



IUCAA

ISSN 0972-7647

KHAGOL

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No. 64 / October 2005

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

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Workshop on Observing Projects with Small Telescopes



Participants and lecturers of the workshop on Observing Projects with Small Telescopes

Twenty eight participants from various universities and colleges attended the workshop. The workshop theme was to discuss projects and exercises for M.Sc. students having course work in astronomy. Both types of projects which can be undertaken with small telescopes as well as without telescopes were discussed. Basic tools necessary for implementing such projects viz. telescopes, detectors, image processing, photometry, spectroscopy and error analysis, were covered by the lecturers. Speakers and topics were as follows:

Ajit Kembhavi (IUCAA) on Noise, Sky Brightness and Observing Limits; Ranjan Gupta (IUCAA) on Spectroscopy;

S.K. Pandey (Pt. Ravi Shankar Shukla University, Raipur) on Projects and Exercises in Astronomy; Arvind Paranjpye (IUCAA) on Using an Astronomical Telescope; Vijay Mohan (IUCAA) on Image Processing and Photometry; and Abraham Samson (IIA, Bangalore) on Domes for Small Telescopes.

Participants also presented the facilities in their departments and observing projects being undertaken by them. A demo session was held on Image Processing using IRAF. S.K. Pandey and Vijay Mohan coordinated the workshop.

IUCAA-NCRA Graduate School Courses

The IUCAA-NCRA Graduate School (conducted jointly with the National Centre for Radio Astrophysics (NCRA), Pune) is divided into two semesters (four terms) spread over one year. Each term is of roughly eight weeks duration. During the Graduate School, the Ph.D. students (Research Scholars) are taught relevant advanced courses in Physics and are also introduced to courses in Astronomy and Astrophysics (A & A). The Graduate School structure is given below. The number of teaching hours is shown in brackets after each course.

Semester I, Term I, From August second week to October first week.

01. Methods of Mathematical Physics I (21)
02. Introduction to Astronomy and Astrophysics I (14)
03. Electrodynamics and Radiative Processes I (14)
04. Quantum and Statistical Mechanics I (14)

Semester I, Term II, From October third week to December second week.

05. Methods of Mathematical Physics II (14)
06. Introduction to Astronomy and Astrophysics II (14)
07. Electrodynamics and Radiative Processes II (14)
08. Quantum and Statistical Mechanics II (14)

Semester II, Term I, From January first week to February fourth week.

09. Astronomical Techniques I (14)
10. Galaxies: Structure, Dynamics and Evolution (21)
11. Extragalactic Astronomy I (21)

Semester II, Term II, From March third week to May second week.

12. Astronomical Techniques II (14)
13. Interstellar Medium (14)
14. Extragalactic Astronomy II (14)
15. Project Work (During May - July).
16. Topical Course (for earlier batch of students) (< 21)

Syllabus for the Graduate School Courses

1. The courses are designed, emphasizing the aspects which are directly relevant to A & A. It is assumed that unnecessary repetition of material which is already taught at M.Sc. is avoided.
2. The syllabus provides enough avenues for topics which are of "local interest" to be included in the graduate school. This is necessary so that graduate students coming out of IUCAA/NCRA, not only have a comprehensive grasp of the A & A but are also aware of the key research areas in which these two institutions are concentrating at present.

If any of the Research Scholars from Indian universities/colleges are interested in attending any of these courses, they may contact: The Coordinator, Core Programmes, IUCAA, e-mail: vch@iucaa.ernet.in

An Introductory Workshop: From Stars to the Universe



The 14 inch telescope at the Madhava Observatory



G. Ambika in the lecture session

An introductory workshop entitled From Stars to the Universe was organized by IUCAA in collaboration with the Physics Department, University of Calicut, Kozhikode, on the university campus on August 7 and 8, 2005. The workshop was attended by about 150 students and teachers from university departments and colleges in the area around Kozhikode. The lectures given at the workshop were as follows:

G. Ambika (Maharaja's College): Non linear dynamics and Astrophysics; Naresh Dadhich (Director, IUCAA): Introduction to Einstein's Theory; Ajit Kembhavi (IUCAA): (i) Einstein's Gravity (ii) Opportunities in Astronomy; V.C. Kuriakose (Cochin University): Elements of

Cosmology; Jayant Murthy (IIA, Bangalore): Diffused UV Observations; Ninan Sajeeth Philip (St. Thomas College): Neural Networks and Their Applications in Astronomy; A.N. Ramaprakash (IUCAA): The Use of Small and Medium Telescopes; N. Kameswara Rao (IIA, Bangalore): Astronomy with Medium Sized Telescopes; Ulysses John Sofia (Whitman Astronomy, USA): Interstellar Grains and Dust.

There was a discussion session on Opportunities in Astronomy led by Ajit Kembhavi. The lectures were all followed by intensive questions and answers, and discussion on the topics covered.

A special event which took place during the workshop was the inauguration of the Madhava Observatory by Naresh Dadhich, Director, IUCAA, which has a new 14" telescope to be used by students and faculty of the university. The well equipped observatory with a dome has been set up with technical assistance from the Indian Institute of Astrophysics (IIA), Bangalore with dome design and construction being supervised by J.P. Abraham Samson of IIA. During the workshop, there was a discussion between Syed Iqbal Hasnain, Vice Chancellor of the university, his senior colleagues, and visitors from IUCAA about possible continuing collaborative programmes to be undertaken over the next few years. The coordinators of the workshop were B. Ravishankar Babu from the University of Calicut and Ajit Kembhavi from IUCAA.

Workshop on High Performance Computing



The participants of the High Performance Computing Workshop

The High Performance computing (HPC) facility of IUCAA entered the phase II of its projected development sometime back. The capability of the set up was more than doubled to 32 processors spread out on eight nodes of 64 bit 8x4 Alpha-Server ES45 68/1250 Systems that have a clock speed of 1.25 GHz with a generous random access memory per processor of a total 76 Gb RAM. While the four processors within each node directly share the memory, the nodes themselves are interconnected via the HP proprietary low latency high bandwidth MCA (Memory Channel Architecture) that allows seamless distribution of larger computing jobs over the entire cluster. The HP Trucluster Cluster File System (CFS) efficiently manages a single image files system allowing efficient data transfers within. The size of available CFS storage is about 2 Terabytes. TCP/IP (network) connectivity for all 8 nodes are achieved through gigabit ethernet connection. The HPC facility of IUCAA is heavily used by the IUCAA members and associates. Spare CPU time is also being provided to other groups in the university sector.

To promote and spread the use HPC in Astronomy and Astrophysics research, a training workshop on High Performance computing was held in IUCAA during October 5-9, 2004. The workshop was a joint venture with members of C-DAC, Pune. C-DAC members conducted the HPC course along the lines of their regular HPC programmes and also made available teaching manpower and the course material. The workshop scheduled many hands-on sessions to allow

participant to work on the HPC facilities both at IUCAA and C-DAC, Pune, round the clock. The workshop also featured inspiring seminars by prominent scientists, who use HPC in very different fields. There were talks on upcoming trends like grid computing and of the near future possibilities in HPC. There was a live compute cluster building demonstration by IUCAA visiting associate, Sajeeth Phillip and a presentation by Redhat, India on available and upcoming Linux clustering tools. The prime motive was to generate users for the HPC facilities in IUCAA and C-DAC. There were over 60 participants from all over India, who benefited from this workshop. A large number of computers were set up for all participants to work simultaneously. Typically, C-DAC training courses are costly and inaccessible to the university sector. Being an IUCAA activity, it allowed free participation from the university sector. The workshop was successful in creating users from the university sector. This was perhaps the first serious joint venture between IUCAA and C-DAC.

The workshop was coordinated by Tarun Souradeep and IUCAA HPC team members, Sarah Ponthratnam, Rita Sinha, Sunu Engineer, Sanjit Mitra and Anand Sengupta. Sundar Rajan and V.C. V. Rao led the CDAC team. Administrative support was provided by Manjiri Mahabal and Swati Gujar and system administration team of IUCAA set up and ably managed the large computer laboratory for the meeting. The description of the IUCAA HPC facility and the training workshop is available online at <http://www.iucaa.ernet.in/~hpc>

IUCAA Preprints

S. Chandra, P.G. Musrif, S.V. Shinde, S.A. Shinde, *Another suggestion for an interstellar C₅H₂ search*, IUCAA-27/2005; Massimo Tinto, S.V. Dhurandhar, *Time-Delay interferometry*, IUCAA-28/2005; A. Ivanchik, P. Petitjean, D. Varshalovich, B. Aracil, R. Srianand, H. Chand, C. Ledoux, P. Boisse, *A new constraint on the time dependence of the proton-to-electron mass ratio. Analysis of the Q 0347-383 and Q 0405*, IUCAA-29/2005; Rita Sinha, Tarun Souradeep, *Estimating Cosmological Parameters from CMBR: Systematic effects*, IUCAA-30/2005; K. Rajesh Nayak, S. Koshti, S.V. Dhurandhar, J-Y. Vinet, *Reducing the flexing of the arms of LISA*, IUCAA-31/2005; Mofazzal Azam, M. Sami, *Many body treatment of white dwarf and neutron stars on the brane*, IUCAA-32/2005; S.G. Ghosh, D.W. Deshkar, *Higher dimensional dust collapse with a cosmological constant*, IUCAA-33/2005; Rajib Saha, Pankaj Jain, Tarun Souradeep, *A blind estimation of the power spectrum of CMB anisotropy from WMAP*, IUCAA-34/2005; Anirudh Pradhan, Pouravi Verma, Saeed Otarod, *Plane symmetric inhomogeneous bulk viscous domain wall in Lyra geometry*, IUCAA-34/2005; Anirudh Pradhan, Pouravi Verma, Saeed Otarod, *Plane symmetric inhomogeneous bulk viscous domain wall in Lyra geometry*, IUCAA-35/2005; Anirudh Pradhan, G.S. Khadekar, Vrishali Patki, Saeed Otarod, *Kaluza-Klein type Robertson Walker cosmological model with dynamical cosmological term lambda*, IUCAA-36/2005; C. Mercier, Prasad Subramanian, Alain Kerdraon, Monique Pick, S. Ananthakrishnan, P. Janardhan, *Combining visibilities from the Giant Meterwave Radio Telescope and the Nanca y Radio Heliograph: High dynamic range snapshot images of the solar corona at 327 MHz*, IUCAA-37/2005; C.D. Ravikumar, Sudhanshu Barway, Ajit Kembhavi, Bahram Mobasher, V. C. Kuriakose, *Photometric Scaling Relations for Bulges of Galaxies*, IUCAA-38/2005; Dilip Paul and Bikash Chandra Paul, *Probabitlity for Primordial Black holes Pair in 1/R Gravity*, IUCAA-39/005.

Seminars

01.07.2005 Mohammad Sami on *Accelerated expansion and cosmological relevance of scaling solutions: Brane worlds, tachyons, phantoms, cosmic doomsday and all that*; 22.07.2005 Saeed Otarod on *A discussion on the devised new methods for solving nonlinear partial differential equations*; 27.07.2005 S. Mukherjee on *The emerging universe in Starobinsky model*; 29.07.2005 Sudipta Sarkar on *Quantum field theory in collapsing spacetime*; Sharanya Sur on *Cosmological inflation and generation of primordial perturbations*; Mudit Kumar Srivastava on *Outflows from quasars: The Z=2.082 absorption system towards quasar TOL 1037 – 2703*; 04.08.2005 Himan Mukhopadhyay on *Cosmic spectroscopy on CMB correlation patterns*; 08.08.2005 Maulik Parikh on *A matter of Inertia: Mach 2*; 09.08.2005 Rosanne di Stefano on *Mesolensing: Studying nearby dark and dim stars with gravitational lensing*; 25.08.2005 Urjit A. Yajnik on *Magnetic domain walls of relic fermions as dark energy*; 05.09.2005 Prathamesh M. Shenai on *Shapes of the Galaxies*; and 26.09.2005 Sanjit Mitra on *CM/GW Beams*.

Colloquium

07.07.2005 Somak Raychaudhury on *The largest structures in the universe and their dynamical effect on us*.

Congratulations to...

Arvind Gupta, on being conferred with an award by Prashant Padhye Educational, Cultural and Public Trust Fund, Satara.

Jayant Narlikar, on being conferred with the Vikram Sarabhai Lifetime Achievement Award (2004) by Consortium for Educational Communication, New Delhi, for his contribution to Education and Public Outreach.

IUCAA Post-doctoral Positions

Applications are invited for post-doctoral fellowships at IUCAA, for durations which are flexible within a range of one to five years. The fellowship includes a remuneration, contingency grant, accommodation on the campus and medical benefits. Facilities required for research are provided through the general IUCAA budget. Post-doctoral fellows with excellent performance can be considered for a tenured position.

The Inter-University Centre for Astronomy and Astrophysics (IUCAA) is an autonomous institution under the University Grants Commission. It was set up in December 1988 amidst the picturesque surroundings of the University of Pune. IUCAA has an integrated campus which includes the academic facilities as well as residential and recreational areas. IUCAA is a centre of excellence within the university sector for teaching, research and development in astronomy and astrophysics. The centre at present consists of about 35 academic members, including core faculty, post-doctoral fellows and graduate students, with potential for growth in the numbers. IUCAA has a vigorous visitor programme, involving short and long term visits of scientists from India and abroad. The centre has about 90 visiting associates from universities and colleges, who visit periodically and participate in all its activities. Further information can be obtained from the IUCAA website at www.iucaa.ernet.in

Applicants should send a curriculum vitae and list of publications, and arrange for three confidential references to be sent independently. All the relevant material should reach IUCAA by November 25, 2005. Candidates will be informed of the result by January 16, 2006. Successful candidates are normally expected to commence their fellowship during 2006.

Facilities at IUCAA: include a network of state-of-the-art computers, high speed internet connections, mirror sites of important databases like ADS and VIZIER, a very well equipped instrumentation laboratory and a library with exhaustive collections of books and periodicals. A 2m optical telescope has been installed by IUCAA at a site which is about 100 kms from the IUCAA campus and the scientific observations are expected to commence from beginning of 2006.

Research Areas covered by faculty members at IUCAA include:

- Classical and quantum gravity
- Cosmology and large scale structure
- Cosmic magnetic fields
- Gravitational waves
- Galactic and extragalactic astronomy
- High energy astrophysics
- Instrumentation for astronomy
- Interstellar medium
- Radio astronomy
- Solar system and stellar physics
- Virtual observatory

IUCAA has a vigorous observational programme in several areas. Support is available for guest observing from international facilities.

Other academic activities: include a graduate school for Ph.D. students, teaching at the Masters level for students from the University of Pune and other universities, schools and workshops, refresher courses for university and college teachers, and a vigorous public outreach programme.

Applications and enquiries should be sent by post or e-mail to:

The Coordinator,
Core Programmes,
IUCAA, Post Bag 4, Ganeshkhind,
Pune 411 007, India.
Email: vch@iucaa.ernet.in

Welcome to...

Soumen Basak, who has joined as a Post-doctoral Fellow. His research interests are Analog Models of Gravity, Blackhole Physics, Cosmological Perturbations, and Cosmic Microwave Background Radiation.

Santosh Joshi, who has also joined as a Post-doctoral Fellow. His research interests are Observational Astronomy, Site Observation for Astronomical Observations, and Instrumentation.

Dawood Ahsan Kothawala, who has joined as a Research Scholar.

Farewell to...

Manoj Puravankara, who has joined as a Post-doctoral Fellow at the Institute of Astronomy and Astrophysics, Academia Sinica, Taipei.

Rita Sinha, who has completed her one year tenure at IUCAA as a Project Scientist.

Workshop on Astrostatistics at the Department of Statistics, Calcutta University, Kolkata (December 21-23, 2005)

This workshop will cover the application of various statistical techniques to data analysis in astronomy. The aim will be to go beyond the usual statistical tests and to examine how the application of advanced techniques can lead to significant progress in astronomy. Lectures at the workshop will be delivered by astronomers and statisticians based in India and USA. The workshop will be suitable for research students, young researchers as well as experienced workers in astronomy and statistics, who wish to learn about exciting developments in astrostatistics and to possibly apply these to their own work. Limited funds for travel and stay are available. The workshop is being organized as a collaboration between IUCAA and the Department of Statistics, Calcutta University. Interested persons may contact Asis Chattopadhyay, Department of Statistics, Calcutta University, 35, Ballygunge Circular Road, Kolkata 700 019; Phone: (033) 24753681/82; 28890825 (O); Email: asis_stat@yahoo.com, chattopadhyayasis@hotmail.com

Visitors during July to September

Patrick Petitjean, Y. Akrami, E. Koukci, Tuhin Ghosh, B.P. Sarmah, B.C. Paul, V.B. Kamble, C.V. Vishveshwara, S. Barway, S. Raychaudhury, S.C. Kaushik, S. Mukherjee, N. Banerjee, P. Abdul Aziz, L. Chaturvedi, A. Zdziarski, S.C. Kulkarni, T.R. Seshadri, S.D. Chavan, S.L. D'Costa, P.R. Sandimani, S. Bhattacharya, S.G. Ghosh, Priyanka Sharma, Ramesh Narayan, S. Otarod, A. Pradhan, U.S. Raikar, B.L. Desai, R. Shirako, D.W. Deshkar, Sukanta Bose, Rajib Saha, K.A.P. Singh, R. Cowsik, M. Parikh, R. Baecher, G.S. Khadekar, V. Patki, P.K. Singh, B. Kylce, A.N. Yawalkar, S.M. Bhide, A.R. Kakade, J.K. Jumale, K.D. Thengane, A. Seniorita Devi, P.K. Sai Prakash, S. Balasubramanian, Arun Kumar, Urjit Yajnik, S. Mukherjee, S. Bhanja, R. Sinha, S.K. Banerjee, L. Chaware, Ninan Sajeeth Philip, J. Audouze, P. Janardhan, K. Mukunda, K. Biradar, S. Ramani, K.S.V.S. Narasimhan, S.P. Gupta

About 30 people attended the workshop on Observing Projects with Small Telescopes held at IUCAA during August 29 to 31.

Visitors Expected

October

A. Tartari, University of Milano Bicocca, Italy; Shiv Sethi, RRI, Bangalore; P. Khare, Utkal University, Bhubaneswar; D.C. Srivastava, Gorakhpur University; Saibal Ray, Barasat Government College, Kolkata; K.P. Harikrishnan, The Cochin College; B.S. Kushvah, B.R.A. Bihar University, Muzaffarpur; B. Ishwar, B.R.A. Bihar University, Muzaffarpur; Abhijit Bhattacharyya, St. Xavier's College, Kolkata; Abhik Kumar Sanyal, Jadavpur University; Ranbir Dutt, Visva Bharati, Santiniketan; Basanti Das, Belda Prabhati Balika Vidyapith; B.C. Paul, North Bengal University; P. Pal, University of Delhi; and D. Mayya, Instituto Nacional de Astrofisica, Mexico.

November

P. Karia, Nand Vidya Niketan, Surat; Ann Sayre Wiseman, USA; R. Tikekar, Sardar Patel University, Vallabh Vidyanagar; S.G. Tagare, Shadan Institute of PG Studies, Hyderabad; and Kanti Jotania, M.N. College, Visnagar.

December

Parampreet Singh, Pennsylvania State University, USA; A. Zdziarski, Nicolaus Copernicus Institute, Warsaw; D. Sokoloff, Moscow State University; J. Ehlers, Max Planck Institute, Germany; G. 't Hooft, Spinz Institute, The Netherlands; A. Shukurov, University of Newcastle, UK; P.N. Pandita, NEHU, Shillong and A. Ashtekar, Pennsylvania State University, USA

Experience tells us that when a solid body is dragged on top of another [like, for example, a steel block on rough ground] the dry friction is independent of the area of contact. Is this not surprising? Since the friction arises due to the interaction of atoms in the surface of contact should it not scale in proportion to the area? The viscous drag force between two layers of liquid, flowing relative to one another, is indeed proportional to the area of contact. Can you provide a quantitative explanation as to why solids behave differently?

Solution to For The Younger Minds – 13

This question is, of course, related to night sky brightness, which optical astronomers are always worried about. If the pupil of the eye has a diameter of $d = 2$ mm and the photon background intensity is I , then the flux of photons entering the eye per second is about $\pi I(\pi d^2/4)$. Taking the optimistic view that the night sky brightness in B-band ($\lambda = 445$ nm; $\Delta\lambda = 94$ nm) is 23 mag arcsec⁻², a simple conversion gives about $I \approx 10$ photons m⁻² s⁻¹ arcsec⁻² as the photon flux. Using 1 steradian $\approx 4.25 \times 10^{10}$ arcsec², we find that the eye receives about 4×10^6 photons in this band.

A “first principle” estimate of this number can be made as follows. A solid angle $d\Omega$ will intercept a volume $(1/3)R^3 d\Omega$ of our galaxy if R is the radius of the galaxy. If the number density of bright stars with luminosity of $L \simeq L_\odot$ is $n \simeq 0.1$ pc⁻³, then the flux per steradian is

$$\mathcal{F} \simeq \frac{1}{3}R^3(nL_\odot) \frac{1}{4\pi(R/2)^2} \simeq \frac{1}{3\pi}nL_\odot R \simeq 2.4 \times 10^{-5} \text{ W m}^{-2} \text{ rad}^{-2},$$

if $R = 10$ kpc. This is the bolometric flux in all bands. Taking a fraction $f \approx 10^{-2}$ of this energy to be in the B-band will lead to the same result as above.

Khagol (the Celestial Sphere) is the quarterly bulletin of IUCAA. We welcome your responses at the following address:

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