

KHAGOL

A quarterly bulletin of the Inter-University Centre for Astronomy and Astrophysics
(An autonomous institute of the University Grants Commission)



IUCAA
ISSN 0972-7647

Editor: Swara Ravindranath (swara@iucaa.ernet.in)
Editorial Assistant: Manjiri Mahabal (mam@iucaa.ernet.in)

No. 83 July 2010

Available online at <http://ojs.iucaa.ernet.in>

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Introductory Summer School on Astronomy and Astrophysics (for College/ University Students) & Vacation Students' Programme

The Introductory Summer School on Astronomy and Astrophysics, was conducted by IUCAA, during May 10 - June 11, 2010. Twenty-five students, who were in their final year of B.Sc., or first year of M.Sc., as well as second/ third year of engineering participated in the school. The programme consisted of a series of lectures on a wide range of topics in theoretical and observational astronomy, a few special lectures, data analysis, and problem solving sessions. Facilities like library, internet access, etc. were provided to the students during their stay. The main areas on which the lectures were given include, Astrophysical Processes, Stars and Stellar Systems, Gravitation and Cosmology, Telescopes and Instruments, and Data Analysis. The lectures were given by IUCAA and NCRA faculty members, and visiting associates of IUCAA. There were special lectures, which focused on the topics of frontier research, and new opportunities in



Participants and lecturers of the Introductory Summer School on Astronomy and Astrophysics
(for College / University Students) and Vacation Students' Programme

astrophysics. There was active involvement from the graduate students and post-doctoral fellows from IUCAA, who delivered lectures, which exposed the participants to the doctoral research work, and other active research areas being pursued by the youngest researchers in the institute. The IUCAA graduate students and post-doctoral fellows also helped with the problem solving and lab sessions. The participants were taken for a visit to the IUCAA Girawali Observatory to see the 2-m optical and infrared telescope. They also visited the GMRT, operated by NCRA. This year the Summer School students had the opportunity to do short-term projects, in groups consisting of five to six students, under the guidance of IUCAA faculty members and post-doctoral fellows. The aim of these short-term projects was to give the students an experience of working with real scientific data and analysis methods. The Summer School students made presentations of their project work on the last day of the school. The faculty coordinators for the IUCAA Summer School in the year 2010, were Swara Ravindranath, and Ajit Kembhavi.

The Vacation Students' Programme (VSP), for students in their penultimate year of M.Sc. (Physics) or Engineering degree course was held during May 10 - June 25, 2010. Exceptionally motivated final year B.Sc and second year engineering students were also invited. This year, five students (one in the second year of B. Tech.) participated in this programme. The participants attended about 50 lectures, dealing with a wide variety of topics in Astronomy and Astrophysics, given by the academic members, visiting associates of IUCAA, and faculty members of NCRA. They also did a project with one of the faculty members of IUCAA during this period. K. Subramanian was the faculty coordinator of this programme.

School Students' Summer Programme 2010

The annual School Students' Summer Programme was held from April 19 to May 28, 2010. Ninety-three students of class VIII / IX / X were invited to work on a week long project at IUCAA. Most of the participants were high scorers in the National Science Day quiz contest organised on February 28.

During the above period, starting every Monday, teams of 2-6 students were guided on scientific projects by volunteering scientists at IUCAA. This year the students carried out projects under the supervision of J. V. Narlikar, K. Subramanian, S. Unnikrishnan, R. Ansari, D. Bhattacharyya, S. Laha, D. Mukherjee, S. Kolekar, A. Rotti, C. Jose, A. Paranjpye, A. Rupner, and S. Dhurde.

The projects covered wide-ranging topics from Calculus to Gravitation to Musical instruments. While one team studied different kinds of telescopes and did a study on the relation between society and telescopes, another researched the relation between Mathematics and Physics through Lissajous figures. There were

astronomy related topics like the study of Pulsars, introduction to AGN, scale of Solar System and the effects of Solar phenomenon on Earth. One team measured the latitude and longitude of IUCAA using the Samrat Yantra after understanding how it works. Several experiments related to electricity and magnetism were also carried out. The students were given access to the main IUCAA library, and the facilities of the Mukhtangan Vidyanay Shodhika, including the library, computers and workshops. On completion of their work on the last working day of every week, the student teams made presentations about the work they did during the week, and submitted a report.

School students engrossed in various activities during this programme



An Advanced Workshop on Astronomy Observation, Theory & Interpretation



The participants and the Lecturers of the Workshop

An Advanced Workshop on Astronomy was held during April 5-9, 2010 at IUCAA Resource Centre (IRC), Physics Department, North Bengal University, Siliguri. B.C. Paul from NBU and G. C. Dewangan from IUCAA coordinated the program. There were 37 participants, including faculty members and research scholars from different parts of the country. The speakers of the workshop were A. K. Kembhavi, R. Misra, G. Dewangan, B. Paul, I. Chandra, A. Chatterjee, S. Mukherjee, S. K. Ghosal, B. C. Paul, and A. Bhadra. The main objective of the workshop was to train interested young researchers having some exposure on astrophysics. The area of observational astronomy using data, in particular those obtained by Indian telescopes and ASTROSAT, has been discussed to generate research interest among the participants and motivated M.Sc. students, research scholars, and young faculty members of college/university. It was an interactive workshop with a series of lectures on both basic and advanced topics of observational astronomy. In addition to the lectures, considerable time was devoted for hands-on-training to analyze X-ray data. G. C. Dewangan coordinated the data analysis sessions.

During the workshop, a special lecture was delivered by eminent Astrophysicist, Ajit Kembhavi, Director of IUCAA, to mark the occasion of signing a Memorandum of Understanding (MOU) between the University of North Bengal and the Inter-University Centre for Astronomy and Astrophysics (IUCAA), on April 06, 2010 in the Conference Hall of the administrative building. Students and faculty members from different departments of North Bengal

University as well as teachers from various affiliated colleges attended the programme. A. Basumajumdar, Vice Chancellor of the university inaugurated the Programme. Both, A. Basumajumdar and A. K. Kembhavi highlighted the importance of data Centre in doing work in observational Astronomy and related areas of research. B. C. Paul, Head, Department of Physics, NBU, narrated the activities of the IRC since its inception, and its close association with IUCAA. S. Mukherjee and S. K. Ghosal outlined the activities of the IRC and emphasized IUCAA's role in the region, which uplifted the research opportunities in Northern India.

Introductory Workshop on Optical and Infrared Astronomy (October 26-29, 2010)

The Department of Physics, DDU Gorakhpur University, Gorakhpur will be hosting an IUCAA- sponsored Introductory Workshop on Optical and Infrared Astronomy during October 26-29, 2010.

The workshop is aimed at post-graduate students and young researchers, who intend to take up research in the field of Astronomy and Astrophysics. The workshop will focus on modern observational methods and analysis techniques. The main topics include introduction to the concepts and methods of astrophysics, survey of astronomical objects, stellar structure, galaxies, astronomical photometry, and spectroscopy. There will be demonstrations on data handling and processing.

To participate in this workshop, please send your resume by post or e-mail along with a covering letter to the address given below before October 4, 2010.

Participants will be provided with free hospitality (boarding and lodging) during this workshop. Limited travel support will be available. Those who require travel support should mention that in their application.

D. C. Srivastava / Shantanu Rastogi

Department of Physics
DDU Gorakhpur University
Gorakhpur 273 009, Uttar Pradesh.
Ph : (0551) 2332398
e-mail : shantanu@iucaa.ernet.in.

Workshop on Recent trends in Astronomy and Astrophysics at the Department of Physics, Tezpur University



Participants and Lecturers of the workshop

Department of Physics, Tezpur University had organized a Workshop on Recent trends in Astronomy and Astrophysics, during October 21-23, 2009 to mark the International Year of Astronomy. The workshop was sponsored by IUCAA. The idea behind arranging the workshop was to motivate young students and faculty members of the North-East region to pursue higher studies in the field of Astronomy and Astrophysics, and give them exposure to the latest developments in this field. The workshop was inaugurated by H. Duorah, former Vice Chancellor, Gauhati University. M. K. Choudhury, Vice Chancellor of Tezpur University assured of extending all kinds of support in starting Astrophysics specialization in M.Sc. programme in the Department of Physics, Tezpur University, during the inaugural session of the workshop. IUCAA faculty members Ranjeev Misra, Swara Ravindranath, and Gulab Dewangan, and M.P. Bora, and Archana Bora from Gauhati University, delivered inspiring talks at the workshop. Some of the topics of discussion were radioactive processes and accretion disks, galaxies, structure and evolution, X-ray astronomy, active galactic nuclei, and plasma processes in astrophysical environments. Ranjeev Misra delivered a public talk on "Observational evidence for black holes". Participants from various universities and colleges of North-Eastern states attended the workshop. The workshop was coordinated by Ranjeev Misra and Neelakshi Das.

Workshop on Laboratory Astrophysics : Applications to Cosmic Dust (November 12 -13, 2010)

The Mafatlal Gagalbhai Science Institute, Ahmedabad will be hosting an IUCAA sponsored workshop on Laboratory Astrophysics: Applications to Cosmic Dust, during November 12-13, 2010.

This workshop is intended for college and university teachers who are involved in research aimed to have a better understanding of the nature of cosmic dust grains. The importance of laboratory studies in several branches of astrophysical research is now recognised and several international groups are very active in these areas of research. The main topics proposed to be covered are Experimental studies in light scattering by small particles; Extinction and polarization by suspensions / dispersed media; Angular distribution of scattered intensity and linear polarization; Spectroscopic studies in UV, visible and IR; Laboratory spectra of amorphous and crystalline silicates in the IR; Simulation in laboratory of solid grains; Optical constants of silicates and carbonaceous materials from UV to IR; Dusty plasma, etc. Lectures covering the above topics will be held in the morning sessions and early afternoon sessions. Demonstrations and experiments will be conducted later in the afternoon.

To participate in this workshop, please send your resume by post or e-mail along with a covering letter to the address given below before September 30, 2010. The total number of participants will be restricted to 30.

Participants will be provided free hospitality and accommodation during this workshop. Limited travel support will be available. Those who require travel support should mention that in their applications.

Contact address :

Chirag Y. Pandya / Deepak B. Vaidya

Department of Physics,
M. G. Science Institute
Ahmedabad 380009, Gujarat.
Telephone (079) 26302872
FAX : (079) 26300242
drcvpandya@gmail.com
deepak.vaidya@iccsir.org

ISGWA@UoD10 IndiGO School on Gravitational Wave Astronomy (December 13 - 24, 2010)

IUCAA Resource Centre at the University of Delhi will be hosting an IUCAA-sponsored school on Gravitational Wave Astronomy during December 13 - 24, 2010.

This school is intended for highly motivated B.Sc. / B.Tech / B.E. / M.Sc. students with strong background in Physics and Mathematics to provide exposure to the emerging and exciting area of Gravitational Wave Astronomy. A few Ph.D. students interested in the area can also be accommodated. The total number of participants will be restricted to 25. The aim of the school is to familiarise young students to the research opportunities in various aspects of Gravitational Wave Astronomy, and assist them in pursuing it as an exciting career option in the future.

The academic content of the school has been carefully planned. It begins with a series of lectures on the basic physics, astrophysics and detection of gravitational waves, and moves on to advanced topics including gravitational wave data analysis. The lectures will be delivered by eminent scientists from different institutes. In addition to the lectures in the morning, there will also be tutorial sessions with hands-on exercises in the afternoons. There is a possibility that a few committed students may be identified for specific follow up research projects.

To participate in this workshop, please send your resume by e-mail along with a covering letter to seshadri.tr@gmail.com with subject "INDIGO SCHOOL" by August 31, 2010. Applicants should arrange to send a recommendation letter (preferably by email to the above address) from their teacher or someone, who is well-versed with their academic abilities and interests. Participants will be provided free hospitality and accommodation during this school. Limited travel support will be available. Those who require travel support should mention that in their applications.

Contact address :

T. R. Seshadri / Anand Sengupta,

Dept. of Physics and Astrophysics,
University of Delhi,
Delhi 110 007.

Email : trs@iucaa.ernet.in / trs@physics.du.ac.in.

IUCAA-IGNOU/NCRD, Guwahati Introductory Workshop in Astronomy and Astrophysics (December 15 - 17, 2010)

IGNOU / NCRD, Guwahati, will be hosting an IUCAA sponsored Introductory workshop in Astronomy and Astrophysics. This workshop is intended for young researchers (final semester post-graduate students, research scholars, and college / University teachers) who are working in the area of observational astronomy. The workshop will enable participants to efficiently use the next generation space and ground based telescope facilities such as Herschel, JWST, ALMA, VISTA, SCUBA / JCMT, etc. The total number of participants will be restricted to 25.

To participate in this workshop, please send your resume by post or e-mail along with a covering letter to the address given below before September 30, 2010. Ph.D. students, PDFs and young faculty members interested in starting their research career in observational astronomy are particularly encouraged to apply. They should arrange to send a recommendation letter from their guide or head of the department along with their application. Participants will be provided free hospitality and accommodation during this workshop. Limited travel support will be available. Those who require travel support should mention that in their applications.

Contact address :

Anil Ch. Borah

Deputy Director
North East Centre for Research and Development
Indira Gandhi National Open University
Near Nayantara Super Market
R/No. 2, 6 mile
Guwahati 781 022, Assam
E-mail : anilchborah@ignou.ac.in / anilchborah@yahoo.com
Fax : (0361) 2335461.

Welcome...

IUCAA Honorary Fellow

Professor Govind Swarup, FRS, has accepted an invitation by the Governing Board of IUCAA to be an Honorary Fellow of IUCAA. We are very happy to welcome him to the IUCAA Family.

IUCAA Photometer Fabrication Workshop (December 6 - 10, 2010)

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 / staff. The participants are expected to fabricate the night sky photometer and use it for the light pollution observations 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 use with their own telescopes.

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

To participate in this workshop, please send your resume by e-mail along with a covering letter to The Administrative Officer (Core Programmes), at snk@iucaa.ernet.in with subject "Photometer Fabrication Workshop" latest by September 15, 2010. Applicants should arrange to send a recommendation letter (preferably by e-mail to the above address) from the concerned HOD / Principal, or someone who is well versed with their academic abilities and interests. 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 with a statement 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 September 2010.

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

IUCAA Preprints

Listed below are the IUCAA preprints released during April to June 2010. 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>

E. Hadamcik, A. K. Sen, A. C. Levasseur - Regourd, R. Gupta, and J. Lasue, [Polarimetric observations of comet 67P / Churyumov-Gerasimenko during its 2008-2009 apparition](#), IUCAA-10/2010; Sukanta Deb, Harinder P. Singh, T. R. Seshadri, and R. Gupta, [A CCD photometric study of the late type contact binary EK Comae Berenices](#), IUCAA-11/2010; Dhiraj Kumar Hazra, Moumita Aich, Rajeev Kumar Jain, L. Sriramkumar, and Tarun Souradeep, [Primordial features due to a step in the inflaton potential](#), IUCAA-12 / 2010; G. C. Dewangan, R. Misra, A. R. Rao, and R. E. Griffiths, [Associated spectral and temporal state transition of the bright ULX NGC 1313 X-](#), IUCAA-13/2010.

Seminars

Listed below are the seminars conducted at IUCAA during April - June 2010.

15.04. 2010 J.V. Narlikar on [A search for very old stars](#); 12.05.2010 Mita Brierley on [High resolution spectral models for globular clusters](#); 14.05. 2010 Onkar Dabeer on [Design of next generation networks](#); 07. 06. 2010 Sebastien Heinis on [Relations between star formation history in galaxies and their environment : constraints from Galex](#); 17.06.2010 Roustam M. Zalaletdinov on [Macroscopic gravity and cosmology](#); 21.06.2010 Sanil Unnikrishnan on [Barotropic scalar field models in cosmology](#); 22.06.2010 Harsha Raichur on [Broad band spectral study of LMXB Aql X-1](#); 24.06.2010 Pavan Iyengar on [X-ray irradiated accretion disk structure](#); 24.06.2010 Anu N. Mohan on [Super massive black holes](#); 24.06.2010 Suvodip Mukherjee on [The epoch of reionization in the universe](#); 24.06.2010 Shabnam I.S. on [Modelling GRB Polarization arising from Compton drag](#); 24.06.2010 Sukhdeep Singh on [Variable X-ray absorption and broad iron K alpha line](#); 25.06.2010 Bhaswati Bhattacharyya on [Investigation of single pulses from pulsars](#); 25.06. 2010 Kinjal Banerjee on [Total derivatives in general relativity with torsion](#); 28.06.2010 Surjit Paul on [Understanding the role of filaments in formation and evolution of morphology and energy budget of large scale structures](#); 29.06.2010 Moumita Aich on [Statistical isotropy violation of the CMB brightness fluctuations](#); and 29.06.2010 Gaurav Goswami on [Non-standard evolution of modes of perturbations during inflation](#).

Visitors

(April - June 2010)

Mahadev Pandge, Mahadevappa Swami, Nitin Wadnerkar, Sandip Bhattacharya, Joe Jacob, S. Datta, T. Saha, N. Thakur, A. Mukherjee, A. C. Kar, S. Majumdar, S. K. Chatterjee, R. Rama, Prithi Kumari, Dipwanita Das, Dhiraj Kumar Hazra, L. Sriramkumar, Ravi Joshi, Jeena Samuel, Ashish Goyal, Himanshu Pawar, Nikhil Khatavkar, H. Duggal, Amitesh Omar, Diego Altamirano, Devraj Pawar, Archana. M, C. Murugesan, B. Mukhopadhyay, B. C. Paul, Jagdish Arora, Ashok Kumar Rai, Anwar JahanZuberi, P. Prakash, S. Venkatesan, G. P. Agrawal, M. Koteswara Rao, R. Samyuktha, V. G. Talwar, Asoke Kumar Sen, K. Indulekha, Anirban Saha, S. Das, S. Kalyan Chandra, B. Karmakar, S. Malla, T. Ghosh, A. Barman, R. Pandiyan, P. Sreekumar, J. D. Rao, U. Kesava Raju, B. P. Dakshayani, M. Pitchaimani, V. Vinu, C. S. Stalin, S. S. Hasan, T. Ramasami, T. P. Prabhu, Bhagyashree Bavare, M. Chandrashekhar, Tanmay Macwan, Sonali Sachdeva, Pushpa Khare, Roustam Zalaletdinov, Parminder Singh, Vartika Gupta, Minu Joy, Daksh Lohiya, Rachel Reena Philip, Mita Brierley, P. Venkatakrishnan, Saji Augustine, K. R. Jotania, Ujjal Debnath, Mohit Tanga, Samarpita Bhattacharya, K. P. Harikrishnan, Sanjay Sarwe, Sarbari Guha, Jibitesh Dutta, K. D. Patil, Subenoy Chakraborty, Nairwita Mazumder, Ritabrata Biswas, Habib Khosroshahi, Reza Ravani, Asghar Jafarzadeh, Pranjal Trivedi, A. A. Usmani, Sebastien Heinis, Sanjay Pandey, Chinmayee Sawant, Paniveni Udayashankar, Anjan Dutta, P. K. Srivastava, Sk. Saiyad Ali, Mamta, T. R. Seshadri, Biplab Raychaudhuri, Shruti Tripathi, Mahesh Kumar Yadav, Jagjivan Ram Balai, Shruti Thakur, Ratul Chowdhury, Shantanu Rastogi, Sourav Kumar Sahoo, Nidhi Joshi, Archana Pai, S. Shankaranarayanan, Sanjay Singh, K. Suresh, Jai Singla, Fr. A. Abraham, Ens Mathews, K. G. Biju, Yogesh Chahar, Rizwan Khan, Anant Kesavan, Shailesh Kulkarni, A. Chattopadhyay, T. Chattopadhyay, and S. K. Pandey.

About 19 students alongwith 4 teachers visited in April from the Idukki District of Kerala as part of a special programme arranged by Joe Jacob, Visiting Associate of IUCAA; 25 students attended the summer school, and 5 students attended the Vacation Students' Programme during May-June 2010.

Visitors Expected

July :

V. C. Jain, Govt. Engg. College, Ajmer; Tarundeep Saini, IISc., Bangalore; Samir Mathur, Ohio State University, USA; Smita Mathur, Ohio State University; B. Ahmedov, Institute of Nuclear Physics, Uzbekistan; S. N. Borah, DKD College, Assam; S. K. Banerjee, Centre for Engineering Studies, Dehradun; A. Pradhan, Hindu PG College, Ghazipur; Padmini Yadav, Hindu PG College, Ghazipur; Bari Maqbool Bhat, Kashmir University; Manmohan Dash, Texas A & M, USA; S. P. Singh, MMM Engg. College, Gorakhpur; Anirban Saha, West Bengal State University; K. Jeena, Calicut University, Kerala; V. Jithesh, Calicut University, Kerala; P. N. Pandita, NEHU; Mansi Kasliwal, Caltech, USA; Anoop Kumar Srivastava, DDU Gorakhpur University; Prashant Singh, APS University, Rewa; J. P. Singh, APS University, Rewa; Sonali Sachdeva, Delhi University; Shradha Patel, Delhi University; Laxmikant Chaware, Pt. Ravishankar University; and Arundhati Dasgupta, University of Lethbridge, Canada.

August :

Udit Narain, Meerut College; Pooja Gupta, Meerut College; Joginder Sharma, Meerut College; Kanti Jotania, M. S. University of Baroda; Kunal Sharma, Sardar Patel University; Alain Lecavelier, Institut d'Astrophysique de Paris; M. K. Patil, SRTMU, Nanded; A. Kakodkar, DAE, Mumbai; C. D. Ravikumar, Calicut University; and Ravikiron, Osmania University, Hyderabad.

September :

K.S.V.S. Narasimhan, Chennai; George Djorgovski, California Inst. of Technology, USA; Ashish Mahabal, California Institute of Technology, USA; Devraj Pawar, R. Jhunjhunwala College, Mumbai; Nidhi Joshi, Jamia Millia Islamia; Jishnu Dey, Presidency College, Kolkata; Mira Dey, Presidency College, Kolkata; and B. Ishwar, BRA Bihar University.

Long term visitors

P. P. Divakaran (till October, 2010), R. Tikekar (till May 2011), and N. Sajeeth Philip (till January, 2011).

IUCAA Girawali Observatory Training School

A training school on observational astronomy was organised at IUCAA during April 1-30, 2010. The aim of the school was to train potential users of IGO telescope in observational astronomy. Two young Ph.D. students and two faculty members from universities attended the school. A few introductory lectures on observational astronomy, standard preparations for observations and how to write observing proposals were given to the participants by Vijay Mohan, Ranjan Gupta, A. N. Ramaprakash, Ajit Kembhavi, and R. Srianand. Each participant was associated with a faculty member to do a two weeks project based on observations taken with IGO telescope. After introductory lectures, the participants were taken to IGO for

observations in two groups for a duration of three nights each. While one group was observing, other was being trained in data reduction. After learning basic data reduction techniques, the participants interacted with their respective supervisors for analyzing and interpreting the data observed by them from IGO. At the end of the programme, each participant presented a 20 minute seminar, summarizing the results obtained by them. The projects were supervised by R. Srianand, Ranjan Gupta, Swara Ravindranath, and Joydeep Bagchi.

The school was coordinated by Vijay Mohan and R. Srianand.

Cumulus : Clouds with Vertical Development

This article is the second in the series and we begin the discussion on the identification of clouds starting with the type of cloud we are most familiar with. The puffy, woolly, cotton ball like clouds floating in the sky are often illustrated in fairy tales showing dancing fairies and jumping children or saints with halo behind their head playing some musical instrument, on these clouds. These are cumulus clouds.

The cumulus clouds are at a height above the ground where water vapour carried by rising hot air cools and condenses to form the cloud droplets. This height is called condensation level of the atmosphere.

The cumulus clouds have rather well defined outline and have flat base. The upper part of the cloud appears brilliantly white in particular against the blue sky background. The base is generally gray or dark.

These clouds can completely hide the moon or the sun. If you are at high altitude such as on top of a hill overlooking large area on land then you can see the shadows of these clouds on the ground. The life time of these clouds vary from about 5 minutes to about less than an hour. The temperature inside these are in the range of +15 deg C to -5 deg C.

Small widely spaced cumulus are associated with fair weather. These clouds are identified as cumulus humilis or fair weather clouds. But as the cloud grows and start towering, looking more like cauliflower tops then it is called cumulus congestus and it is associated with bad weather. These clouds are then hardly be the place where one would like to go to. These clouds have very strong convection inside them, with water vapour rapidly rising and falling. Aviators avoid these clouds, in particular those flying small aircraft.

These clouds then can grow into cumulonimbus which we shall discuss in the next article.



Name

Cumulus

Symbol

Cu

Temperature

15 to -5 deg C

Symbol (graphic representation)
little vertical
development



Height

500 to 1000 m

Symbol (graphic representation)
Considerable vertical
development



Height

500 to 2000 m

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

We welcome your responses at the following address :

IUCAA, Post Bag 4, Ganeshkhind,
Pune 411 007, India

Phone

Fax

(020) 25691414; 25604100

(020) 25604699

email : publ@iucaa.ernet.in

Web page : <http://www.iucaa.ernet.in/>