KHAGOL
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A Bulletin of the
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(An Autonomous Institution of the University Grants Commission)

No. 22 **April 1995**

National Science Day

IUCAA celebrated the National Science Day on February 28, 1995, with a participation of about 500 school students. The main theme of this year's celebration was the total solar eclipse to be seen on October 24, 1995. Fifteen schools had participated in model making competition with the theme of demonstrating the phenomenon of eclipse. There were a couple of entries which were very innovative in design. The first, second and third prizes for this competition were won by Jnana Prabodhini Prashala, V.K. Patil Memorial School and Smt. Vimlabai Garware High School respectively. Another eye-catching item was the performance of an *Astro-ballet* by the students of the Sanjeewan Vidyalaya, Panchgani, based on the theme of the myths and legends about the eclipses that exist in about twenty different communities in the world. A video film on total solar eclipse of February 16, 1990 was shown. It ended with a quiz contest in which about 80 schools participated. The first, second and third prizes for the quiz contest were won by St. Vincent High School, Vidya Bhavan High School and Kendriya Vidyalaya, Southern Command respectively. The ceremony concluded with the Director giving away the rotating Trophy, Cup and a retainable plaque to the winning team.

School students demonstrate the model for Lunar and Solar Eclipse during National Science Day Celebrations

Indo-French School on

"Understanding Large Scale Structures in the Universe"

The first Indo-French School on Understanding Large Scale Structures in the Universe *(Sponsored by Indo-French Centre for Promotion of Advanced Research)* was held at IUCAA, Pune, during January 30 - February 20, 1995. This is the first school which was organised in the area of Astrophysics, a thrust area identified under the Indo-French collaboration.

Six speakers from France and three from India delivered fortytwo lectures, while twelve scientists delivered fifteen seminars. The following topics were covered :

*Observational Review of Large Scale Structures, Standard Big Bang Cosmology, Linear Perturbation Theory and CMBR, Obs*ervational *Aspects of CMBR Anisotropy, Population Synthesis, Star Formation and Hydrodynamic Processes, Weakly and Strongly Nonlinear Regime and Statistics of Density Fields.*

Participants of the Indo-French School

A book containing the lecture notes of this school will be brought out in about a year's time and this publication will be edited by T. Padmanabhan of IUCAA and F. Bouchet of Institut D'Astrophysique, Paris; they were the Coordinators of this school.

Parsecstones in Astronomy - 10 — *J.V. Narlikar*

The Discovery of Helium

In the Total Solar Eclipse (TSE) of 1868, astronomical observations achieved a "first", namely, the first time that the astronomical setting led to a discovery which was replicated in a terrestrial laboratory years later. This happened in the TSE observations by the French astronomer Pierre Jules Cesar Janssen (1824-1907) at Guntur, now in the Andhra Pradesh state of India. The source of a yellow line in the flash spectrum was identified as a new element which, because of its presence on the Sun (Helios in Greek), was named Helium. The genesis of the name is due to the co-discoverer of the new element, Joseph Norman Lockyer (1836-1920). The same element was discovered anew on the Earth in 1895 by Ramsay in a classical investigation as a constituent of the earth's atmosphere. Today, the cosmologists recognize it as the next most abundant element in the universe after hydrogen. There is a postscript to the eclipse episode. During his post-eclipse stay in Simla, Janssen made the first spectrohelioscope, which was used for the daily examination of the Sun. It was the transit of Venus on December 9, 1876, that led to the institutionalization of astrophysics in India. European solar physicists realized the advantage of India's sunny weather for their research and took the initiative. The Government of India was persuaded that support for the study of the Sun would help prediction of the errent monsoons, so essential to India's agriculture!

Workshop on Computer Networks

A workshop on Computer Networks was held at IUCAA during January 2-13, 1995. The workshop was co-sponsored by NCST, Bombay, and ICTP, Italy. A number of invited speakers from India and abroad spoke on the principles and practices of computer networking. The topics included:

(i) TCP/IP networking technology, (ii) Messaging systems, (iii) Network security, (iv) User services - Network news, Archie, WAIS, Gopher, WWW, Xmosaic, etc.

Lectures were held in the morning and the afternoons were devoted to computer laboratory sessions. Fifty-six participants from universities, colleges and research institutions attended the workshop. During informal discussions, computer networking problems of the participants were discussed and solutions were proposed.

Participants of the Workshop on Computer Networks

Discussion Meeting on Group and Singularity Analysis of Differential Equations

Peter Lesch and Kesh Govinder from University of Natal, Durban (South Africa), conducted a week long course on manipulating differential equations by using the techniques of Lie and Painleve analysis with special reference to Einstein's equations. It was attended by about 25 colleagues from universities. The participants had an opportunity to have hands-on experience of using Lie analysis software package. The lecture notes as well as the Lie package was provided to the particpants so that they could actually use it in their places of work. The topics discussed included: Symmetry and invariance under transformation, Symmetries of differential equation, Computer methods, Algebraic properties of symmetries of ordinary differential equations (ode) and their first integrals, Similarity reductions of partial differential equations (pde) and Painleve analysis of ode and pde.

Participants of the Discussion Meeting

Estimating Scintillation of Stars

If you look at the sky in a remote area, it appears to be quiet and steady -- the only indication of some variability is scintillation of stars. Scintillation of stars is easily seen even in the relatively light-polluted sky of cities and a careful observer also notices that although bright stars appear to scintillate, the bright planets do not scintillate -- absence of scintillation is an obvious distinguishing feature of the planets, which otherwise appear like the stars to the unaided eye. In this instalment we will discuss the origin of scintillation and a way to make measurements of it.

The light from stars, etc. has to travel through the atmosphere before it reaches us, and consequently it suffers effects due to refraction, etc. The atmosphere can be considered as made up of plane parallel layers, each having a refractive index corresponding to its density. In practice, however, each of these layers has some variations in density from position to position and hence the refractive index also varies. In effect, each layer acts like a bad sheet of glass, which has a wavy surface, and can be considered as a collection of randomly distributed weak lenses. You can easily verify that if a piece of bad sheet glass is kept above the floor, the sunlight passing through it gives rise to a non-uniform illumination of the floor; this effect is very small if the sheet is kept close to the floor. It is also seen that if the sheet is moved sideways, the illumination pattern on the floor follows the motion of the sheet. Thus, if you kept your eye at the floor and moved the sheet sideways, the sun would appear to scintillate. In a very similar way the motion of the upper layers (5 - 10 km. high) of the atmosphere give rise to scintillation of stars.

We can arrive at the time scale and angular scale of scintillation by considering the wind velocity and the effects of diffraction. A consideration of diffraction effects shows that the light reaching our eye is affected by an area which is at least as large as ~ 10 cm. (The diameter increases with increasing height). If the wind velocity is taken as 36 km./hr., then the whole layer would move by 10 cm. in about 10 ms. Thus every 10 ms. or so we are looking through a new position of the atmospheric layer at 10 km. height and the brightness of the stars would appear to change on such a time scale if our eye could detect it. In addition to these fast variations, there would be slower variations in the atmospheric layers, on a scale size which is much larger than 10 cm. It can also be seen that if we are looking at two nearby stars which are separated by an angle greater than 2 sec. of arc, then the light reaching us from the two would have travelled through different portions (each of $\phi \approx 10$ cm. size) of the layers at 10 km. height, and therefore, the variations in their brightness would be independent of each other. A bright planet can be considered as a collection of many stars spread over angles much larger than 2 sec. of arc, and these stars would scintillate independently of each other, i.e., some of these brighten up while the others are dimming. As a consequence, the combined light of all the different parts of a planet shows very little scintillation.

In practice, the scintillations we observe is caused by the combined effect of the atmospheric layers at all the levels above the ground. Further, due to the larger thickness of the atmosphere stronger scintillations are observed at larger zenith angles. You could measure the scintillations by modifying the photometer described in the last issue (Khagol, No. 21, January 1995) on a small telescope (see the box below).

Taking the the Observations

Consider the circuit diagram given in Astroproject - 8, on page 5 of Khagol No. 20, October 1994. The product of the value of the capacitor C3 and resistance R4 gives us a quantity called 'time constant', generally denoted by T, [$T_{(second)} = R_{(ohms)} \times C_{(Farads)}$]. T nearly corresponds to the time interval over which amplifier integrates the signal.

Therefore, fixing values of R and C in a circuit we can decide the time interval on which we would like to make our measurements. In Astroproject - 9, on page 4 of Khagol No. 21, January 1995, we were interested in measuring flux from stars. To average out scintillation, the time constant was kept much larger than 10 ms. [The time constant was 3.9×10^6 ohms x 0.4×10^{-6} Farads $\approx$ 1.5 sec.] In the present study, we want to measure change over 10 ms. Keeping resistance R4 = 3.9 M ohms, value of C can be calculated as 2.5 nF for the time constant of 10 ms.

The modified circuit then can be used as described in Astroproject-9. Follow the steps for taking observations given on page 4. First measure the D.C. output voltage of the photometer. This voltage gives us average value for the star's flux received at the photodiode. Now take second set of readings of AC output voltage. This will be the measure of scintillation. The ratio A.C./D.C. would be small for stars near zenith as their scintillations is not strong, whereas this ratio would be a good fraction of unity for stars near the horizon - This is because the much larger depth of the atmosphere gives rise to strong scintillations. Variation of signal due to scintillation over a period of time can be demonstrated by using an oscilloscope.

- *A. Paranjpye*

Errata : Astroproject - 8 : Part list

Error	Correction
1. R3 10k Ω [MFR 1%]	R3 18k Ω [MFR 1%]
2. R4 3.9k Ω [MFR 1%]	R4 3.9M Ω [MFR 1%]

Welcome...

to the new **UGC Chairperson, Armaity Desai,** who is also the Chairperson of IUCAA's Governing Body and Governing Council. We look forward for her guidance in all our endeavours.

to the new members of the **Governing Body,** the **Governing Council** and the **Scientific Advisory Committee** who are appointed for a period of three years from January 1995.

and

...Farewell

to the former UGC Chairman, **G. Ram Reddy.** We thank him very much for his whole hearted support and advice.

to the former members of the **Governing Body,** the **Governing Council** and the **Scientific Advisory Committee,** who have given invaluable input into the veins of IUCAA. We thank them too.

Pep talks

By Locals

3.3.95 **A.N. Ramaprakash** on *Thermal Equilibrium in Emission Nebulae*, 31.3.95 **T. Padmanabhan** on *Some Curiosities in Newtonian Gravity and Classical Mechanics.*

By Visitors

7.2.95 R. **Schaeffer** on *Fractals, Percolation, Genus and all that,* 15.2.95 **Y. Mellier** on *Observing Faint Objects.*

Extramural Activities

Ratan Thiyam and his group performed two dramas: **Chakravyuha,** December 24, 1994 and **Andha Yug,** December 25, 1994.

Vinay Kulkarni, Talk on - **AIDS: How it Concerns You?,** February 7, 1995.

Post Doctoral Fellowship

Applications are invited for a post-doctoral fellowship under the project **Modelling of nonlinear effects in high-power optical cavities of laser interferometric gravitational wave detectors,** sponsored by the *Indo-French Centre for Promotion of Advanced Research.* The project is in collaboration with J.Y. Vinet at the Ecole Polytechnique, France, who is directly involved with the French-Italian Gravitational Wave Detection project VIRGO. The project will be undertaken at the IUCAA, Pune, India, under the supervision of S.V. Dhurandhar and B.S. Sathyaprakash. **The project is for a duration of *three* years from June 1, 1994.**

The total emoluments at the beginning of the fellowship will be around Rs. 4000/- per month (which is commensurate with IUCAA post- doctoral fellowship) and a suitable accommodation is available on the IUCAA campus. The post-doctoral appointment will be initially offered for a period of *one year* with the possibility of renewal till the end of the project depending on the progress of the candidate. *Candidates are expected to have a doctorate degree in physics /astrophysics and should have a very good experience in computing.*

Detection of gravitational waves is the most challenging experiment in physics today. There is a worldwide effort to build highly sensitive laser interferometric gravitational wave detectors. At IUCAA, there already exists a group that has expertise in modelling laser interferometric gravitational wave detectors. This group is also actively involved in developing efficient data analysis algorithms for detecting gravitational waves. The present project involves simulating interferometric laser cavities and studying the response of realistic cavities to gravitational waves. The post-doctoral fellow is expected to work in close collaboration with the French group and may be required to visit France as a part of the project.

IUCAA is located in the lush environs of the Pune University Campus. It has a stimulating research environment, excellent computing facilities e-mail, telnet, ftp, etc.) and an up-to-date library.

Interested applicants may send their applications to the project supervisors: S.V. Dhurandhar or B.S. Sathyaprakash, IUCAA or by email to: ***sanjeev@iucaa.ernet.in*** or ***bss@iucaa.ernet.in.*** The last date for the receipt of the applications is **June 1, 1995.**

V All India Amateur Astronomers' Meet

(January 14 - 16 , 1995 at Pathani, Samanta Planetarium, Bhubaneshwar)

The above Meet was sponsored substantially by IUCAA and DST. About 150 participants spent three days with a variety of programmes including an address by Jogesh Pati. The Samanta Chandrasekhar Planetarium hosted the Meet and there were attractive items such as painting contest on various astronomical themes, essay contest, dance-drama performance by a local group and concluded by the General Body Meeting of the Confederation of Indian Amateur Astronomers. On this occasion, two books namely: *'Nightfall on a Sunny Morning'* by Nilesh Vaidya, Samir Gandhi and N.C. Rana, and *'Jewels in the Sky'* by Binaya Krushna Pattannayak, published by the Confederation were formally released. A. Paranjpye of IUCAA and two students of Jyotirvidya Parisanstha, Pune, (Anagha Agte and V. Kulkarni) demonstrated a low cost photometer built at IUCAA for estimating the magnitudes of stars, using 3 inch telescope. (see Astroprojects 8, 9 & 10). The venue for the next Meet has been tentatively decided to be in Madras.

Lecture Series by

R.M. Vivekanand, NCRA, Pune:

Physics of Pulsars, January 11 - 17, 1995 (six lectures)

And

Igov Novikov, Theoretical Astrophysics Centre, Copenhagen:

(i) **Can we see what happens inside a black hole?** February 17, 1995, (ii) **Astrophysics of black holes,** February 20, 1995, (iii) **Can we change the past? (Physics in the presence of a time machine),** February 21, 1995.

Colloquia held at IUCAA...

19.1.95 **D. Lal** on *Cosmic Rays and Planetary Sciences* and 20.2.95 **S. V. Damle** on *Ways and Means of Space Research: Scientific Balloon - a Poor Man's Satellite .*

Seminars held during January - March

5.1.95 **Rosanne Di Stefano** on *Binary stellar systems in globular clusters,* 6.1.95 **Arvind Borde** on *Did the inflationary universe have a beginning ?,* 6.1.95 **Jogesh Pati** on *Unity of forces and understanding the origin of families and mass scales,* 10.1.95 **Smita Mathur** on *Absorption in AGN,* 12.1.95 **Naresh Dadhich** on *Gravitational Casimir effect,* 1.2.95 **Mike Thompson** on *Helioseismology: Probing the interior of a star,* 2.2.95 **Jean-Yves Vinet** on *Virgo: A first step towards gravitational wave astronomy,* 8.2.95 **P.G.L. Leach** on *The in-channel evolution of the mixmaster universe,* 10.2.95 **A.A. Rangwala** on *Nonlinear evolution equations, Baiklund transformations and solitons,* 2.3.95 **Somenath Chakrabarty** on *Quark bubble nucleation in neutrons in presence of strong magnetic fields,* 9.3.95 **Gordon Love** on *Progress in adaptive optics and liquid crystal wavefront corrections* and 14.3.95 **Somenath Chakrabarty** on *Electron capture rates of light. elements of astrophysical interest in the presence of a non-thermal tail of electron plasma.*

IUCAA Preprints

Listed below are the IUCAA preprints released during January - March 1995. These can be obtained from the Librarian, IUCAA.

Varun Sahni, B.S. Sathyaprakash and S. Shandarin *Voids and their evolution in the model,* IUCAA-1/95; **D. Munshi, B.S. Sathyaprakash and Varun Sahni** *Comparison of nonlinear approximations to gravitational instability,* IUCAA-2/95; **Biplab Bhawal** *Evolution of intra-cavity fields at non-steady state in dual recycling interferometer,* IUCAA- 3/95; **M.C. Durgapal** *Uniform density spheres in general relativity,* IUCAA-4/95; **P.G.L. Leach, S.D. Maharaj and K.S. Govinder** *Closed form solutions for equations derived from the Einstein* field *equations,* IUCAA-5/95; **S.D. Maharaj, P.G.L. Leach and K.S. Govinder** *Cosmic strings in Bianchi III spacetime: integrable cases,* IUCAA-6/95; **S.D. Mohanty and B.S. Sathyaprakash** *A modified periodogram for the detection of gravitational waves from coalescing binaries,* IUCAA-7/95 ; **J.S. Bagla and T. Padmanabhan** *Evolution of gravitational potential in the quasilinear and nonlinear regimes,* IUCAA-8/95 and **J.S. Bagla and T. Padmanabhan** *A new statistical indicator to study nonlinear gravitational clustering and structure formation,* IUCAA-9/95.

Ravi Gulati participated in the IAU General Assembly XXII, which was held in the Hague, The Netherlands, during August 14-24,1994. He presented a poster paper during joint discussion session on *Accuracy of the HR Diagram and Related Parameters.*

He visited the ICTP, Italy, from August 24 to September 24, 1994, and carried out collaborative research work at the Department of Astronomy, University of Trieste. He went to USA and attended the fourth annual Astronomical Data Analysis Software and Systems Conference in Baltimore, Maryland, during September 24-28, 1994 and presented a poster paper and a computer demonstration on classification of stellar spectra using Artificial Neural Networks. He visited NASA, Goddard Space Flight Center during September 28 - October 1, 1994, and also visited Department of Astronomy, University of Michigan, Ann Arrbor, during October 1-4, 1994, and gave a talk on *Synthesis of stellar spectral features.* During October 4-8, 1994, he had been to CfA, Cambridge, Massachusetts, to interact with R.L. Kurucz for use of his stellar model atmospheres and spectrum synthesis technique.

He also visited the Department of Astronomy, University of Toronto, Canada, during October 8-15, 1994, where he gave a talk entitled, *Tools to understand stellar populations.* He was a visiting faculty member, sponsored by CNRS, at the Institut d' Astrophysique de Paris, from October 15 to December 31, 1994. During this period, he has initiated a collaborative work with Michele Gerbaldi on determining physical properties of A-type peculiar stars. He gave a talk on *Employing an artificial brain to stellar classification.* During his stay in France, he made a short visit to Observatoire De Haute Provence, Saint Michel.

During September-early November, 1994, **N. Dadhich** visited universities of Aegean (Samos, Greece), Barcelona, Bilbao, Guthenburg, Stockholm, Queen Mary Westfield College, Southampton, Wales, Portsmouth and Institute of Astrophysics, Copenhagen and Institute of Astronomy, Cambridge. He gave an invited plenary lecture on *Uniqueness of non-singular inhomogeneous perfect fluid cosmological models* in ERE-94 (Spanish Relativity Meeting) held at Menorca, during September 12-14, 1994, and also gave a talk on *Inhomogeneous non-singular cosmological models* in the Aegean Conference on Relativity and Cosmology, held at Karlovassi (Samos), during September 5-7, 1994.

Debiprosad Duari visited the following institutes and also attended some conferences during August-September 1994.

August 2-8, Institut du Astrophysique, Paris, France; August 8-14, Institut du Astrophysique, Liege, Belgium; August 14-27: XXII General Assembly of the IAU, Hague, Netherlands; August 27- September 2, Universitat van Amsterdam, Amsterdam, Netherlands; August 31, Kapetyn Institute, University of Groningen, Netherlands; September 2-12, Institute of Astronomy, Cambridge, United Kingdom; September 12-15, Royal Observatory, Edinburgh, United Kingdom; September 15-17, Queen Mary and Westfield College, London, United Kingdom; September 18-24, Conference on Large Scale Structure of the Universe : Theory and Observations, Potsdam, Germany; September 25-30, CERN, Geneva, Switzerland.

Ashish Mahabal visited the Las Companas Observatory, Chile, during January 20 - February 4, 1995. He carried out observations of low redshift radio galaxies in broad optical and infrared bands using the 40" and 100" telescopes with Patrick McCarthy. He then visited the Kitt Peak National Observatory for a week, observing star burst galaxies using a 36" telescope. He then visited Carnegie Institute of Washington, Pasadena, for infrared image processing.

J.V. Narlikar visited Japan under the India-Japan Cooperative Science Programme during March 2-12, 1995.

He had interaction with K. Sato from University of Tokyo and J. Yokoyama from the Kyoto University. He had discussions on details of operating an exchange programme between scientists from IUCAA with these two universities.

He delivered a colloquium at Tokyo University on *Challenges and Puzzles in Astronomy* and a seminar on *The Quasi-Steady State Cosmology : Achievements and Challenges.* He delivered a seminar at the Yukawa Institute, Kyoto University on *Quasi-Steady State Cosmology: Achievements and Challenges.*

Public Lecture

Antony Hewish, University of Cambridge: The Excitement of Pulsars, January 23, 1995.

Visitors Expected

April : V.M. Nandakumaran, Cochin University of Science and Technology; P.S. Naik and B.S. Krishnamurthy, Gulbarga University; M.A. Ittyachen and Sukumaran Nair, Mahatma Gandhi University.

May : P.C. Vinodkumar, Sardar Patel University; S.G. Tagare, University of Hyderabad; K.S.V.S. Narasimhan, Madras; S. Mukherjee, North Bengal University.

June : B. Ishwar, B.R.A. Bihar University; R.K. Thakur, Raipur.

Visitors to IUCAA January - March 1995

January: B.R. Iyer*, B. Babuji, N.S. Borade, M. Chakraborty, S. Verma, S.S. Tomar, A. Srivastava, R.C. Senapati, K.E. Rangarajan, J.S. Nathan, B.N. Shinde, S. Banerjee, A.D. Bobra, S.N. Pradhan, Pardeep Kumar, A.K. Mukhopadhyay, S. Bhattacharya, V. Ghildyal, C.P. Revankar, G.H. Patil, M. Gohel, D. Rajasekar, P. Ramadurai, D. Khadadi, D. Gopinath, C.G.K. Samy, M. Somasekaran Pillai, V.V. Rane, O.P. Vyas, S. Upendra Rao, A.K. Gupta, A. Murtaza, S. Ramani, D.C. Kothari, K. Shanmuganathan, A. Beesham, R. Jain, N. Srivastava, G. Garge, Y. Chandra, H. Shridhar, J. Pati, A. Induruwa, J.N. Desai, S.H. Pathak, R. Cowsik, D.K. Sahu, M. Sakagami, S. Mathur, G. Sampemane, A. Mehta, K. Rama Reddy, N.V. Madhusudana, A. Bhanumathi, T. Nagarajan, R.M. Singru, R. Batra, S.S. Jha, M.C. Durgapal, S. Mukherjee, D. Lal, A. Hewish, P.G.L. Leach, K.S. Govinder, S.D. Maharaj, V. Chitnis, A.K. Sharma, S. Jhingan, Y. Mellier, E. Hivon, M. Sharma, F. Bouchet, A. Blanchard, D. Barbosa, P. Valageas, S. Roy, C. Mukku, C.N. Kumar, F. Ahmed, M.C. Sabu, D.K. Chakrabarty, B.C. Paul, L.K. Patel, R. Tikekar, S.S. Prasad, N. Banerjee, A.A. Sen, B.C. Chauhan, S. Banerji, R. Subrahmanyan, Charu Ratnam, S. Bharadwaj, D.C. Srivastava, M.K. Sah, T.R. Seshadri, E. Audit, C. Benoist, R. Teyssier, L.N. Katkar, G.G. Asgekar, V.C. Kuriakose, T. Singh, V.O. Thomas, S. Duari, J.Y. Vinet, R. Schaeffer, M.J. Thompson and E.L. Lokas.

February: B. Ishwar, D. Puy, B. S. Katti, B. Guiderdoni, J.P. Chieze, S. Sreedhar Rao, C.R. Ganguli, V. Krishnakumar, V. Chitnis, P.G.S. Mony, G.K. Johri, I. Novikov, I. Artemova, S.G. Bhargavi, S.V. Damle, S. Chakraborty, A.R. Prasanna, S. Mukherjee.

March : G. Love, S.K. Pandey, Pramod Kumar, K.P. Rao, Kiran Shankar, V. Chitnis, S. Mukherjee and S.P. Tarafdar.

** He visited IUCAA during December 26-31, 1994, which was inadvertently missed out in the previous issue of Khagol No. 21, January 1995.*

The Indistinguishable Boses

R.K. Kocchar has described a mix-up that took place in 1927 when the wrong Bose was invited to an important conference at Como, Italy. The invitee should have been S.N. Bose, the author of the famous 1924 paper on statistics of indistinguishable particles (now known as Bosons) that explained Planck's law of black body radiation. The invitation instead went to another scientist, D.M. Bose who attended the meeting.

The source of the mistake can be traced to Einstein himself whom S.N. Bose had requested to communicate his paper to Zeitschrift fur Physik. The paper communicated by Einstein was credited simply to Bose, without initials although Bose's letter to him did carry the correct initials. Moreover, in a follow-up paper Einstein referred to this paper as by D. Bose. This confusion may have happened because D.M. Bose had spent some time in Berlin, and Einstein may have inadvertently applied the principle of indistinguishability of Bosons to the Boses themselves! The Como conference organizers prior to sending the invitation probably looked for Bose's initials and found the wrong ones in Einstein's paper.

Members of IUCAA deeply *mourn* the passing away of our Honorary Fellow, Professor William A. Fowler on March 14, 1995. Several of us have happy memories of Willy Fowler's visit to IUCAA in March 1990 when he delivered a public lecture in Pune, which was well attended and greatly appreciated.

Khagol **(the Celestial Sphere) is the Quarterly Bulletin of IUCAA.We welcome your responses at the following address:**

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