

KHAGOL



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Indo-UK Scientific Seminar : Confronting Particle-Cosmology with Planck and LHC



An Indo-UK meeting funded by the Royal Society, UK, and the Department of Science and Technology, India, titled "Confronting Particle-Cosmology with Planck and LHC", was held at IUCAA during August 10-12, 2011. The main aim of the meeting was to bring together people with expertise, in two areas: one in the physics of the early universe and the other in the analysis of the cosmic microwave background data. The goal of the meeting was to raise and discuss questions that are expected to be answered with the forthcoming data from missions, such as Planck and experiments, such as the LHC.

There were five participants from the UK, and more than forty participants from various institutions within India. The meeting mainly consisted of about twenty-five talks by specialists from particle physics, string theory, and cosmology on topics related to theme of the

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meeting. The students and post-doctoral fellows also had an opportunity to present their work. In addition, there was an intense and long discussion session on the prospects of detecting dark matter particles at the LHC and its possible implications for particle physics as well cosmology.

It was widely felt that a meeting focussing on aspects of the LHC and the Planck mission was quite timely. The reactions of the participants had also suggested that the main aim of the meeting viz., to bring

together particle physicists, string theorists and cosmologists under one umbrella – was largely successful. We believe that the meeting had provided a good opportunity to engender new interactions between the scientists in India and the UK, even as it strengthened existing associations.

The coordinators of the meeting were Anupam Mazumdar, Tarun Souradeep and L. Sriramkumar.

Workshop on Physics of the Solar Transition Region and Corona

A national workshop on 'Physics of the Solar Transition Region and Corona' was held during September 5 -7, 2011 at IUCAA, Pune, and the Indian Institute of Science Education and Research (IISER), Pune. Two and half days of the workshop took place at IUCAA, while one afternoon session was held at IISER. Twenty seven participants attended the workshop, representing almost all the institutions in India with specialisation in upper solar atmosphere.

The theme of the workshop was focused on the dynamics of the upper solar atmosphere and physics of the solar eruptions at all scales. The aim was to find mutual scientific interests to promote inter-institutional scientific collaborations. This was planned keeping in mind the upcoming solar observing facilities such as Multi-Application Solar Telescope (led by the Udaipur Solar Observatory), Aditya-1 (led by the Indian Institute of Astrophysics (IIA)) and the National Large Solar Telescope (also led by IIA). These upcoming missions would require

tremendous amount of mutual collaborations within the country and abroad. During the workshop, there were two dedicated sessions for 'Science with Aditya-1', where extensive discussion took place regarding what scientific goals can be achieved with the observations recorded by Aditya-1 and what sort of roles the scientific community could play to make it a successful mission. In addition, there were twenty three presentations and two colloquia, which were followed by lively but intense discussions.

In the final session of the workshop, a general discussion was held, where many different issues regarding scientific collaborations on Aditya-1 were raised. An emphasis was also given on forming more cohesion among the solar physicists in the country.

The workshop was coordinated by Durgesh Tripathi.



Workshop on Astronomy with Adaptive Optics on Moderate-sized Telescopes



Caltech and IUCAA are collaborating to develop a novel Adaptive Optics approach (called Robo-AO), which will be very attractive for 1-3 m class observatories. This project is supported by grants from IUCAA as well as the National Science Foundation (NSF), USA. The development phase of Robo-AO will soon culminate with its operational demonstration and scientific performance verification on Palomar 60 inch (P60) telescope over the next six months period. A number of observatories around the world have expressed interest in the Robo-AO concept, and are keenly awaiting the outcome of the project.

Robo-AO will usher in an era of new observational possibilities for small and medium class telescopes. These studies would cover the solar system, extra-solar planets, the Milky Way galaxy, other galaxies, active galactic nuclei, etc. to name a few. In particular, the Robo-AO capability will be very powerful for carrying out (i) large surveys, (ii) rapid characterization of transients and (iii) time domain astronomy. This workshop has allowed scientists and engineers who have been involved in the Robo-AO project to come together, exchange information and ideas and plan in detail the programme for P60 demonstration. It also has allowed astronomers in both the countries, who are interested in exploiting the capabilities of Robo-AO to generate unique and creative observational ideas. In addition, the workshop helped in crystallizing planned upgrades of Robo-AO to enhance its observational capabilities in the near-infrared wavelengths.

Another important component of the meeting was a one-day short workshop on adaptive optics on the first day. This was aimed at primarily Ph.D. students, who would be interested in and benefit from understanding the nuances of AO for their research work. The series of

talks given during the course covered the field of adaptive optics, right from motivation, history, components, algorithms, system engineering, etc., all the way to modern implementations of AO systems at Palomar and Keck Observatories. There was also an evening lecture on the AO system planned for the future Thirty Metre Telescope project.

A third component of the meeting was a coverage of adaptive optics related developmental work being carried out by different groups in India in several areas like defence, solar astronomy, atmospheric studies, etc. There was also a session on two other areas, where potentially India and US could collaborate: (i) ASTROSAT and NuSTAR satellites, and (ii) Palomar Transient Factory. Discussions have been initiated for collaboration in the Palomar Transient Factory (PTF) project, as well as its planned successor, the Next Generation Transient Factory (NGTF). The long term vision is that once NGTF survey starts on the Palomar 48 inch telescope, it will detect so many transient objects in the sky that a whole global network of Robo-AO enabled moderate-size telescopes will become busy carrying out follow up observations.

On the fourth day, a visit was arranged to IUCAA Girawali Observatory, which is at a distance of about 80 km from the IUCAA campus.

About fifty participants from India (both astronomers and otherwise) attended the meeting, including about twelve students. In addition, scientists, students and engineers totalling to fifteen from the US participated (four through video link). The meeting was sponsored by the Indo-US Science and Technology Forum (IUSSTF). It was coordinated by A. N. Ramaprakash at IUCAA, and C. Baranec at Caltech.

Welcome to the IUCAA Family

IUCAA is happy to announce the selection of the Twenty-second Batch (2011) of Visiting Associates. The Visiting Associateship is for a tenure of three years, beginning August 2011.

Extension of term to the Nineteenth Batch of Visiting Associates

01. Vasudha Bhatnagar, University of Delhi.
02. Gour Bhattacharya, Presidency College, Kolkata.
03. Suresh Chandra, Lovely Professional University, Phagwara.
04. Asis K. Chattopadhyay, Calcutta University, Kolkata.
05. Tanuka Chattopadhyay, Calcutta University, Kolkata.
06. Rabin Kumar Chhetri, Sikkim Government College, Gangtok.
07. Ujjal Debnath, Bengal Engg. and Science University, Shibpur.
08. Jishnu Dey, Presidency College, Kolkata.
09. Mira Dey, Presidency College, Kolkata.
10. Naseer Iqbal Bhat, University of Kashmir, Srinagar.
11. V.C. Kuriakose, Cochin University of Science and Technology, Kochi.
12. Manzoor A. Malik, University of Kashmir, Srinagar.
13. Pradip Mukherjee, Barasat Government College, Barasat.
14. Sanjay K. Pandey, L.B.S. (P.G.) College, Gonda.
15. S.K. Pandey, Pt. Ravishankar Shukla University, Raipur.
16. Kishor Dnyandeo Patil, B.D. College of Engineering, Sevagram, Wardha.
17. Ninan Sajeeth Philip, St. Thomas College, Kozhencherri.
18. Shantanu Rastogi, DDU Gorakhpur University.
19. Saibal Ray, Govt. College of Engineering and Ceramic Tech., Kolkata.
20. Sanjay Baburao Sarwe, St. Francis De Sales College, Nagpur.
21. T. R. Seshadri, University of Delhi.

New Visiting Associates

01. Bijan Kumar Bagchi, University of Calcutta, Kolkata.
02. Shuvendu Chakraborty, Seacom Engineering College, Howrah.
03. Ramesh Chandra, Kumaun University, Nainital.
04. Surajit Chattopadhyay, Pailan College of Management and Technology, Kolkata.
05. Sudipta Das, Visva-Bharati, Santiniketan.
06. Anoubam S. Devi, Assam University, Silchar.
07. Sunandan Gangopadhyay, West Bengal State University, Barasat.
08. Abhinav Gupta, St. Stephen's College, Delhi.
09. Suresh Kumar, Delhi Technological University.
10. B. S. Kushvah, Indian School of Mines, Dhanbad.
11. Soma Mandal, Taki Government College.
12. Rajib Saha, IISER, Bhopal.
13. B. P. Sarmah, Tezpur University.
14. Anand Sengupta, University of Delhi.
15. H. D. Singh, Sikkim University, Gangtok.

Welcome to ...

- **Debbijoy Bhattacharya**, who has joined as a Post-doctoral Fellow. His research interests include the study of blazars and modeling of AGN jets, accretion disks around black holes and the disk-jet connection. He also works on the origin of extragalactic gamma-ray background using Fermi observations.
- **Suvodeep Mukherjee, Anirban Ain, and Sabyasachi Chattopadhyay**, who have joined as Research Scholars.

... Farewell to

- **Harsha Raichur**, who completed her term as a Post-doctoral Fellow at IUCAA.
- **Mohammad Hasan**, who joined ISRO, Bangalore, as Scientist 'C'.
- **Saugata Chatterjee**, who has joined the Arizona State University, USA, to complete his Ph.D. degree.

IUCAA Seminars and Colloquia

Listed below are the seminars and colloquia given at IUCAA during July to September 2011.

Seminars

01.07.2011 Rajib Saha on *Removing foreground contaminations from CMB map using Non-Gaussianity measurement*; 04.07.2011 Kanak Saha on *Dynamical evolution of a low mass classical bulge in barred galaxies*; 04.07.2011 Moumita Aich on *CMB anisotropy in compact spaces*; 04.07.2011 Tuhin Ghosh on *Optimal approach of foreground parameter estimation using the WMAP data*; 04.07.2011 Gaurav Goswami on *Uncovering cosmic inflation*; 04.07.2011 Sandeep Kumar on *Modeling of cyclotron resonance scattering features (CRSF) in accreting neutron star in X-ray binary system*; 04.07.2011 Aditya Rotti on *A new window into stochastic gravity waves*; 05.07.2011 Maryam Arabsalmani on *Are GRBs standard candles?*; 05.07.2011 Saugata Chatterjee on *Black hole membrane paradigm in higher derivative gravity and conserved quantities*; 14.07.2011 Marsha J. Wolf on *Do merger-induced starbursts and AGN live and die at the same times?*; 18.07.2011 Ramesh Sharma on *Vacuum and conformally flat synchronous space-times*; 21.07.2011 Amitabha Lahiri on *Proving no hair theorems for black holes with a positive cosmological constant*; 25.07.2011 Suchetana Chatterjee on *Cosmological evolution of supermassive black holes*; 26.07.2011 Main Pal on *X-ray emission from 1H0419-577: Partial covering absorption or disk reflection*; 26.07.2011 Nagendra Kumar on *X-ray variability of AGN spectrum and Comptonization*; 26.07.2011 Vikram Khair on *QSO dominated extragalactic UV background*; 26.07.2011 Pallavi Bhat on *Turbulent dynamos*; 26.07.2011 Krishnamohan Parattu on *Lanczos-Lovelock theories of gravity*; 26.07.2011 Ritban Chatterjee on *The AGN/X-ray binary connection*; 01.08.2011 Akin Wingerter on *Tribimaximal mixing from small groups*; 16.08.2011 T. Roy Choudhury on *Constraining reionization history of the Universe*; and 17.08.2011 Sushan Konar on *Effects of glitches on magnetic fields in radio pulsars*.

Colloquia

08.08.2011 Somak Raychaudhury on *The turbulent youth of galaxies on the cosmic web*; 09.08.2011 Sukanta Bose on *Gravitational wave astronomy: Recent results and future prospects*; 22.08.2011 Rajaram Nityananda on *Imaging science: The journey from seeing to believing*; 23.08.2011 L. Hillenbrand on *A potpourri of accretion, outflow and activity in young suns*; 29.08.2011 Scott Dodelson on *The dark sector vs. modified gravity*; 05.09.2011 S.M. Chitre on *The inconstant Sun*; 06.09.2011 Siraj Hasan on *National Large Solar Telescope*; 13.09.2011 Anant Patki on *Meteoroids and space missions*; and 15.09.2011 Jogesh Pati on *Unification of forces and the evolution of the universe*.

Announcements

Workshop on Photometer Fabrication (January 9 –13, 2012)

This workshop is intended for lecturers from colleges and universities. The aim is to initiate and promote astronomical photometry observation programmes at college/university level. The total number of participants will be restricted to 10.

The academic content of the workshop will consist of talks covering various aspects of astronomical photometry, light pollution, photometer fabrication, etc., and will be delivered by IUCAA faculty and staff. The participants are expected to fabricate the night sky photometer and use it for the observations of light pollution and astronomical photometry, if they have access to small telescopes. They will fabricate the photometers under guidance from IUCAA coordinators, and these photometers will be given to them on loan from IUCAA. They will have to provide yearly updates on its usage with their own telescopes.

Post fabrication training of observations with the fabricated photometer will be carried out at night during the entire period of workshop.

To participate in this workshop, please send your resume by e-mail, along with a covering letter to **the Administrative Officer (Core Programmes), (e-mail : aocp@iucaa.ernet.in)** with subject "Photometer Fabrication Workshop", latest by November 15, 2011. Also, applicants should arrange to send a reference letter (preferably by e-mail to the above address) from the HOD/Principal/concerned authority, who is well-versed with the academic abilities and interests of the applicant. Participants will be provided free hospitality and accommodation during this workshop. Limited travel support will be available, and those who require travel support should mention that in their applications, clearly stating that they do not have any travel support from their project funds and/or Institution. Selected participants will be informed by e-mail towards the end of November 2011.

The workshop will be coordinated by Ranjan Gupta, with support from Arvind Paranjpye, Vilas Mistry, and Samir Dhurde.

Workshop on Gravitational Wave Data Analysis (January 23-27, 2012)

Tezpur University and Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune are jointly organising a Workshop on Gravitational Wave Data Analysis in the Department of Mathematical Sciences, Tezpur University, during January 23-27, 2012.

With several long-baseline interferometric gravitational wave observatories around the world beginning operations to detect gravitational waves, and the IndIGO consortium in India also gearing up for data analysis in the near future, a rich pool of trained manpower needs to be created to handle gravitational wave data analysis and related work.

In consonance with the above, this particular workshop is arranged (1) to motivate a select group of young students and faculty members from different parts of the country, and from north eastern region in particular, to pursue higher studies in the field of gravitational wave astronomy, and (2) to train the group with gravitational wave data analysis techniques. The resource persons for this workshop, who are expected to impart classroom lectures in the generation, propagation and detection aspects of gravitational wave at an advanced level with intensive computer laboratory sessions, will include experts from IUCAA, Tata Institute of Fundamental Research, Delhi University, Indian Institute of Science Education and Research (IISER) at Thiruvananthapuram, and Kolkata.

M.Sc. students, research scholars and faculty members of mathematics and physics with strong motivation to pursue future studies in gravitational waves are specially encouraged to participate in this workshop. As there will be intensive computer laboratory sessions, participants are expected to have a reasonable level of computer knowledge, specially familiarity with Linux OS.

Interested persons may send their resume by post or by e-mail along with a covering letter, mentioning the reason for participating in the workshop. The application shall be supported by reference letters from two referees to be sent separately. The deadline for applications and reference letters to reach the address below is November 10, 2011.

Selected participants will be provided with free hospitality during the workshop. Limited travel support, as admissible, may be available for participants on advance request. Those who require support should mention specifically in their application.

Bhim P. Sarmah

Department of Mathematical Sciences,
Tezpur University, Napaam-784028,
Tezpur, Assam.
e-mail : gwd12@tezu.ernet.in

Announcements contd....

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)**, IUCAA, by March 15, 2012 (for events to be conducted during August 2012 - July 2013), 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.

IGO Training School in Observational Astronomy (January 9 – February 3, 2012)

This school is aimed at training young researchers among Ph.D. students, post-doctoral fellows, faculty members from Indian universities/colleges/research institutes in astronomical observations and data reduction.

During the school, one week will be devoted for observations with IUCAA Girawali Observatory (IGO) 2 m. telescope under the guidance of experienced astronomers, followed by data reduction and presentation of scientific results. Rest of the time will be used to introduce the basic fundamentals of optical observations. The number of participants is restricted to five.

Applications (in plain paper) with complete curriculum vitae, current research plans/topics, e-mail address, etc. are invited from Ph.D. students, post-doctoral fellows, and young faculty members of Indian universities/colleges/research institutes, who want to pursue observational astronomy as their career, and the same should reach **The Administrative Officer (Core Programmes), IUCAA, Post Bag 4, Ganeshkhind, Pune 411007**, by November 10, 2011 (e-mail: aocp@iucaa.ernet.in, fax: (020) 25604699). Ph.D. student applicants should arrange to send a confidential reference letter from their thesis supervisor. The shortlisted candidates will be informed by the last week of November 2011, through e-mail.

All outstation participants will be provided travel support as per the norms, and free hospitality during the school.

Coordinators of the school: **R. Srianand and Vijay Mohan.**

Advanced Research Workshop on X-ray Timing (January 23 – 28, 2012)

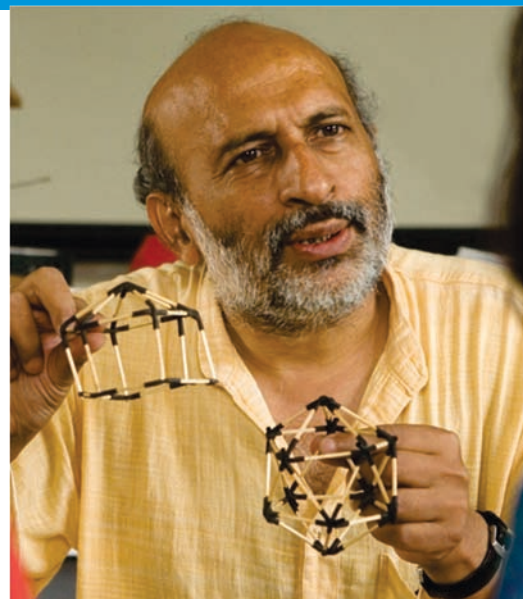
IUCAA will conduct an Advanced Research Workshop on X-ray Timing during January 23 – 28, 2012. The primary organisers are Dipankar Bhattacharya (IUCAA), and Tomaso M. Belloni (INAF). The intended participants are those already engaged or seriously interested in X-ray timing research. Timing principles and data analysis techniques with various software tools will be introduced. Topics such as high frequency aperiodic variability, cross spectral correlations, issues arising from statistical and instrumental effects, etc. will be covered. Hard X-ray timing using ASTROSAT CZTI detector will also be discussed. The workshop time will be divided equally between lectures and hands-on sessions. Those who would like to participate are requested to indicate their interest by filling in a simple form at:

http://www.iucaa.ernet.in/~astrosat/timingWS2012/participation_request.html

IUCAA Preprints

Listed below are the IUCAA preprints released during July – September 2011. 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>

Sanil Unnikrishnan, Shruti Thakur, and T. R. Seshadri, *Can $f(R)$ gravity mimic dark energy with constant equation of state parameter?*, IUCAA-15/2011; Amir Aghamousa, Mihir Arjunwadkar, and Tarun Souradeep, *Evolution of the CMB power spectrum across WMAP data releases: A nonparametric analysis*, IUCAA-16/2011; Shruti Tripathi, Ranjeev Misra, Gulab Dewangan, and Shantanu Rastogi, *Soft time lags in the X-ray emission of Mrk 1040*, IUCAA-17/2011; S. G. Ghosh, *5D radiating black holes in Einstein-Yang-Mills-Gauss-Bonnet gravity*, IUCAA-18/2011; Jayanti Prasad, and Tarun Souradeep, *Cosmological parameter estimation using particle swarm optimization (PSO)*, IUCAA-19/2011; Nidhi Joshi, Aditya Rotti, and Tarun Souradeep, *Statistics of bipolar representation of CMB maps*, IUCAA-20/2011; Laura G. Book, Marc Kamionkowski, and Tarun Souradeep, *Odd-parity bipolar spherical harmonics*, IUCAA-21/2011; and Pushpa Khare, Daniel Vanden Berk, Donald G. York, Britt Lundgren, and Varsha Kulkarni, *Exploring the dust content of SDSS DR7 damped Lyman alpha systems at $2.15 < z_{ab} < 5.2$* , IUCAA-22/2011.



Forthcoming events of Public Outreach Programme

Second Saturday

Lecture/Demonstration programme for School Students

October 8, 2011

Chemistry in the Kitchen
Arvind Paranjpye

Regular weekly events

Tuesdays and Thursdays
Scientific Toys Workshop
10:00 to 13:00 hours

Wednesdays
Astronomy Workshops
10:00 to 13:00 hours

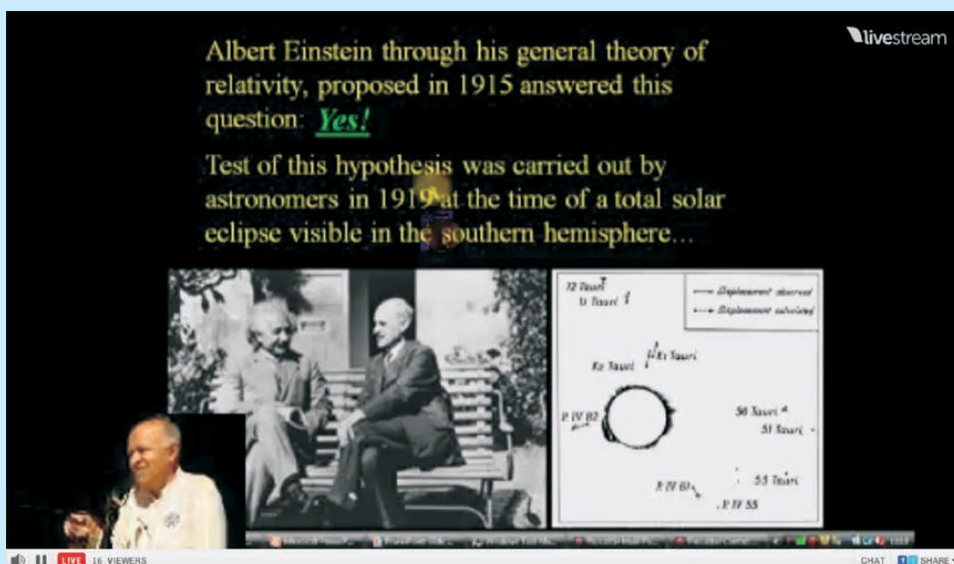
Thursdays
Public Visit to IUCAA
16:00 to 17:30 hours

Fridays
Public Sky Shows
18:30 to 20:00 hours

For details please visit

<http://www.iucaa.ernet.in/scipop>

IUCAA Outreach Lectures – Live webcasts



Jayant Narlikar delivered the first lecture on July 9, 2011 (the background is the slide that was projected, and the speaker in the inset).

Beginning this year, the outreach programme of IUCAA added a new dimension of web casting the lectures live. For the past 15 years or so, a regular lecture demonstration programme for the school students has been carried out in the Chandrasekhar Auditorium. Same lecture is delivered in English and Hindi or Marathi. About 1000 students of classes IX and X attend these lectures.

Now, these lectures are being streamed live through web cast, so that larger audience can participate. The web link and other details are available on the outreach URL - <http://www.iucaa.ernet.in/scipop>

Special session for hearing impaired students

Samir Dhurde conducted a special session for hearing impaired children from C. R. Ranganathan Residential School. He invited Milind Sathe, who himself is hearing impaired from his birth, and is the Hon. Gen. Secretary of Maharashtra Sports Council of the Deaf. Sathe used sign language to communicate astronomy to the students. It was heartwarming experience to every one present.



K. S. V. S. Narashimhan visits schools in Ambegaon Taluka



K. S. V. S. Narashimhan with Ameya Jadhav from Kamalaja Devi Vidyalay, Kalamb, winner of drawing competition



K. S. V. S. Narashimhan addressing a large gathering of students at Awasari

K. S. V. S. Narashimhan, who has been regularly visiting IUCAA, to give lectures on astronomy for M.Sc. students, had made a generous donation to encourage the students from Ambegaon Taluka (see Khagol # 78 April 2009). The amount is used for giving prizes to the winners of various competitions conducted on the occasion of National Science Day. In September 2011, he visited four schools at Awasari, Gavdewadi, Kalamb, and Chas, and interacted with students and teachers. He also congratulated the winners.

Rural Outreach



Tabasum Bhat addressing the students

Regular visits to schools in Ambegaon have been revived after the summer vacations. Tabasum Bhat, from Kashmir University, visited Pandharinath Secondary and Higher Secondary School, Pokhri. She gave a brief introduction about how she became an astronomer and talked about her work (archaeoastronomy and cosmology).

Visitors (July - September 2011)

Rana Adhikari, P.C. Agrawal, Bobomurat Ahmedov, B.G. Anandarao, Raj Bali, S.K. Banerjee, Naseer Iqbal Bhat, Vasudha Bhatnagar, Samarpita Bhattacharya, Sukanta Bose, Sulagna Chakrabarti, Shuvendu Chakraborty, Nabajit Chakravarty, Ritaban Chatterjee, Asis Kumar Chattopadhyay, Tanuka Chattopadhyay, Laxmikant Chaware, Suchetana Chatterjee, Rabin Chhetri, Tirthankar Roy Choudhury, Mamta Dahiya, Ghanashyam Date, Jyoti Prasad Deka, Jishnu Dey, Mira Dey, Scott Dodelson, Archisman Ghosh, Sushant G. Ghosh, Laura Green, Pooja Gupta, Eric Hooper, K. Indulekha, Bhola Ishwar, Joe Jacob, S.N.A. Jaaffrey, Suyog Ravindra Jadhav, Deepak Jain, Rekha Jaiswal, Sanjay Jhingan, Kanti Jotania, Minu Joy, Parag Kadam, Rama Kant, Mohd. Shafi Khan, Sushan Konar, Nagendra Kumar, V.C. Kuriakose, M.L. Kurtadikar, Amitabha Lahiri, Nestor Lasso, Ashish Mahabal, Soma Mandal, Manzoor A. Malik, S. Mukherjee, Sumit Mukherjee, Vijay Naik, Udit Narain, K.S.V.S. Narasimhan, Kamalika Nath, Sanjay Pandey, S.K. Pandey, P.N. Pandita, Prashant Pathak, M.K. Patil, B.C. Paul, Ninan Sajeeth Philip, Kartik Prabhu, Anirudh Pradhan, R. Ramachandran, Chayan Ranjit, C.D. Ravikumar, Somak Raychaudhury, Krishna Reddy, Sonali Sachdeva, Anirban Saha, Kanak Saha, Rajib Saha, Sk. Ali Saiyad, Bhim Prasad Sarmah, Anand Sengupta, T.R. Seshadri, Kiran Shanker, Ramesh Sharma, Jay Shreekar, Vishal Shukla, J.P. Singh, Donald J. Thielman, Pranjal Trivedi, P. Udayashankar, A.A. Usmani, D.B. Vaidya, Anand P. Vivek, and Marsha Wolf.

Visitors Expected (October - December 2011)

October :

Gour Bhattacharya, Presidency University, Kolkata; Saumyadip Chaudhury, Assam University, Silchar; Broja Dutta, Y.S. Palpara College, West Bengal; K.P. Harikrishnan, The Cochin College, Kerala; Bala Iyer, Raman Research Institute, Bangalore; Agnieszka Janiuk, Centre for Theoretical Physics, Warsaw, Poland; Kanti Jotania, M.S. University of Baroda, Vadodara; Shahid Khan, M.L. Sukhadia University, Udaipur; Soma Mandal, Taki Government College, West Bengal; Pradip Mukherjee, Barasat Government College, Kolkata; Sajeeth Ninan Philip, St. Thomas College, Kozhencherri, Kerala; B.S. Ratanpal, The M.S. University of Baroda, Vadodara; Tamal Sarkar, University of North Bengal, Siliguri; A.K. Sen, Assam University, Silchar; Kiran Shanker, University of Allahabad; Ranjan Sharma, P.D. Women's College, Jalpaiguri, West Bengal; Shruti Tripathi, Deendayal Upadhyay University, Gorakhpur; and Andrzej Zdziarski, NCAC, Poland.

November:

Manjari Bagchi, West Virginia University, USA; Sukanta Bose, Washington State University, USA; Russell Cannon, Anglo-Australian Observatory, Australia; Badri Krishnan, Max Planck Institute, Germany; Changbom Park, Korea Institute for Advanced Study, Korea; P. Vivekananda Rao, Osmania University, Hyderabad; and Priya Shanti D, Osmania University, Hyderabad.

December:

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Long term visitor :

Pushpa Khare (till January 2014)

Know Thy Clouds - 7

Cirrocumulus : Herringbone or Mackerel clouds

Arvind Paranjpye

As the monsoon recedes, often we see tufts of clouds scattered across the sky. These are cirrocumulus clouds. But often the term cirrocumulus indicates the entire patch of clouds, and then the individual clouds are referred to as a "cloudlets". The patches of these clouds are colloquially called "herringbone" (V-shaped weaving pattern of will fabric) or "mackerel" (fish).

The angular size of these tufts is just about half degree as seen from the surface of the earth. You can block the cloud with a finger extended at the arm's length. Needless to remind, a regular observing astronomer, that the sun and moon also subtend an angle of half degree at the earth. These clouds may remind you of altocumulus¹ which are the middle level clouds (reaching up to 7,000 m). Cirrocumulus do not cast shadows and look almost translucent.

Of five types of cumulus² clouds (signifying convection inside them), these are the highest clouds occur at 6,000 m to 12,000 m. Unlike cirrus³, these clouds have small amount of liquid water droplets in a supercooled state, but like cirrus, these have ice crystals. Ice crystals cause the supercooled water droplets to freeze rapidly and transform the clouds into cirrostratus. These clouds can also produce precipitation and are usually short-lived.

At sunset or sunrise, the clouds reflect the yellow, orange and red light, making these clouds one the most beautiful ones to look at.

1. *Know Thy Clouds - Khagol No. 83, July 2010.*


2. *Know Thy Clouds - Khagol No. 85, January 2011.*

3. *Know Thy Clouds - Khagol No. 86, April 2011.*

(Photograph by Arvind Paranjpye)



Cirrocumulus clouds

Name	:	Cirrocumulus
Symbol	:	Cc
Height	:	6,000 m - 12,000 m
Symbol	:	



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