, and also worked at the Smithsonian Institution's Astrophysical Observatory, where he worked on the Chandra satellite for NASA. He was appointed as the first William P. Coldrick Professor of Cosmology and Astrophysics at the University of Bristol in 1995, and leads the university's Astrophysics Group.

IUCAA Outreach Programmes

Workshop on Visualising Textbook Astronomy

The workshop on Visualising Textbook Astronomy was conducted on October 30, 2017, for secondary school teachers from Kendriya Vidyalayas at Regional Training Centre, Khadki Cantonment Board. The workshop was organised by Sakal NIE in collaboration with IISER, Pune, and IUCAA. Thirty teachers from Kendriya Vidyalayas from different states of the country participated in the workshop. Basic astronomy concepts involved in Science and Geography books were explained along with a few demonstrations, role-play, etc. to visualise and understand these concepts better.

International Observe the Moon Night

Every year, International Observe the Moon Night (InOMN) is celebrated in the month of September or October by Astronomers Without Borders. This year, InOMN was celebrated worldwide on October 30, 2017. The special sky-watch session was arranged at IUCAA on this occasion with the theme: The Moon. About 60 enthusiasts of different age groups enjoyed the view of our closest celestial object through telescope.

PuLastya Science Festival

To commemorate the birth anniversary of Late Shri Pu La Deshpande, November 8, the PuLastya Science festival was organised during Nobember 8 - 10, 2017 at IUCAA. The programme included day-time sessions for school students, including astronomy without telescopes, and interaction with IUCAA PhD students. The 3 public lectures in series by IUCAA faculty members, Durgesh Tripathi, Sukanta Bose and Joydeep Bagchi, followed by sky-watching sessions with the help of volunteers from local amateur astronomers organisations were delightful for public. About 2,500 people visited IUCAA on this occasion.

Solar Outreach Programme

As a part of the Solar Outreach Programme, Helen Mason (University of Cambridge) along with Durgesh Tripathi (IUCAA) interacted with school students during November 28 - 30, 2017. School students from MIT Gurukul (Pune), Barshi (Solapur), St Mary's School (Pune), and BVB Paranjapye High School (Pune) gained very much about the Sun, and enjoyed the lively interaction with Helen.

Nobel Curtain Raiser Talks

National Center for Cell Sciences (NCCS, Pune), in collaboration with IUCAA organised public talks at the NCCS Auditorium on the Nobel prizes awarded during 2017. The talks were delivered by experts from respective fields on December 04, 2017.

Thirty Metre Telescope Workforce, Education, Public Outreach and Communications Meeting

The annual meeting of the Thirty Metre Telescope Workforce, Education, Public Outreach and Communications (TMT WEPOC) board took place in Bengaluru, and was hosted by the IIA, during November 2 - 5, 2017. Samir Dhurde (IUCAA) was the organiser for this meeting, which saw partner representatives from all five countries joining in person or through the Skype, and discussing present and future issues of outreach and education efforts of the TMT project. He also conducted exposure visits to Hostkote TMT facility and Bangalore Planetarium for the board members. Some outreach programmes were also carried out during the TMT Science Forum meeting that took place in Mysuru, the following week.

UNOOSA Workshop

As part of the Outreach Programme in IUCAA, Samir Dhurde attended the United Nations/Italy Workshop on the Open Universe initiative in Vienna, Austria, during November 20 - 22, 2017. He gave a presentation on Making Astronomy and Astrophysics Data More Accessible to Universities in India: The IUCAA Model. The participants of the workshop emphasized the importance of promoting the best practices and standards developed by the scientific community over the past decades, expressed their interest in advancing towards a more open and transparent sharing of scientific data, and highlighted the value of education in science as a prerequisite for the initiative.

Regular Events

The Public Outreach team has conducted 3 science toys workshops, 5 basic astronomy workshops, and 7 campus visits during October - December 2017, with reach to about 1,000 people.

The shows of mobile planetarium (Taramandal) given to Agricultural Development Trust, Baramati were conducted for different remote village schools during November 14 - December 31, 2017. Their volunteers, trained by IUCAA, reached to about 45 schools, and 4,500 students.

Second Saturday Lecture/Demonstration

December 16, 2017: Shrikant Pawar (NCCS-MCC) on *Wonders of Microbiology.*

Proposals for holding Workshops/Schools Outside IUCAA

Proposals to conduct workshops/schools in Astronomy and Astrophysics or related areas are invited from university departments/affiliated colleges and the same may be sent to the Administrative Officer, Core Programmes, (email; aocp@iucaa.in), IUCAA, by April 30, 2018 (for events to be conducted during August 2018 - July 2019), so as to be included in the academic calendar for the next academic year.

The following details should be given while sending the proposals: (i) the title (topic), (ii) duration of the workshop/school, (iii) topics to be covered and number of lectures in each topic, (iv) the level of audience and their number, (v) the number of resource persons available locally and the number of resource persons expected from IUCAA, and (vi) a description of the facilities available and (vii) the budget estimates (clearly stating the support offered by the host university/institute).

It is generally expected that infrastructural facilities and accommodation to the participants as well as the resource persons will be provided by the host institution. Other expenses will be borne by IUCAA. The proposers are encouraged to consult IUCAA faculty while framing the proposal.

Once the workshop/school is approved, IUCAA will nominate a coordinator from its faculty, who will interact with the organiser in relation to the academic programme, budget, and identifying and approaching the resource persons.

Meeting on Research in Astronomy: Opportunities and Challenges

The south regional astronomers meeting on Research in Astronomy: Opportunities and Challenges was conducted at the Department of Physics. WMO Arts and Science College, Muttil, Wayanad, Kerala, during December 1 - 2, 2017. The fourth in the series of annual meetings, intended for fostering ties between astronomers in this region, was inaugurated by Ranjeev Misra (IUCAA), and presided over by T.P. Muhammed Fareed (Principal, WMO Arts and Science College). There were 27 presentations, each of 15 minutes duration, given by the research students from the region. New results from the fields of Cosmology, AGN, Stars, ISM, IGM, Galaxies, Gravitational Waves, Instrumentation, and Machine Language were presented. Active discussions which ensued after each presentation served to provide new insights and directions for the participating researchers. There were 7 review talks by senior faculty members in various aspects of Astronomy, and were given by V.C. Kuriakose (CUSAT, Kochi), Annapurni Subramanium (IIA, Bengaluru), Charles Jose (CUSAT, Kochi), K. Indulekha (Mahatma Gandhi University, Kottayam), Blesson Mathew (Christ University, Bengaluru), and Sajeeth Ninan Philip (St. Thomas College, Kozhenchery)). Ranjeev Misra and Joe Jacob (Newman College, Thodupuzha) were the academic coordinators, and Biju K.G. (WMO Arts and Science College) officiated as the organising secretary. There were cultural programmes by the participants on the evening of the first day of the meeting.

Welcome to . . .

SAYANTAN CHOUDHURY

Sayantan Choudhury, who has obtained his Bachelors degree (2007) in Physics (Hons.) from Scottish Church College, Kolkata, and Masters degree (2009) in Physics from the University of Calcutta. He obtained his Ph.D. degree (2016) from the Indian Statistical Institute, Kolkata, affiliated to the University of Calcutta. Then he joined the Department of Theoretical Physics, Tata Institute of Fundamental Research, Mumbai, as a Post- doctoral Fellow for 2 years 8 months, and after which he joined IUCAA as a Post-doctoral Fellow in October 2017. His research has been focused on the Quantum Field Theory of early universe cosmology, Effective Field Theory, Non-linear cosmological perturbation theory, Phenomenology from warped extra dimensions, Quantum entanglement, AdS/CFT, String Theory and Non Equilibrium Quantum Field Theory.

Visitors

(October - December 2018)

Richal Abhang, Sandeep Kumar Acharya, Oluwashina Adegoke, Aniket Agrawal, P. C. Agrawal, Poonam Agrawal, Gazi Ameen Ahmed, Zeeshan Ahmed, Moumita Aich, Shadab Alam, Ujjaini Alam, Md. Sabir Ali, William Alston, Pavan Kumar Aluri, G. Ambika, Sampurn Anand, Ayesha Anjum, Jagdish Arora, Richa Arya, Unnati Ashar, Trisha Ashley, Anjana Ashok, N. M. Ashok, Praveer Asthana, Ramona Augustin, Mofazzal Azam, Abdul Aziz, Willem Baan, Carlo Baccigalupi, Kalyani Bagri, Shivi Baijal, Ayan Banerjee, Biswajit Banerjee, Srikumar Banerjee, Sumita Banerjee, Sebika Kangsha Banik, Saugata Barat, Rennan Barkana, Mustansir Barma, Samuzal Barua, Aritra Basu, Chetan Bavdhankar, Tomaso Belloni, Aru Beri, Swetha Bhagwat, Naseer Iqbal Bhat, R.C. Bhatt, Pooja Bhattacharjee, Sudipto Bhattacharjee, Debbijoy Bhattacharya, Sukannya Bhattacharya, Chirayata Bhattacharyya, Maitraya Kanta Bhattacharyya, Sudip Bhattacharyya, K.G. Biju, Mahasweta Biswas, Archana Bora, Francois Bouchet, Soham Chakraborty, Sudip Chakraborty, Nand Kumar Chakradhari, Nabajit Chakravarty, Swadesh Chand, Sunil Chandra, Suresh Chandra, Ritaban Chatterjee, Rounak Chatterjee, Prakrut Chaubal, Kishor Chaudhury, Virander S. Chauhan, Hsiao-Wen Chen, Girish Chhatre, Pravabati Chinganbam, Varsha Chitnis, Sheetal Chopde, Sundeep Chopra, Madhurima Choudhury, Pratyusha Chowdhury, Sourav Roy Chowdhury, Sreetama Das Chowdhury, Annalisa De Cia, Peter Coles, V.K. Dabral, Pravat Dangal, Abhishek Das, Amit Das, Avik Kumar Das, Ishani Das, Kaustav Kashyap Das, Mousumi Das, Shyam Das, Subinoy Das, Sudipta Das, Edward Daw, Debabrata Deb, Jacques Delabrouille, Karishma Dhanmeher, Suhail Dhawan, Payaswinee Dhoke, Mansi Dhuria, Vijayakumar Doddamani, Broja Gopal Dutta, Koushik Dutta, Rajeshwari Dutta, Epari Shalini Epan, Savithri Ezhikode, Andrew Fabian, Poshak Gandhi, Mayukh Gangopadhyay, Radouane Gannouji, Akash Garg, Lijo Thomas George, Ritesh Ghosh, Shamik Ghosh, Shounak Ghosh, Sushant G. Ghosh, Tathagata Ghosh, Tuhin Ghosh, Gourab Giri, Vedasri Godavarthi, Rupjyoti Gogoi, Gaurav Goswami, Pranjupriya Goswami, Umananda Dev Goswami, Milind Goverdhan, Sarbari Guha, Ajesh Gulati, Hitesh Gulati, Pawan Kumar Gupta, Prateek Gupta, Shivangi Gupta, Sreehari H., Shravan Hanasoge, N.D. Haridass, Priya Hasan, Yaghoub Heydarzade, David Hilditch, Swetha Indira, K. Indulekha, Asif Iqbal, Kishore Iyer, S.N.A. Jaaffrey, Joe Jacob, Dhairyashil Jagadale, A.K. Jain, Deepak Jain, Pankaj Jain, Sumit Jaiswal, Priyanka Jalan, Steven Janowiecki, Prakash Javadekar, K. Jeena, Chanda Jog, Reju Sam John, N. Jose, Prasanna Joshi, Kanti Jotania, Minu Joy, Anusree K.G., Varsha K.R., Shravan K.V., Rakesh Kabir, Md. Mehedi Kalam, Dinakar Kanjilal, Akanksha Kapahtia, Vinay Kashyap, Sandeep Kumar Kataria, L.N. Katkar, Neal Steven Katz, Yasha Kaushal, Aditi Shiv Shankar Kaushik, Arun Kenath, Nishikanta Khandai, Rukaiya Khatoon, Rukaiya Khatoon, Rishi Khatri, Rubinur Khatun, Gopal Krishna, Abin Krishnan, Jens-Kristian Krogager, Arun Kulkarni, A. S. Kiran Kumar, Abhishek Kumar, Meghana Kumar, Niraj Kumar, Pravir Kumar, Shibesh Kumar, Y. Rohin Kumar, V.C. Kuriakose, Kshama Sara Kurian, Joseph Kuruvilla, Sathyanarayanan Kuzhikkatt, Ioannis Kypriotakis, Jonathan Linton, Britt Lundgren, Sundar M.N., Roy Maartens, N. Madhavan, Smriti Mahajan, Sunil Maharaj, Subhabrata Majumdar, Partha Pratim Majumder, Manzoor A. Malik, Shahnawaz Malik, Sunil Malik, Samir Mandal, Soma Mandal, Suvadip Mandal, Arun Mangalam, Aditya Manuwal, Sui Ann Mao, Bari Maqbool, Alex Markowitz, Helen Mason, Titus Mathew, Nairwita Mazumder, I.M. McHardy, Meena, Irom Ablu Meitei, Christopher Messenger, Ashish Mhaske, Arvind Kumar Mishra, Baisakhi Mitra, Abhishek Mohapatra, Palle Moller, Surhud More, Sneha Prakash Mudambi, Ankan Mukherjee, Arunava Mukherjee, S. Mukherjee, Subroto Mukherjee, Suvodip Mukherjee, Sowgat Muzahid, Jerin Mohan N.D., Mithun N.P.S., Sharvari Nadkarni-Ghosh, Nikhil Naik, P. A. Naik, Sumana Nandi, Rakshit Nanwani, Anand Narayanan, Abhishek Naskar, Nilam Navale, Nikhil Navaratna, Parth Nayak, Rajesh Kumble Nayak, Rahul Nigam, Pasquier Noterdaeme, Krishna P.B., Joby P.K., Mahesh P.K., Archana Pai, Rita Paikaray, Supratik Pal, Vaidehi Sharan Paliya, S.K. Pandey, Sanjay Pandey, Mahadev Pandge, Nidhi Pant, Iossif Papadakis, Viral Parekh, Abhishek Parida, Sonal Ramesh Patel, M.K. Patil, Subodh P. Patil, Swarali Patil, Satyabrata Patnaik, Ishan Patro, Devraj Pawar, Pramod Pawar, Ninan Sajeeth Philip, Khun Sang Phukon, Anil Prabhakar, Ananta Charan Pradhan, Anirudh Pradhan, P.N. Prakash, Raj Prince, Shibaji Raha, Majidul Rahaman, Sendhil Raja, Mainpal Rajan, Suvendu Rakshit, K. V. Ramanathan, Akshay Rana, Sandeep Rana, Raghavan Rangarajan, Adarsh Ranjan, A. R. Rao, Udaya Shankar Narayana Rao, Janakee Raste, Shantanu Rastogi, B.S. Ratanpal, Ajay Ratheesh, Bharat Ratra, C.D. Ravikumar, Katherine Rawlins, Subharthi Ray, Biplab Raychaudhuri, Sananda Raychaudhuri, Vikram Rentala, L. Resmi, Henrik Rhodin, Luiz Felippe Santiago Rodrigues, Sandeep Kumar Rout, Amit Roy, Anirban Roy, Jayashree Roy, Shreya Roy, Surojit Kumar Roy, Shouvik Roychoudhury, Dipthi S., Malu S., Onkar Sadekar, Rajib Saha, Subhajit Saha, Sunder B. Sahayanathan, Sandeep Sahijpal, Sreeporna Saikia, M. Sami, Shishir Sankhyayan, Varun Saraswat, Iftikar H.

Sardar, Lakshmi Saripalli, Arkadipta Sarkar, Abhilash Sarwade, Durgesh Nandini Satpathy, Aniket Sen, Anjan Ananda Sen, P. Sen, Somasri Sen, Anand Sengupta, T.R. Seshadri, Vishant Shah, Zahir Ahmad Shah, Nigar Shaji, Himanshu Shanker, K. Shanthi, K.N. Shanti, Ankit Sharma, Arijit Sharma, Kewal Kumar Sharma, Mohit Kumar Sharma, Ramkishor Sharma, Ranbir Sharma, Ranjan Sharma, Swarnim Shashank, Prajval Shastri, Sadhana Shelar, Tatyasaheb Shelar, Yuri Shtanov, Frank H. Shu, Amit Shukla, Anvar Shukurov, H.S. Sunil Simha, Vimal Simha, Alkendra Singh, Ankit Singh, Avinash Singh, Gaurav Singh, Gyan Prakash Singh, H.P. Singh, Heisnam Shanjit Singh, Jasbir Singh, K.P. Singh, Saurabh Singh, Swapnil Singh, Vir Singh, Akram Chandrajit Singha, Ajit Kumar Sinha, Aneesh Sivasankaran, Debopam Som, Vikram Soni, P. Sreekumar, K. Sriram, L. Sriramkumar, Amit Srivastava, Arun Srivastava, C.S. Stalin, Lorrie Straka, Ravi Subrahmanyan, Vipin Sudevan, S. Sunil, Sharanya Sur, Avinash Surendran, Esha Swaroop, Lekshmi T., Rajalakshmi T.R., Pulat Tadjimuratov, Parijat Thakur, Arun Thampan, Devika Tharakkal, Manasadevi P. Thirugnanasambandam, Pranav Tiwari, Alexei Toporensky, Ashutosh Tripathi, Shruti Tripathi, Aaroodd U.R., Paniveni Udayashankar, Amrita Unnikrishnan, Anisul Ain Usmani, Santosh Vadawale, Deepak Vaid, Alex Vano-Vinuales, Hum Chand Varma, Ranjan Vasudevan, Guru Venkat, P. Venkatakrishnan, Ramasamy Venugopal, Murli Manohar Verma, Aditya Vidhate, Amit Vikram, Federico Vincentelli, R.G. Vishwakarma, Rahul Kumar Walia, Kasturi V. Warang, J.S. Yadav, Jaswant Kumar Yadav, Mahesh Kumar Yadav, Khabbab Zakaria, and Siwei Zou.

Visitors Expected

January 2018

Shreya Anand, University of Maryland, USA; Anjana Ashok, National Centre for Biological Sciences, Mangalore; Ranajoy Banerji, University of Paris, France; Arunima Banerji, IISER, Tirupati; Samuzal Barua Hojai, Assam; Tomaso Belloni, INAF, Brera, Italy; Aru Beri, University of Southampton, UK; Yashpal Bhulla, Udaipur University; Robert Botet, University of Paris, France; Ramesh Chandra, Kumaun Universiy, Nainital; Philip Charles, SAAO, South Africa; Goutami Chattopadhyay, University of Calcutta, Kolkata; Surajit Chattopadhyay, Amity University, Kolkata; Bhag Chand Chauhan, Central University of Himachal Pradesh; Pooja Devi, Kumaun Universiy, Nainital; Payaswinee Dhoke, Dharampeth M. P. Deo Memorial Science College, Nagpur; Elena D'Onghia, University of Wisconsin, USA; Jose Toni Font, University of Valencia, Spain; Rupjyoti Gogoi, Tezpur University, Assam; Umananda Goswami, Dibrugarh University, Assam; Anandita Goswami, Gauhati University, Assam; Kunal Gulati, Symbiosis Institute of Technology, Pune; Anuradha Gupta, Pennsylvania State University, USA; Mubashir Hamid, University of Kashmir, Srinagar; Naseer Iqbal, University of Kashmir, Srinagar; Tanvi Karwal, Johns Hopkins University, USA; Ankita Khanal, Gauhati University, Assam; Rishi Khatri, TIFR, Mumbai; Soma Mandal, Govt. Girls General Degree College, Kolkata; Suvadip Mandal, IISER, Kolkata; Bari Maqbool, University of Kashmir, Srinagar; Hemwati Nandan, Gurukula Kangri University, Uttarakhand; Rajalakshmi Narayanan, IIA, Bengaluru; Sreejith Padinhatteeri; Mayukh Pahari, University of Southampton, UK; P. N. Pandita, IISc, Bengaluru; Manu Paranjape, University of Montreal, Canada; Rutu Parekh, Dhirubhai Ambani Institute of Information and Communication Technology, Gujarat; B. C. Paul, North Bengal University, Darjeeling; Akhil Punia, VIT University, Vellore; Nirmala Ramtekkar, RTMNU-Nagpur University; Saibal Ray, Govt. College of Engg. and Ceramic Tech., West Bengal; Asoke K. Sen, Assam University, Silchar; Zahir Ahmad Shah, University of Kashmir, Srinagar; Vipin Kumar Sharma, University of Lucknow; Neha Sharma, ARIES, Nainital; H. P. Singh, University of Delhi; Annapurni Subramaniam, IIA, Bengaluru; Vipin Sudevan, IISER, Bhopal; Ramasamy Venugopal, IAU Office of Astronomy for Development, South Africa; Bal Krishna Yadav, University of Lucknow; Giulio Del Zanna, University of Cambridge, UK; Andrzej Zdziarski, Nicolaus Copernicus Center, Poland; and Girish, IIA, Bengaluru.

February 2018

Apoorva Abiramiy, Sri Krishna College of Engineering and Technology, Coimbatore; Kevin Alabarta, University of Southampton, UK; Patrick Brady, University of Wisconsin-Milwaukee, USA; Jamie Court, University of Southampton, UK; Mona Mostafa, National Research Institute of Astronomy and Geophysics, Egypt; Nived V. N., IISER, Pune; John Paice, University of Southampton, UK; Sherehan Shehata, National Research Institute of Astronomy and Geophysics, Egypt; and Alex Vilenkin, Tufts University, USA.

March 2018

Anjana, Government College, Madappally, Kerala; and Marina Prokopyeva, St. Petersburg State University, Russia.

Long Term Visitors

Ajesh Gulati, TMT Project Office, USA; and Vithal Tilvi, Arizona State University, USA.

Know Thy Birds 18

- Chaitanya Rajarshi

Hello friends,

It is time to say good bye to you as this is the last article in this series, but this should not be a goodbye to the birding adventures.

Do you know number of bird species in the world? We are not even sure how many different kinds of birds are there; but the no. is near to 10 thousand. In our country, the official no. says 1266 species and in Maharashtra the no. is around 550. Wow…

But, why should we care to know about these little creatures and go outside to watch them? In the present world, the importance of birds seems minimal due to technological advancement and current life style. Many of us do not even bother to see them.

Well, ***we should care for birds because…….***

Birds play a vital role in the nature. They are integral parts of the food chain. Some birds feed on grains, fruits and they help in seed propagation. We cannot grow trees like Banyan, Figs, Peepal etc. in nursery; these trees grow only through birds dropping.

Birds are important pollinators. Some birds feed on insects and control pests in gardens, farms in a natural way. Some eat rats, lizards etc. Birds and eggs in turn are also food for some animals like snakes etc. This relationship maintains the balance of ecosystem by preventing growth of a single species.

Birds like Vultures are natural scavengers. They help keep the nature clean of dead and decay matter and prevent spreading of harmful bacteria and viruses.

Birds are the true friends of humans. Farmers use bird droppings as fertilizers as it is rich with nutrients like nitrogen, phosphate and potassium. Birds like Owls, and other birds of prey control rodents which are nuisance to farmers.

Other than this, birds are prime source of food for humans (eggs and meat of turkey, hen, ducks, geese, quails etc.). Eggs are rich in protein. The white meat has less fat content and is good for health. So, these birds are grown to make economic gains. Birds are pets for many. They help in loneliness. Birds add beauty to environment.

Thus birds are greatly helpful to humans and nature. Due to pollution, excess use of pesticides, modernization and wide spread radiation many birds are getting extinct. We need to protect them and minimize the hazards of technology on them.

Refer to the figure: If we timescale the lifespan of Earth in a 24-hour clock, humans have evolved at 11.59 PM. As the youngest child, we should care more about the ecosystem.

Figure: History of Earth in 24-hour clock
(Source: Internet)

"The world has enough for everyone's need, but not enough for everyone's greed."

— Mahatma Gandhi

List of some movies on birds:

"Happy Feet",

"The Big Year",

"Rio",

"Winged Migration"

Wish You A Very

Happy Birding

Khagol (the Celestial Sphere) is the quarterly bulletin of IUCAA

We welcome your feedback at the following address:

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