



24th IUCAA Foundation Day *Lecture*

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The 24th IUCAA foundation day lecture was delivered by Professor Ashoke Sen from Harish-Chandra Research Institute, Allahabad, and was titled "Search for a unified theory". Professor Sen provided an overview of the current status of string theory.

He started with a description of our understanding of the elementary particles and their interactions, and how the Standard Model can unify the three (strong, weak, and electromagnetic) of the four fundamental forces and explain most of the experimental data. He then discussed issues, which arise when one tries to include gravity. The standard model is based on the framework of the theory of relativity and quantum mechanics, and gravity will have to be consistent with these two concepts for a unified model to work.

He introduced the idea that string theory may be the avenue where this can be achieved, since gravity appears as a more natural outcome in this formalism, which incorporates relativity and quantum theory. In string theory, the different elementary particles correspond to different vibrational states of a string, where the typical size of a string is about sixteen orders of magnitude smaller than the smallest scales probed by current experiments.

Theoretical consistency of string theory requires working in 9-dimensional space. In order to relate to our experience of 3-dimensional space, one introduces the notion of 'compactification'

of space, which he explained using simple analogies. He also used analogies to describe how various versions of string theory are based on the choice of the compact space, but are all really equivalent in the M-theory formalism of the string theory. This formalism is capable of describing different phases of the string theory, and Professor Sen concluded the talk by emphasizing that the real challenge is to determine the phase that corresponds to the observable Universe that we live in.



Congratulations to ...

Jayant Narlikar on being conferred with the **Jeevan-Gaurav Puraskar** by Maharashtra Foundation, USA.

Tarun Souradeep on being elected as **Fellow, Indian Academy of Sciences**, Bangalore.

Arvind Gupta on being conferred with the **Dadhichi Puraskar** by the Education Society, Ambarnath.

Workshop on Cosmology



The workshop held at Bangalore University was formally inaugurated by K. Siddappa, former Vice-Chancellor of Bangalore University and a renowned nuclear physicist, who was also a member of the Scientific Advisory Committee of IUCAA in the year 2000. Siddappa spoke about the importance of holding workshops on current topics and about the good work done by IUCAA in this regard. He advised the participants to concentrate their energy in learning the newly emerging field of cosmology. S. Mukherjee presented an overall picture of the activities of IUCAA.

Twelve lectures on various topics in cosmology, as finalized by the academic coordinators, S. Mukherjee and Sanjay Jhingan, were held during November 8–10, 2012 in the auditorium of Bangalore University. The following list gives the topics and the speakers:

B.A. Kagali (History of cosmology); Sanjay Jhingan (Introduction to GR and cosmology); Shiv Sethi (Early universe and CBR); Biman Nath (Large scale structure formation); S. Mukherjee (Cosmological models); C. Sivaram (Formation of structures in the universe and conceptual issues in cosmology); and Tarun Deep Saini (Dark matter and dark energy).

Sufficient time was made available for discussion with the speakers. The workshop was attended by about 30 teachers and 25 post graduate physics students.

An interactive session was held on the last day wherein the participants asked questions to the resource persons. Two of the participants made brief presentations about their work in cosmology.

The participants were given several review articles in cosmology as well as the well known book 'Elements of Cosmology' by Jayant Narlikar, at the time of registration.

The participants expressed their happiness with the arrangements for their boarding and lodging, as well as on the contents of the lectures delivered. In fact, some of them felt that the workshop could have been extended to five days! B.A. Kagali, Sanjay Jhingan, and S. Mukherjee were the coordinators of this workshop.



Introductory workshop on Solar Physics

A three-day workshop on Solar Physics was organized at Indian Institute of Science and Technology (IIST), Thiruvananthapuram, in collaboration with IUCAA, during November 29 - December 01, 2012. The workshop was attended by 12 final year B.Tech. (Physical Sciences) students of IIST as well as 14 students from other institutes and universities. The focus of the workshop on Sun was driven by the upcoming Solar Missions of ISRO like Aditya-I. The workshop was primarily designed to provide a flavour of solar physics to undergraduate and post-graduate students and to underline its importance in understanding the dynamics of the Sun.

The workshop was coordinated by the faculty members of the Astronomy Group of Department of Earth and Space Sciences, IIST and Durgesh Tripathi of IUCAA. The workshop started in an informal manner with a few words of encouragement from K.S. Dasgupta, Director, IIST, followed by an address by A. Chandrasekar, Head, Department of Earth and Space Sciences, who gave an introduction

about IIST and the Department. Lectures were delivered by P. Venkatakrishnan, Ramitendranath Bhattacharyya and Shibu K. Mathew of Udaipur Solar Observatory, P. Janardhan of Physical Research Laboratory, Ahmedabad and Durgesh Tripathi of IUCAA. The lectures spanned a range of topics in Solar Physics – Solar Dynamo, Solar Magneto-Hydrodynamics, Solar Interior, Helioseismology, Solar Magnetic Field, Solar Activity, Eruptive Phenomena, and Solar Wind including Sun-Earth Connection. A couple of lectures were focused on Solar Instrumentation and on upcoming national and international observing facilities.

The workshop came to a close with the felicitation of the speakers and a vote of thanks. The workshop was deemed very successful as it featured attendees from different parts of India. It was indeed a unique and enlightening learning experience, and a fantastic opportunity for all the participants to interact with luminaries from the country's premier institutes.



Thirty Metre Telescope Science and Instrumentation Workshop



The Thirty Metre Telescope (TMT), which is planned to see first light around 2020, will be the most advanced Optical NIR observatory in the world. A two and a half day TMT Science and Instrumentation workshop was held at IUCAA, Pune, during December 10-12, 2012.

This workshop brought together sixty five astronomers and instrument specialists from the TMT consortium members. It explored the potential of the TMT in areas of polarimetry, time resolved science and astrometry. The TMT will be equipped with three powerful instruments that will be available at, or soon after, first light. However, additional capabilities may be needed that can be addressed by the second generation of instruments during the first decade of telescope operations. This workshop provided a forum to discuss the suitability of the use of these instruments for the new science areas, within the framework of the current design. There were two panel sessions to discuss (i) questions of interest to the Indian community, (ii) how to help forge the scientific collaborations with the TMT consortium, as well as (iii) action plans to complete the activities of the working groups on polarimetry, time resolved science and astrometry.

The workshop was followed by a one day meeting of the Science Advisory Committee of the TMT.



Workshop on Galaxies in Absorption

Absorption lines seen in the spectra of QSOs allow one to probe high redshift intervening galaxies and intergalactic medium in a luminosity unbiased way. The thrust in this area is to establish the connection between absorption lines and galaxies. Substantial progress in this direction has been possible due to recent advances in telescopes and instrumentation.

A group of people working in this field has been meeting once a year for the past three years. The fourth workshop in this series - "Galaxies in Absorption" - was held in IUCAA during December 17-20, 2012. There were about 40 participants including people from Europe and US. There were about 25 talks, each of 40 minutes duration, covering various issues related to the connection between QSO absorbers and galaxies.

The workshop was coordinated by Pushpa Khare and R. Srianand.



Workshop on Advanced Data Analysis Technique in Astrophysics



The IUCAA sponsored four day workshop on Advanced Data Analysis Techniques in Astrophysics was conducted at the Madhava Observatory, University of Calicut, during October 10-13, 2012. About 100 participants attended the lectures, including M.Sc. students of the department. The lectures were given on topics like Basics of Linux, Planetary Science, Solar Physics and High Energy Astrophysics. Ranjeev Misra (IUCAA) inaugurated the workshop and gave a talk on Black holes. He discussed the basics of black holes and rationale behind observing black holes in the universe. K. Sankarsubramaniam (IIA, Bangalore) discussed the various aspects of Sun and its association to space weather. Ninan Sajeeth Philip (St. Thomas, College, Kozhenchery) delivered a talk and offered hands-on session on various VO tools. The session involved detailed discussion on small projects that can be done using an internet ready computer, and was well appreciated by the participants. C.D. Ravikumar (University of Calicut) talked about night sky observation, giving information related properties of observation with respect to the location of observer. A.M. Vinodkumar (University of Calicut) gave working introduction to the use of linux for the participants. M.P. Dhanya (VSSC, Thiruvananthapuram) talked about magnetic fields associated with planets. P. Sreejith (ISAC, Bangalore) gave a presentation on day-time astronomy, detailing various projects that can be carried out by observing the Sun. Finally, Vinu Vikram (University of Pennsylvania) discussed the morphological analysis of galaxies in the universe.

Afternoon sessions were devoted to hands-on activities and the participants were introduced to different astronomical tools. The session was conducted by V. Jithesh, A.U. Preetha, Joseph Dhanya and M. Nikesk (Research Scholars of the Physics Department, University of Calicut) and it comprised of photometric and spectroscopic data reduction of stars and galaxies.

C.D. Ravikumar and Ranjeev Misra were the coordinators.

Introductory Workshop on Virtual Observatory

An Introductory Workshop on Virtual Observatory was held in the Department of Applied Mathematics, Calcutta University, during December 3-7, 2012, in collaboration with IUCAA Resource Centre (IRC), Kolkata.

Virtual Observatory (VO) is a collection of data archives and software tools, using which various types of astronomical research can be conducted with the help of internet. This is analogous to a real observatory, where telescopes are used for data collection. VO however, stores data from the observations made through various telescopes all over the world. The advantage of VO is that users from various regions all over the world can simultaneously access data easily without going through painstaking task of observations. At the same time terabytes of data can be stored in VO at a time, which can be used for various studies simultaneously.

The perspective of this workshop was (i) to train M.Sc. students on how to work with VO, so that they could pursue their M.Sc. based project dissertations using VO in future. (ii) Enable young faculty members to introduce VO-for their students in their respective universities. Ph.D. students also benefitted from this workshop.

In the inaugural session, Susmita Sarkar, Head, Department of Applied Mathematics, CU, welcomed the participants. Uma Basu, senior faculty member, Department of Applied Mathematics, presided over the session and Asis Kumar Chattopadhyay, Coordinator of IRC, Kolkata, outlined on the perspective of the workshop. Suma Debsarma conveyed vote of thanks.

Ajit Kembhavi, Asis Kumar Chattopadhyay, Tanuka Chattopadhyay, Sajeeth Philip, Shruti Tripathi, Sharmad Navelkar, M. Vivek, Tejas Kale, Ajay Bibhuti, Tushar Agarwal, Saptarshi Mondal, delivered lectures as well as conducted LAB sessions during the workshop.

About forty five persons participated in the workshop. Ajit Kembhavi and Tanuka Chattopadhyay were the coordinators of the workshop.



BITS-IUCAA Workshop on Gravitational Wave Data Analysis



The Birla Institute of Technology and Science (BITS), Pilani, Goa Campus, and IUCAA, Pune jointly organised a national level workshop on Gravitational Wave Data Analysis at the BITS-Pilani K.K. Birla Goa Campus, Goa during December 17–21, 2012. The workshop was intended for highly motivated undergraduate students / graduate students / postdocs / college and university teachers of Physics, Mathematics and Engineering, to provide exposure to Gravitational Wave Astronomy and familiarise them with Data Analysis techniques specific to this emerging and exciting area of research. There was an overwhelming response from all the corners of the country. In total, we were able to accommodate 61 participants, among which 36 participants (including 7 resource persons) were from other Institute/Universities, and 25 participants (including 2 resource persons) were local (Goa Campus).

The workshop was inaugurated by K.E. Raman, Acting Director, BITS, Pilani, K.K. Birla Goa Campus, who mentioned how a Computer Science department can provide important contributions to observational astronomy. The workshop started with a lecture on Introduction to Gravitational Waves by Sanjit Mitra (IUCAA), in which the importance of a possible gravitational wave detector in India was highlighted. The other lectures were delivered by some of the experts in the country; K.G. Arun (Chennai Mathematical Institute), Patrick Dasgupta (Delhi University), Sanjeev Dhurandhar (IUCAA), T.K. Jha (BITS-Pilani, Goa campus), Rajesh Nayak (IISER-Kolkata), S.K. Sahay (BITS-Pilani Goa campus), Anand Sengupta (IIT-Gandhinagar), and

C.S. Unnikrishnan (TIFR, Mumbai). The main topics covered in the lecture sessions were the basics of General Theory of Relativity, Gravitational Waves, their sources and detectors, and basics of GW Data Analysis. The afternoons were dedicated to hands-on sessions in the computer lab to give the participants a flavour of Gravitational Wave Data Analysis, focused basically on the Matched Filtering technique.

On the fifth day afternoon, there was a face-to-face discussion session with the participants to receive feedback on the workshop, and to get directions on how to make it more fruitful in the future. The organisers were delighted with the students' responses and their enthusiasm towards Gravitational Waves. S.K. Sahay (BITS-Pilani, Goa Campus) and Sanjit Mitra (IUCAA) coordinated the workshop.



Higgs Mini-Fest

In July 2012, scientists in CERN announced the discovery of the Higgs Boson, a crucial component in the Standard Model of particle physics. The search for the Higgs Boson was one of the main goals for building the Large Hadron Collider. Naturally, there was great excitement in scientific circles leading up to this fundamental discovery and announcement. The popular name "the god particle" also generated a media frenzy and aroused the curiosity of the general public: What is the Higgs Boson? How was it discovered? What does this mean for fundamental physics? What's next?

On October 11, 2012, IUCAA organized a Higgs mini-fest to discuss the discovery of the Higgs-Boson, and shed some light on this elusive particle. Three experts from different institutes gave talks in front of an overflowing and eager audience.

Avinash Khare (IISER, Pune) opened with a discussion of the discovery of the Higgs Boson. After giving a historical perspective of particle physics, he introduced the "Standard Model" - the basic foundation of particle physics. He touched upon the theoretical motivation for the presence of the Higgs Boson, and concluded by outlining some open questions that remain after the discovery.

Rohini Godbole (IISc, Bangalore) built on this introduction and discussed the theoretical predictions of the Higgs Boson in detail. She augmented this with discussions of past theoretical predictions and successful experimental searches for other particles in the Standard Model. She shed light on the hard work that went into the July 4 announcement of the discovery of the Higgs Boson. Finally, she addressed the road ahead for research about the Higgs Boson, and "Beyond Standard Model" physics.

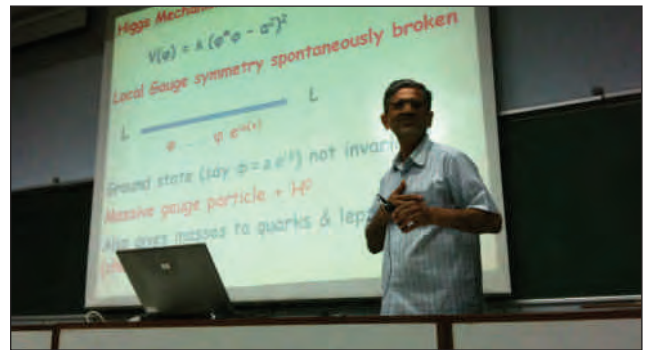
Gobinda Majumder (TIFR, Mumbai) complemented the theoretical discussions with experimental aspects of the Higgs Boson search. He described the working principles of particle accelerators and led us through their historical development. He then focused on the construction and working of the Large Hadron Collider, in particular of the "Compact Muon Solenoid" (CMS), one of the instruments that detected the Higgs Boson. In conclusion, he discussed the technical aspects and statistical significance of the experimental discovery.

The talks mesmerized all members of the audience, from college students to senior scientists. They were glad to learn about Indian contributions to both theoretical and experimental aspects of the Higgs Boson saga.

Following the lectures, many people went on to discuss their doubts with the speakers over tea.

The mini-fest, first of its kind at IUCAA, was a success. Ajit Kembhavi thanked all the speakers and attendees, and invited ideas for more such mini-fests in the future.

Varun Bhalerao and Ajit Kembhavi coordinated this Mini-Fest.



IUCAA Preprints

Listed below are the IUCAA preprints released during October - December 2012. These can be obtained from the IUCAA library (library@iucaa.ernet.in). The preprints can also be freely downloaded from <http://www.iucaa.ernet.in/~library/main.html>

Christoph Luhn, Krishna Mohan Parattu, and Akin Wingerter, *A minimal model of neutrino flavor*, IUCAA-12/2012.

Aditya Rotti and Tarun Souradeep, *A new window into stochastic gravitational wave background*, IUCAA-13/2012.

Santanu Das and Tarun Souradeep, *Dipole leakage and low CMB multipoles*, IUCAA-14/2012.

Aditya Rotti, Moumita Aich and Tarun Souradeep, *WMAP anomaly: Weak lensing in disguise*, IUCAA-15/2012.

Nidhi Joshi, Santanu Das, Aditya Rotti, Sanjit Mitra and Tarun Souradeep, *Revealing non-circular beam effect in WMAP-7 CMB maps with BipoSH measures of statistical isotropy*, IUCAA-16/2012.

Shantanu Das, *Cosmological solution of Machian gravity*, IUCAA-17/2012.

Shantanu Das, *On the wavy mechanics of particles*, IUCAA-18/2012.

Shantanu Das, *Machian gravity and the giant galactic forces*, IUCAA-19/2012.

Welcome...



Nishant Singh has joined IUCAA as a Post-doctoral Fellow.

Nishant, under the Joint Astronomy Programme of the Indian Institute of Science, Bangalore, did his Ph. D. at Raman Research Institute, Bangalore under the supervision of S. Sridhar.

During his Ph.D., he was mainly involved with the problems related to the study of the generation of large-scale magnetic field due to small-scale turbulence in a background shear flows, and demonstrated, for the first time, the large-scale dynamo action in such systems when the fluid Reynolds number was below unity.

His areas of research are Magnetohydrodynamics: Astrophysical dynamos, evolution of various helicities and their implications; Cosmology: Structure formation in the universe; and Binary systems: Implications for bipolar molecular outflows and maser intensity variations.



M. Vivek has joined IUCAA as a Post-doctoral Fellow.

M. Vivek did his Ph.D. at Cochin University of Science and Technology (CUSAT), Kochi, working with V.C.Kuriakose (CUSAT) and R. Srianand (IUCAA) and studied the time variability of a sample of low ionization gas outflows from the AGN using the IUCAA Girawali telescope. He also worked on dual AGNs exhibiting two sets of emission lines in the spectra.

His main areas of research are Quasar absorption/emission lines, Quasar outflows, Broad absorption line quasars, and Binary quasars.

One of his future plans is to understand the nature of variability in a large sample of quasar outflows in the SDSS catalog.

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), IUCAA (email: aocp@iucaa.ernet.in), by March 31, 2013 (for events to be conducted during August 2013 - July 2014), 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, (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 members 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.

Seminars

Listed below are the seminars given at IUCAA during October-December 2012.

04.10.2012	M. Parthasarathy on <i>Post-AGB supergiants: Chemical composition, evolution and circumstellar envelopes.</i>
16.10.2012	Seema Satin on <i>Noise kernel for self similar Tolman Bondi metric: Fluctuations on Cauchy horizon.</i>
14.11.2012	Suman Ghosh on <i>Quantum phase transition in higher derivative theories.</i>
16.11.2012	Sebastien Heinis on <i>Unveiling obscured star formation: Links between galaxy properties and dust attenuation in UV-selected samples from redshift 4 to 1.5.</i>
19.11.2012	Chanda Jog on <i>Prolate-shaped dark matter halo of the Milky Way and its dynamical implications.</i>
06.12.2012	Suman Bhattacharya on <i>Simulating the universe beyond lambda CDM.</i>
12.12.2012	Surhud More on <i>Cosmological constraints from galaxy surveys.</i>
21.12.2012	Susmita Chakravorty on <i>Thermodynamic stability for AGN and XRB winds.</i>
27.12.2012	Paniveni Udayashankar on <i>Solar convection as seen in solar supergranulation.</i>

Colloquium

23.11.2012 Krishna N. Ganesh on *Making drugs out of nucleic acids: The genomic medicine.*

Visitors

October - December 2012

Ram Gopal Agarwal, Shantanu Agarwal, Vivek Agrawal, Moumita Aich, Shah Alam, G.C. Anupama, Jagdish Arora, Ashish Asgekar, M.N. Ashok, Dharmanand Baboolal, Tanwi Bandyopadhyay, Ravinder K. Banyal, Pankaj M. Bavishi, Tomaso Belloni, Debbijoy Bhattacharya, Gour Bhattacharya, Samarпита Bhattacharya, Sudip Bhattacharya, Suman Bhattacharya, K.G. Biju, Ankur Biswas, Atreyee Biswas, Ritabrata Biswas, Sonali Borah, Arindwam Chakraborty, Koushik Chakraborty, Shuvendu Chakraborty, Subenoy Chakraborty, Sumanta Chakraborty, Susmita Chakravorty, Hum Chand, Suresh Chandra, T. Chandrasekhar, Anantha Chanumolu, Asis Kumar Chattopadhyay, Surajit Chattopadhyay, Tanmoy Chattopadhyay, Tanuka Chattopadhyay, Rabin Chhetri, Partha Chowdhury, Pratik Dabhade, Prathamesh Dalvi, Bhanu Pratap Das, Shyam Das, Rumi Deb, Sanghamitra Deb, Ujjal Debnath, Prasanna Deshmukh, Broja Gopal Dutta, Reda El-Bendary, Hassan Fathivavsari, Andreas Finke, Hayley Finley, Madhuri Gaikwad, Rupesh Tejpal Gandhi, Sharad Gaonkar, Archisman Ghosh, Rahul Ghosh, Ritesh Ghosh, Suman Ghosh, Rohini Godbole, Aruna Govada, Gabriel Govender, Matteo Guainazzi, Perna Gupta, K.P. Harikrishnan, Annapurna Hazra, Rudi Horak, Karl Horak, Sk. Manowar Hossein, Tanvir Hussain, Bhola Ishwar, Joe Jacob, Gaurava Jaiswal, Shreeram Jawadekar, Naveen Jingade, V. Jithesh, Chanda Jog, Anslyn John, Ravi Joshi, Kanti Jotania, Minu Joy, Md. Mehedi Kalam, Niti Kant, Avinash Khare, Luv Khurana, Dawood Kothawala, R.K. Koul, Asim Kumar, Atmjeet Kumar, Siddireddy Prasanna Kumar, Saurabh Kumar, B.S. Kushvah, Sruthil Lal S.B., Pedro

Mafa-Takisa, Sunil Maharaj, Nikunj Maheswari, P.K. Mahesh, Chandreyee Maitra, Gobinda Majumder, Ariyeh Maller, Soma Mandal, Dhananjay Mandalkar, S.N. Mathur, Soumen Mondal, Aditya Mondal, Pradip Mukherjee, Sargam Mulay, Sachindra Naik, Urvashi Nangia, Nandish Nanjappa, Riven Narain, K.S.V.S. Narasimhan, Anand Narayanan, Sifiso Ngubelanga, Tejos Nicolas, Pasquier Noterdaeme, Mayukh Pahari, Isha Pahwa, Vaidehi Sharan Paliya, Bhushan Pandey, Gajendra Pandey, K.K. Pandey, S.K. Pandey, Supriya Pan, Mahadev Pandge, P.N. Pandita, Padmakar Parihar, Changbom Park, B.C. Paul, Devraj Pawar, Pramod Pawar, Patrick Petitjean, Sateesha Poojary, Nidhi Ramwat, Sujata Kundu Ranjit, Chayan Ranjit, A.R. Rao, Anjali Rao, P. Vivekananda Rao, C.D. Ravikumar, Saibal Ray, Subharthi Ray, B. Esvar Reddy, Parizat Deb Roy, Prabir Rudra, Ram Sagar, Anirban Saha, Kanak Saha, Subhajit Saha, Sanjay Kumar Sahay, Sunder B. Sahayanathan, Payaswini Saikia, Sourav Kumar Sahoo, Tarun Deep Saini, Subrato Sarkar, Sudipta Sarkar, Rathin Sarma, Seema Satin, Ashoke Sen, Asoke Kumar Sen, Sujan Sengupta, Ramya Sethuram, Aziz Shaik, Mahavir Sharma, Ranjan Sharma, Shashank Shekhar, Yuri Shtanov, H.P. Singh, Yugindro Singh, Matteo Smerlak, P. Sreekumar, C.S. Stalin, Annapurni Subramaniam, Sathyawageeswar Subramanian, Smitha Subramanian, Avinash Surendran, H.N. Suresh, Amit Tamrakar, P. Tejaswi, Paniveni Udayashankar, A.A. Usmani, Santosh Vadawale, Nidhi Vagisah, Gagan Verma, M.M. Verma, Pratik Waggle, Eric Williams, Urjit Yajnik, Bharat Kumar Yerra, and Don York.

Visitors Expected

January 2013

Gummala Abhinav, IISST, Trivandrum; Amir R. Aghamousa, University of Pune; Syed Moosa Ali, IISST, Trivandrum; Manoj Arora, University of Delhi; Ashish Asgekar, Netherlands Institute for Radio Astronomy; K.G. Biju, W.M.O. Arts and Science College, Wayanad, Kerala; Arindwam Chakraborty, Assam University, Silchar; Gireesh Chandra, ARIES, Nainital; Ajaz Ahmad Dar, University of Kashmir, Srinagar; Sudeep Das, Argonne National Laboratory, USA; Sanghamitra Deb, Argonne National Laboratory, USA; Arghya Dutta, S.N. Bose National Centre for Basic Sciences, Kolkata; Shaon Ghosh, Washington State University, USA; Rounaq Goenka, IISST, Trivandrum; Rupjyoti Gogoi, Tezpur University, Assam; Mubashir Hamid, University of Kashmir, Srinagar; JinLin Han, Chinese Academy of Sciences, Beijing, China; Naseer Iqbal, University of Kashmir, Srinagar; Bala Iyer, Raman Research Institute, Bangalore; Reju Sam John, Pondicherry University; Atish Kamble, Cfa, Harvard, USA; Nars. M. Ahmed Khalifa, NRIAG, Egypt; Rakesh Lakshman, IISST, Trivandrum; Charley Lineweaver, Australian National University, Canberra; Manzoor Malik, University of Kashmir, Srinagar; Soma Mandal, Taki Govt. College, West Bengal; Bari Maqbool, University of Kashmir, Srinagar; Tabasum Masood, University of Kashmir, Srinagar; Olivera Miskovic, Pontificia Universidad Catolica de Valparaiso, Chile; Rodrigo Olea, Pontificia Universidad Catolica de Valparaiso, Chile; Devraj Pawar, Ramniranjan Jhunjhunwala College, Mumbai; Judith Perry, Institute of Astronomy, Cambridge, United Kingdom; Anirudh Pradhan, Hindu Post-Graduate College, Ghazipur; Rajesh S.R., S.D. College, Alapuzha, Kerala; A.R. Rao, TIFR, Mumbai; Ashim Roy, ISI, Kolkata; Parizat Deb Roy, Assam University, Silchar; Saumyadip Samui, University of Kwazulu-Natal, South Africa; S.K. Sharma, SNBSC, Kolkata; Juie Shetye, University College London, England; Shanjit H. Singh, Manipur University, Imphal; Tushar Tamhane, Tata Trust, Mumbai; C.S. Unnikrishnan, TIFR, Mumbai; Naveel Wani, University of Kashmir, Srinagar; Gao XuYang, Chinese Academy of Sciences, Beijing, China; and Rashid Zia, BBS College of Engineering and Technology, Allahabad.

February 2013

Sreeparna Banerjee, West Bengal University of Technology; Sudhanshu Barway, South African Astronomical Observatory; Hui-Yiing Chang, Vanderbilt University, USA; Tanuka Chattopadhyay, University of Calcutta, Kolkata; Aarti Goyal, NCRA, Pune; Yuko Hada, Kyoto University, Japan; Tomohiro Harada, Rikkyo University, Japan; Hiroaki Isobe, Kyoto University, Japan; Mathilde Jauzac, University of Kwazulu-Natal, South Africa; Jithesh V., University of Calicut, Kerala; Dhanya Joseph, University of Calicut, Kerala; Bidya Binay Karak, Indian Institute of Science, Bangalore; Martin Kilbinger, CEA Saclay, France; K.V.P. Latha, Pondicherry University; Soumita Modak, University of Calcutta, Kolkata; Rajendra Prasad, Jawaharlal Nehru University, Delhi; Preetha A.U., University of Calicut, Kerala; Biplab Raychaudhuri, Visva-Bharati University, Santiniketan; Somak Raychaudhuri, Presidency University, Kolkata; Yugindro Singh, Manipur University, Imphal; and S. Sridhar, Raman Research Institute, Bangalore.

March 2013

Pradeep Kumar, M.S. College Motihari, Bihar; Ashish Mahabal, Caltech, USA; P.N. Pandita, North Eastern Hill University, Shillong; Reza Rashidi, Shahid Rajaei Teacher Training University, Tehran, Iran; and Martin Roth, Astrophysics Institute, Potsdam, Germany.

Long term visitors

P.C. Agrawal
Hauen Chung
Sanjeev Dhurandhar
Pushpa Khare
M. Parthasarathy

IUCAA hosted the Third Chandra Lecture titled - "**Modern Genesis and the Limits of Cosmic Knowledge**" by Professor Sandra Faber on December 11, 2012 in the Chandrasekhar Auditorium.

Professor Faber is a University Professor of Astronomy and Astrophysics at the University of California, and works at the Lick Observatory.

The talk focussed on the effect of the remarkable progress made by astronomers in understanding how galaxies form in our expanding Universe. It then went on to distil a century of cosmic discoveries to synthesize the modern story of Genesis and to speculate beyond that on the boundaries of the knowable in the cosmic past and future. The subject was well appreciated by the audience present.



Beaufort Scale: Estimate the wind speed

Sir Francis Beaufort, (who was Rear Admiral in Irish Royal Navy) devised a scale to estimate wind speed based on its effect. The scale was devised in 1805 and officially adapted in 1830. It was first used during the famous voyage of Charles Darwin on HMS Beagle. Over a period of time the scale went through many modifications. Here is the scale in its modern form, which I found very useful along with cloud observations.

BEAUFORT SCALE

Beaufort No.	NAME	Wind speed (kmph)	DESCRIPTION
0	Calm	< 1	Calm; smoke rises vertically
1	Light air	1-3	Direction of wind shown by smoke
2	Light breeze	4 - 7	Wind felt on face; leaves rustle; wind vane moves
3	Gentle breeze	8 - 12	Leaves and small twigs in constant motion
4	Moderate breeze	13 - 18	Wind raises dust and loose paper; small branches move
5	Fresh Breeze	19 - 24	Small-leaved trees begin sway, crested wavelet form on inland waters
6	Strong breeze	25 - 31	Large branches move; overhead wire whistle; umbrellas difficult to control
7	moderate gale or near gale	32 - 38	Whole trees sway; walking against wind is difficult
8	Fresh gale or gale	39 - 46	Twigs break off trees; moving cars veer
9	Strong gale	47 - 54	Slight structural damage occurs; shingles may blow away
10	Whole gale or storm	55 - 63	Trees uprooted; considerable structural damage occurs
11	Storm or violent storm	64 - 72	Widespread damage occurs
12	Hurricane	> 72	Widespread damage occurs

“ This is my last contribution to Khagol. It has been an honour and privilege to have contributed to Khagol that started some 15 years ago, with Shyam Tandon on Astroprojects. I thank T. Padmanabhan and Swara Ravindranath for giving me this opportunity and to Manjiri Mahabal who often extended the deadlines.

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