

# **Annual Report 1988-89**

**Inter-University Centre for Astronomy and Astrophysics,  
Pune.**

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*Edited by*

**Pramila Malegaonkar**

Library & Publications Section, IUCAA

*Cover:*

Perspective drawing of proposed IUCAA buildings

*Architect :* Charles Correa

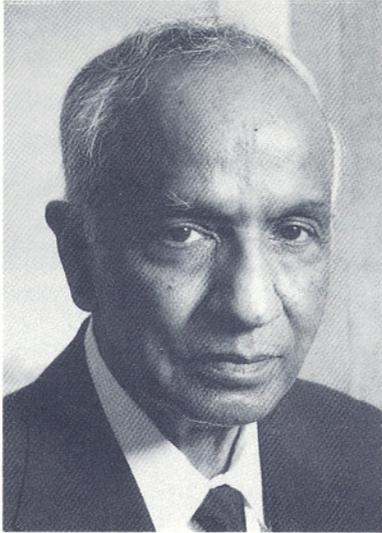
*Construction Management Consultant :* Shrikhande Consultants Pvt. Ltd.

## The Council

- \*Professor Yash Pal (President)  
Chairman, University Grants Commission
- \*Professor K. Sachidananda Murty (Vice President)  
Vice Chairman, University Grants Commission
- Professor V.R. Gowariker  
Secretary to the Government of India, Department of Science and Technology
- Professor U.R. Rao  
Secretary to the Government of India, Department of Space
- Professor A.P. Mitra  
Director General, Council of Scientific and Industrial Research
- Professor S.M. Agarwal  
Vice Chancellor, Ravishankar University
- Professor R.P. Bambah  
Vice Chancellor, Panjab University
- \*Professor M. Bhattacharya  
Vice Chancellor, University of Burdwan
- \*Professor S.C. Gupte  
Vice Chancellor, University of Poona
- Professor M. Lakshmanan  
Vice Chancellor, Madurai Kamaraj University
- \*Professor T. Navaneeth Rao  
Vice Chancellor, Osmania University
- \*Professor Moonis Raza  
Vice Chancellor, University of Delhi
- Professor Satchidanand Sinha  
Vice Chancellor, Rajasthan University
- Professor K.D. Abhyankar  
Emeritus Professor, Osmania University
- Professor A. Banerjee  
Department of Physics, Jadavpur University
- Professor A.N. Mitra  
Department of Physics, University of Delhi
- \*Professor N. Mukunda  
Indian Institute of Science
- \*Professor Archana Sharma  
Department of Botany, Calcutta University
- \*Professor G. Swarup  
Director, GMRT Project., TIFR, Pune.
- \*Professor S.D. Verma  
Department of Physics, Gujarat University
- \*Professor S.K. Khanna  
Secretary, University Grants Commission
- \*Professor J.V. Narlikar (Secretary)  
Director, IUCAA

\*Members of the Governing Body of IUCAA. The President and Vice President of the Council are respectively the Chairman and Vice Chairman of the Governing Body.

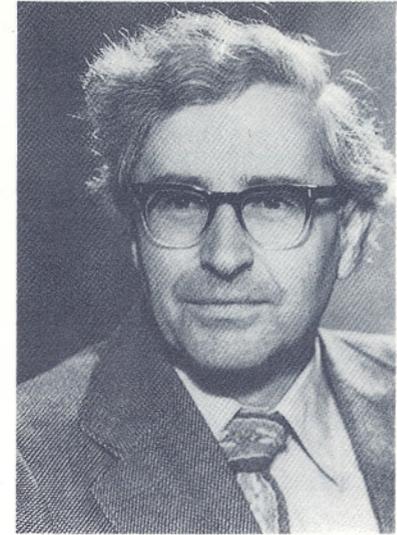
## Honorary Fellows



Professor S. Chandrasekhar  
University of Chicago, Chicago



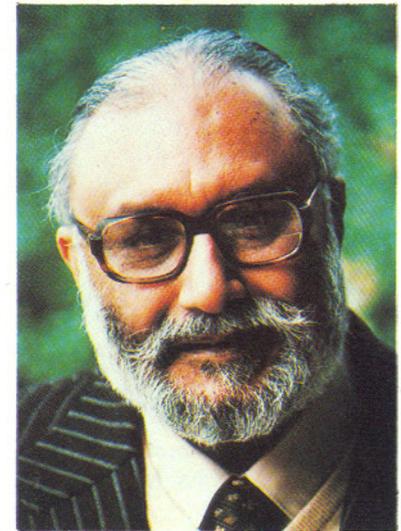
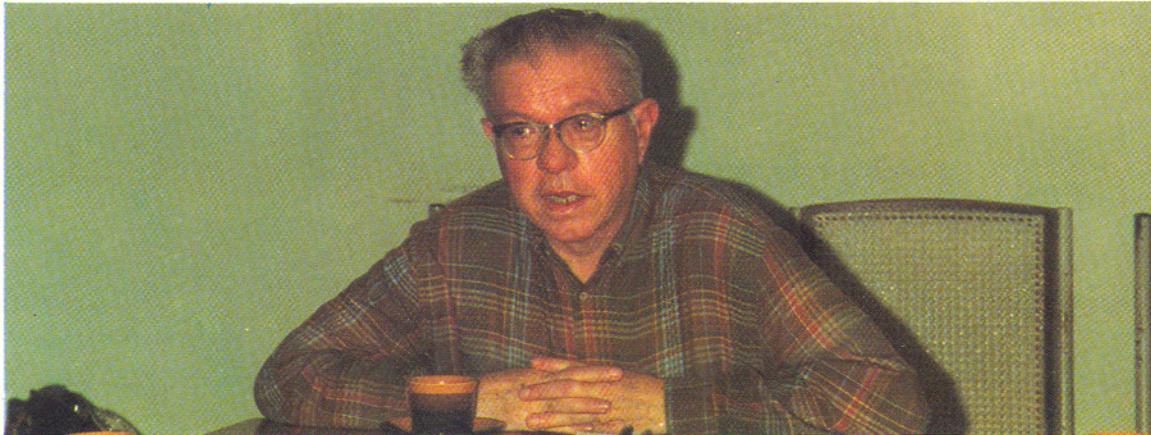
Professor W.A. Fowler  
California Institute of Technology, Pasadena



Professor A. Hewish  
University of Cambridge,  
Cambridge

Professor A. Salam  
Director, International Centre  
for Theoretical Physics, Trieste

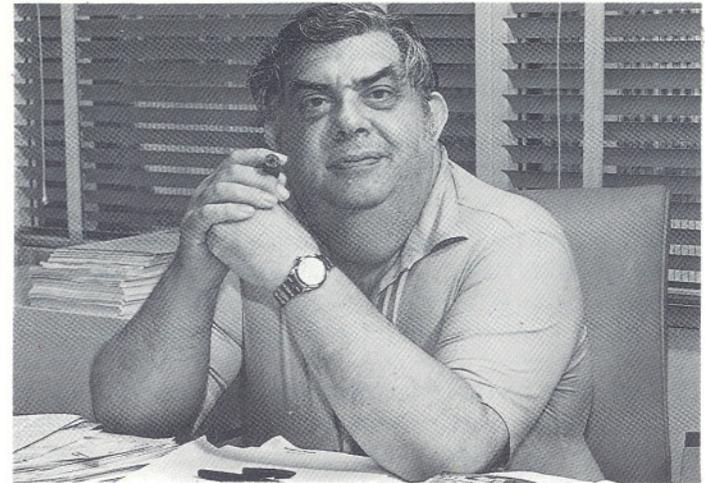
Professor Sir F. Hoyle, St. John's College, Cambridge



## The Scientific Advisory Committee



Professor J. Audouze  
Director, Institut d'Astrophysique, Paris

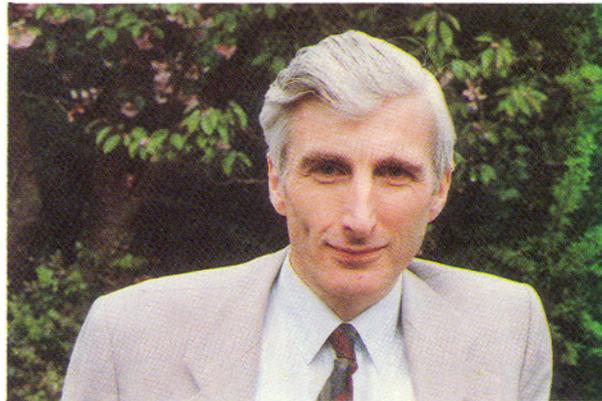


Professor G. Burbidge  
University of California at San Diego, La Jolla

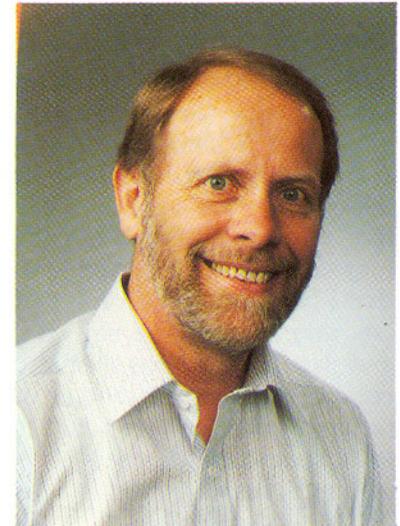
Professor V. Radhakrishnan  
Director, Raman Research Institute, Bangalore



Professor M. Rees  
Director, Institute of Astronomy, Cambridge



Dr. J. Wampler  
European Southern Observatory,  
Garching, Munich



## Preface

After independence, the university system in India expanded with speed. Equally fast was the pace at which a number of national laboratories were set up under various agencies, though outside the university system. Over long years an ethos developed where substantial support for research was directed largely outside the university system. In spite of various research support schemes and laudable extramural activities of agencies like the CSIR, ICSSR and other bodies, the total research support to the university system till recently was a very small fraction of the amount allocated to research.

The situation has changed somewhat in recent years, because of the increase in support provided by various departments in the Ministry of Science and Technology and a change in the policies and programmes of the University Grants Commission. One hopes that there is a growing realisation that a rupee spent on research in a university environment is perhaps more effective than that spent in a laboratory outside the university system. This is largely due to the uninhibited enthusiasm and energy of young people found in greater abundance in the university system. If it were not for some outmoded management practices in our universities this effectiveness would be greater.

Of course the output of research is not the only consideration. In a situation where the social, physical and intellectual environment is changing so fast, the activities of learning and discovering must necessarily coexist; all evidence indicates that this coexistence is good for each of these activities. I do believe that separation of research and teaching can be only a temporary strategy, not a permanent configuration. This is the reason that I have been pleading that from now on all new research laboratories must be set up in an educational environment, and that the old ones should develop a significant educational component. The funding of universities for libraries, laboratories and other facilities needs to be substantially increased. The level should be determined by what we need in the way of research, development and production – and not only in terms

of a certain fraction of the total education budget to be allocated for higher education.

There are several areas in modern science for which one needs to set up special facilities. These may be in the nature of large telescopes, accelerators, research reactors, supercomputers, and several others. Indeed some facilities have been set up by the national science system but till recently all the significant ones have been mostly outside the university sector. It is true that most of these facilities are open to the university users, though their actual use by them remains relatively low. The universities have seldom been involved in the design, development and fabrication of these facilities. This deprives the teachers and students of a great learning opportunity; it also separates them from the culture of doing difficult things and putting together of systems involving science, technology and project management. And after the facility is set up by a national laboratory, the academics from the university don't have a right to decide the policies, allocation of time, and the use and maintenance of facilities. The result has been that by and large such facilities have remained insulated from the university system and there has been little cross-fertilization of activity and ideas.

One alternative may be to set up such major facilities in universities. Some of this must necessarily be done – and has been going on. However, the major facilities can be only few in number, not only in this country but also around the world. Every university cannot have a telescope or an accelerator, but a competent student or a teacher in any university should have the right to propose, design and work with and around such facilities. It is therefore evident that we must create physical and managerial systems through which the ownership is joint and access to the prospective user is ensured.

The setting up of Inter-University Centres is a step in this direction. The justification argued above is only partial. There are many other arguments in favour of setting up such centres. But they hinge not only on the name but the structure and ope-

rational systems these centres develop. Some of the characteristics may be the following:

- a) The Centre must develop into a world class centre of excellence;
- b) Its management, both at the top and at a working level must involve a number of universities;
- c) When stable, its core staff should be a minor fraction of the total academic population of the centre at any one time;
- d) The Centre should provide a quality of academic and experimental environment which is not easily available to the university community in their own places;
- e) The coming and going of university participants should be painless, even pleasurable, with least administrative bottlenecks;
- f) The university community should begin to see it as a place to learn, get new ideas, set up collaborations and to develop and use facilities that they, and others can benefit from.

Some mechanisms for doing all this have been suggested in IUCAA's project report. The importance given to the Associate

and Visitor programmes testifies to this intention. The mechanisms may change as the time goes by. But the objectives should not.

We are lucky that in the case of this Centre active working together with TIFR with their GMRT project is assured. In some sense that was one of the motivations for setting up this Centre in Pune – apart from the enthusiasm displayed by the University of Poona in playing the role of a caring foster mother.

I have a fond hope. Perhaps we have started on a road which will bring our universities centre-stage..... perhaps to a phase when the activities of "learning" "finding out" and "doing" will find their true synergy..... perhaps to a culture where the discovery of a single shining jewel anywhere in the country will ensure that pretty soon most of our academics will begin to shine with equal brilliance – and in many more colours.

But enough of this pompous rhetoric. I only wanted to convey that I am excited at this "New Beginning". Let it be truly meaningful.



Yash Pal  
Chairman  
University Grants Commission

## Director's Report

The concept of IUCAA was born out of a long felt need for a national facility that boosts teaching, research and developmental work in astronomy and astrophysics (A & A) in the university sector. When the Government of India decided to fund the Giant Metre-wave Radio Telescope (GMRT) Project at Narayangaon near Pune, the University Grants Commission (UGC) felt that time was opportune for setting up an inter-university centre (IUC) that would help the university community to make the best use of GMRT and other major national facilities in A & A.

Since the scientific activity of the GMRT was expected to be nucleated at the GMRT Centre in the campus of Poona University, it was desirable to locate the inter-university centre also in Pune, preferably near the GMRT Centre.

The following sequence of events describes how the concept of IUCAA became a reality.

### **21.09.87**

Preliminary discussions took place between the Vice Chancellor, University of Poona, the Project Director of GMRT and a few interested scientists on the scope of the proposed IUC.

### **16.10.87**

The Chairman, UGC provided guidelines at a discussion meeting on how a proposal to establish IUCAA could be formulated.

### **19.10.87**

The Executive Council of Poona University passed a resolution welcoming the proposed IUCAA and agreeing to nurture the Centre in its formative stages until it became an autonomous registered society.

### **07.01.88**

The Prime Minister announced the setting up of IUCAA at the meeting of Indian Science Congress held at Pune.

### **10.02.88**

The UGC appointed Dr. N. Dadhich as Project Coordinator to prepare the Project Report of the proposed Centre.

### **06.04.88**

The Steering Committee of the new Centre met for the first time and discussed its modus-operandi.

### **30.04.88**

The UGC formally set up IUCAA and appointed the Director.

### **18.07.88**

(i) The Government of Maharashtra allotted 7.74 hectares of land to IUCAA in the campus of Poona University on a 99 year lease and one rupee rent per year.

(ii) The Steering Committee provided inputs to finalize IUCAA's Project Report. Shri Charles Correa was appointed architect for the IUCAA buildings.

### **19.07.88**

The Director took charge.

### **05.09.88**

The Government of Maharashtra released 4.295 hectares of land to IUCAA.

### **08.09.88**

IUCAA's Project Report, Memorandum of Association and Rules were submitted by the UGC to the Govt. of India for approval.

### **18.11.88**

The Government of India approved the IUCAA's Project Report, Memorandum of Association and Rules.

### **22.11.88**

IUCAA was registered under the Societies' Registration Act of 1860 by the Charity Commissioner, Pune.

### **29.12.88**

IUCAA's Foundation Day was celebrated at Pune. The Council and the Governing Body met for the first time on this day and Professor Yash Pal laid the Foundation Stone of IUCAA's building complex. An informal seminar was also arranged to mark this occasion.

**27.01.89**

IUCAA was registered as a Trust with the Charity Commissioner, Pune.

**21.03.89**

The Government of Maharashtra released the balance, approximately 3.45 hectares of land to IUCAA to fulfill its total commitment.

The above time-table does not describe the academic activities of IUCAA which are listed separately in the following pages. It is, however, worth highlighting a few matters.

I have written to the Vice Chancellors and Heads of Physics and Mathematics Departments of all universities informing them of the setting up of IUCAA. The Project Report has been sent to them along with the request that they make additional suggestions on how IUCAA can fruitfully play its 'inter-university' role.

Building activities are expected to begin in September and the first phase (of residential buildings) is expected to be over in June 1990. The second phase of office buildings will begin in December 1989 and will be over within two years. During the

interim period, IUCAA will house part of its activities in a temporary shed (presently under construction) and in a few rooms made available through the courtesy of the GMRT Centre. When the residential accommodation is ready, part of it will initially be used for offices and for guest accommodation.

During the first year IUCAA's office was located in one room in the Gole Bungalow and it served as the nucleus for academic and administrative work. We have had several distinguished visitors to give seminars etc., including two members (Professor G.R. Burbidge and Professor J. Audouze) of IUCAA's Scientific Advisory Committee. We have organised two experts' workshops on "Exact Solutions of Einstein's Equations" and "The Early Universe". The seminars and workshops are usually held in the Departments of Physics and Chemistry of Poona University. IUCAA has already started co-sponsoring seminars in A & A in other places with special emphasis on university participation.

It is a pleasure to record my deep appreciation of the help Naresh Dadhich and Ajit Kembhavi have rendered during this first year.

*Jayant Narlikar*

## Members of IUCAA

Professor Jayant V. Narlikar

(Director)

Dr. Naresh K. Dadhich

(Project Coordinator)

Dr. Ajit K. Kembhavi

Dr. Sanjeev V. Dhurandhar

Dr. B.S. Sathyaprakash

(CSIR Research Associate)

Smt. Pramila A. Malegaonkar

(In-charge, Library)

### Students

Shri V. Chellathurai

Kum. S. Koshti

### Project Fellows with GMRT

Shri S. Bhatnagar

Kum. S. Deshwandikar

Shri S. Upreti

## Visitors to IUCAA

Dr. R. Saraykar (October 24-29) University of Nagpur

Professor G.R. Burbidge (December 24-30) CASS, University of California at San Diego

Professor D. Lynden-Bell (January 9-11) IOA, University of Cambridge

Professor P.C. Vaidya (December 28-30, January 15-20) Gujarat University, Ahmedabad

Professor Jean Audouze and Professor M. Casse (February 2-4) Institut d'Astrophysique, Paris

Dr. W.B. Wilson (February 15-17) University of Canterbury, New Zealand

## Academic Activities

### Research by Core Staff

Work on the evidence of evolution in the distribution of discrete sources is proceeding. The aim is to find out whether a hypothesis of 'no evolution' fits the data. Studies so far carried out on radio galaxies with known redshifts show that evolution is not mandatory.

A definition of effective mass for axially symmetric stationary spacetimes was proposed. Effective mass of a rotating black hole in uniform magnetic field was computed which gave a physically reasonable expression. Self dual and degenerate solutions of Einstein's equations have been considered by using Ashtekar's variables.

Extensive studies have been carried out on detector network for observation of gravitational waves from astronomical objects like coalescing binaries. The inverse problem of determining the wave parameters from the detector responses has been solved in the simplest case of 5, 4 and 3 detectors in the same place. The transfer function and signal-to-noise ratio have been computed for the standard and detuned recyclings.

A method has been developed to separate the X-ray emission from radio quasars into beamed and unbeamed parts. It was found that the beamed X-ray part correlates very well with the beamed radio emission. It was shown that the X-ray spectral index is a function of the radio beaming factor, rather than the total radio luminosity.

It has been shown that the surface brightness of spiral galaxies increases as their distance to cluster centres decreases. This behaviour is to be traced to the increased activity in galaxies which are close to the cluster centre. A programme has been developed, using the Monte-Carlo technique to test this behaviour against various models.

The programme of CCD observations at the prime focus of the Vainu Bappu Telescope is continuing.

The X-ray emission from quasars can heat the interstellar medium in galaxies by Comptonization. The effect on the gas in galaxies of such heating is being investigated.

city; A. Mukherji, Delhi University; U. Yajnik, P. Joshi, T.P. Singh, TIFR and T. Seshadri, Physical Research Laboratory.

### Seminars at IUCAA

1. Dr. R. Saraykar: 'Initial Value Problem in General Relativity via Ashtekar's Variables', October 25, 1988.
2. Foundation Day Seminar: 'The Excitement of Doing Astronomy', December 29, 1988.  
Chairman: Prof. Yash Pal  
Prof. P.C. Vaidya: 'The Tradition of General Relativity and Cosmology in India'.  
Prof. G.R. Burbidge: 'Dogmas and New Ideas in Astronomy and Astrophysics'.
3. An informal discussion was arranged with Prof. D. Lynden-Bell on 'Structures in the Universe' followed by his formal seminar on 'Galaxy Streaming and Local Gravity', January 11, 1989.
4. Workshop: 'Exact Solutions of Einstein's Equations', January 15-20, 1989.  
Outstation participants: P.C. Vaidya, Gujarat University; S. Banerji, Burdwan University; L.K. Patel, Gujarat University; R.S. Tikekar, Sardar Patel University and D.C. Srivastava, Gorakhpur University.
5. Prof. J. Audouze: 'The Nuclear Age of the Universe', February 2, 1989.
6. Dr. W.B. Wilson: 'Vertical Potential of the Galaxy', February 16, 1989.
7. Workshop: 'The Early Universe', March 20-25, 1989.  
Outstation participants: T. Padmanabhan, TIFR; S. Mukherji, North Bengal University; D. Lohia, Delhi Univer-

### Seminars Co-sponsored by IUCAA

1. 'Teaching of General Relativity and Cosmology in Universities': (Co-sponsored by TIFR) Bombay, January 21, 22, 1989.
2. 'Supernovae and Stellar Evolution': (Co-sponsored by TIFR) Goa, March 10-16, 1989.
3. 'Emerging Trends in Astronomy and Astrophysics': (Co-sponsored by the University of Delhi) Delhi, March 17-19, 1989.

## Publications by IUCAA Members

### Journals and Proceedings

#### Naresh Dadhich

(1988) Physical processes around black holes, in *Highlights in Gravitation and Cosmology*, eds. Iyer, Kembhavi, Narlikar and Vishveshwara (Cambridge University Press)

#### R. Kulkarni, V. Chellathurai and Naresh Dadhich

(1988) Effective mass of Kerr spacetime, *Classical and Quantum Gravity*, **5**, 1443.

#### S.V. Dhurandhar and M. Tinto

(1988) Astronomical observations with a network of detectors of gravitational waves I: Mathematical framework and solution to the 5-detector problem, *Monthly Notices of the Royal Astronomical Society*, **234**, 663.

#### M. Tinto and S.V. Dhurandhar

(1989) Astronomical observations with a network of detectors of gravitational waves II: Solution to the 4 and 3 detectors problem, *Monthly Notices of the Royal Astronomical Society*, **236**, 621.

#### S.V. Dhurandhar, A. Krolak and A. Lobo

(1989) Detection of gravitational waves from coalescing binaries system: effect of thermal noise in the efficiency of the detector. *Monthly Notices of the Royal Astronomical Society*, **237**, 333.

#### A. Ray and A.K. Kembhavi

(1988) Formation of millisecond pulsars in globular clusters, *Modern Physics Letters*, A 3, 229.

#### S. Shanbhag and A. K. Kembhavi

(1988) QSO activity and lost galaxy evolution, *The Astrophysical Journal*, **334**, 34.

#### Narasimha D. and J.V. Narlikar

(1989) A Doppler interpretation for close pairs and compact groups of quasars, *The Astrophysical Journal* **338**, 44.

#### J.V. Narlikar

(1988) Noncosmological redshifts, theoretical alternatives in *New Ideas in Astronomy* eds. F.Bertola, J.W. Sulentic and B.F. Madore (Cambridge University Press), p.243.

#### J.V. Narlikar

(1989) The role of quantum phenomena in our understanding of the universe, in *KOSMOS: La Cosmologia tra scienza e filosofia* ed Umperto Curi (Gabriele Corbo), p.149.

### Books

#### J. V. Narlikar

'The Lighter Side of Gravity' (Greek translation): Trokalia, Athens, 1988.

'The Return of Vaman' (A science fiction novel): Ravi Dayal, New Delhi, 1988.

#### B.R. Iyer, A.K. Kembhavi, J.V. Narlikar and C.V. Vishveshwara

'Highlights in Gravitation and Cosmology', Cambridge University Press, 1988.

### Popular and General articles

#### Naresh Dadhich

'Sprouting up of IUCAA': Maharashtra Herald and Indian Express, December 29, 1988.

#### J.V. Narlikar

'गणिताचे अवमूल्यन करू नका' (Do not undervalue Maths): Yojana, (in Marathi) May 1-15 1988.

‘ भारतीय संस्कृतीमें विज्ञान की परंपरा ’ (The tradition of science in Indian culture): Sanmarg, Indian Culture Special Issue, in Hindi August 15, 1988.

‘ खगोल विज्ञानाचे नवे केंद्र ’ (A new centre for astronomy): Maharashtra Times, September 26 1988, in Marathi ; also in a few other Marathi newspapers.

‘ Restoring Varsity Confidence ’ :Science Herald, September 30, 1988.

‘ A New Experiment ’:Economic Times,October 12, 1988

‘ विज्ञानाच्या लाटा — कालच्या, आजच्या आणि उद्याच्या ’ (The waves of science: past, present and future):Ghardar, Divali, November, 1988 in Marathi.

‘ Why do I believe in ETs? ’: Society, January, 1989

‘ Noncosmological redshifts ’:I’ Astronomia, Milano, February 1989, in Italian.

गुरुत्वाकर्षण की लेन्स (Gravitational Lens): Lecture in Hindi at Ahilyabai Holkar University, Indore, September 1988.

कृष्ण विवर की अजीब करतूतें (Strange Activities of the Black Holes): Lecture in Hindi at Vikram University, Ujjain, September 1988.

विश्वत आपण एकटे आहोत का? (Are We Alone in the Universe?): Lecture in Marathi at Jyotirvidya Parisanstha, Pune, December 1988.

Man and the Universe: Malaviya Memorial Lectures at Banaras Hindu University, February 1989.

The Excitement of Doing Science: National Science Day Seminar Lecture at Ravindra Bhavan, Lucknow, February 1989.

## Popular talks

### A.K. Kembhavi

क्वेजार्स (Quasars): Talk in Marathi given to amateur astronomers at Sion, Bombay, November 1988.

X-ray binaries: Talk given to Amateur Astronomers Association, St. Xavier’s College, Bombay, March 1989.

### J.V. Narlikar

क्या ब्रम्हांड में हम अकेले हैं? (Are We Alone in the Universe?): Lecture in Hindi at Bharat Bhavan, Bhopal, September 1988

तारों की जीवन गाथा. (Biography of Stars): Lecture in Hindi at Ravishankar University, Raipur, September 1988.

ब्रम्हांड की रचना. (The Structure of the Universe): Lecture in Hindi at Saugar University, Sagar, September 1988.

## Lectures and Seminars by IUCAA Members

### Naresh Dadhich

Invited talk: Effective Mass in General Relativity, Workshop on Teaching of General Relativity and Cosmology in Universities at TIFR, January 21-22, 1989.

Invited talk: 'General Relativity, A Physical Perspective', Burdwan University, February 22, 1989.

Course: 10 Lectures on 'General Relativity' to M. Sc. (Physics) students at Poona University.

### S.V. Dhurandhar

Course: 60 Lectures on 'Problem Solving' in Classical, Quantum and Statistical Mechanics and Electrodynamics to M. Phil. (Physics) students at Poona University.

Course: 8 lectures on 'Differential Geometry and Tensor Calculus' to M.Sc. (Physics) students at Poona University.

### A.K. Kembhavi

Invited talk: Infra-red and X-ray emission in active galactic nuclei, at the Indo-French Workshop on High Energy Astronomy. New Delhi, February 6-8, 1989.

Invited talk: Tidal capture binaries and millisecond pulsars, at the International Workshop on Supernovae and Stellar Evolution, Goa, March 10-16, 1989.

## Conference Participation and Collaborative Programmes

### Naresh Dadhich

DST meeting on Thrust Areas in Astronomy and Astrophysics: PRL Ahmedabad, October 17, 18, 1988.

Teaching of General Relativity and Cosmology in Universities: TIFR, January 21, 22, 1989.

Indo-French Workshop on High Energy Astronomy: New Delhi, February 6-8, 1989.

DST meeting on Review of Thrust Areas Programme in Physical Sciences: Viswa Bharati, Shantiniketan, February 23-25, 1989.

Emerging Trends in Astronomy and Astrophysics: Delhi University, March 17-19, 1989.

IUCAA workshop on Exact Solutions of Einstein's Equations: January 15-20, 1989.

IUCAA workshop on The Early Universe: March 20-25, 1989.

### S.V. Dhurandhar

Marcel Grossmann Conference: Perth, Australia, August 7-13, 1988.

Raman Centenary Symposium on Waves and Symmetry. Bangalore, December 12-15, 1988.

IUCAA workshop on Exact Solutions of Einstein's Equations: January 15-20, 1989.

Workshop on Physics of Gravitating Systems: I.I.Sc., Bangalore, March 6-9, 1989.

IUCAA workshop on The Early Universe: March 20-25, 1989.

### **Ajit Kembhavi**

IAU Symposium No. 134 on Active Galactic Nuclei: Santa Cruz, USA, August 15-19, 1988.

DST meeting on Thrust Areas in Astronomy and Astrophysics: PRL Ahmedabad, October 17, 18, 1988.

Indo-French Workshop on High Energy Astronomy: New Delhi, February 6-8, 1989.

DST meeting on Review of Thrust Areas Programme in Physical Sciences: Viswa Bharati, Shantiniketan, February 23-25, 1989.

International Workshop on Supernovae and Stellar Evolution, Goa, March 10-16, 1989.

### **Jayant Narlikar**

IAU Colloquium on The Teaching of Astronomy: Williamstown MA, July 30, 1988.

IAU General Assembly: Baltimore MD, August 3-12, 1988.

Discussion meeting on The Making of the Earth Citizen: organized by the Indira Gandhi Memorial Trust, New Delhi, January 16-19, 1989.

Indo-French workshop on High Energy Astronomy New Delhi, February 6-8, 1989.

IUCAA workshop on The Early Universe: March 20-25, 1989.

### **B.S. Sathyaprakash**

IUCAA workshop on Exact Solutions of Einstein's Equations: January 15-20, 1989.

IUCAA workshop on The Early Universe: March 20-25, 1989.

## **Awards and Distinctions**

Naresh Dadhich was elected to the Council of Astronomical Society of India for the term 1988-89. He was also elected President of Jyotirvidya Parisanatha (amateur astronomers group), Pune for the year 1988-89.

Jayant Narlikar received the INSA-Vainu Bappu Award for the year 1988.

## Interaction with Universities

Professors Naresh Dadhich and A.K. Kembhavi visited the Burdwan University and the North Bengal University, Darjeeling in February 1989. They had informal discussions on the role of IUCAA with the faculty and the students of the Physics Department of the former, and the Physics and Mathematics Departments as well as the Vice Chancellor of the latter. The discussions were fruitful and indicative of the meaningful interaction and collaboration. Professor Dadhich also had discussions about the role of IUCAA in fostering interaction between researchers in universities and institutes, with some of the faculty members of the Delhi University and the participants of the two workshops organized by IUCAA.

In September 1988, Professor J.V. Narlikar visited five towns in Madhya Pradesh (Bhopal, Raipur, Indore, Sagar and Ujjain) to deliver popular lectures (in Hindi) and to brief the local university audiences about the setting up of IUCAA. In January 1989 he visited the Madurai Kamaraj University and in February/March the Lucknow and Banaras Hindu Universities where also the announcement of IUCAA was made. In March the seminar organized at Delhi University (see details elsewhere) provided opportunities for discussing IUCAA's role in university education and R & D programmes.

Besides universities, IUCAA also expects close interaction with the IITs and during Professor Narlikar's visit to IIT, Kanpur, fruitful preliminary discussions took place concerning how this interaction could start.

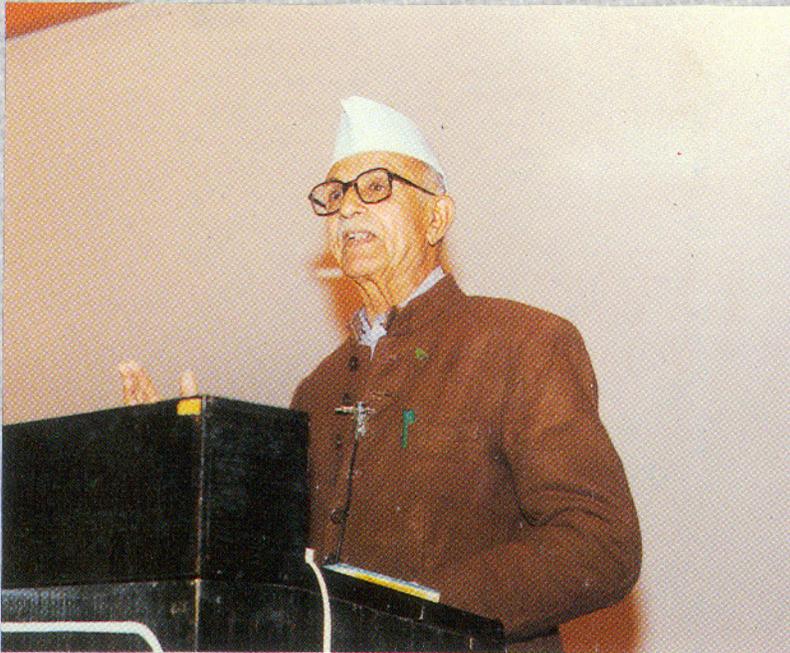
## IUCAA Library

The IUCAA Library is rapidly expanding its collection of books and reference works on astronomy, astrophysics, physics, mathematics and other related branches. About thirty journals in these areas are being received, many by airmail, and this number will increase in the near future. The library will be fully computerized and hardware and software development is in progress.

We gratefully acknowledge the receipt of back-volumes of *Nature* and *Monthly Notices of the Royal Astronomical Society* from the Nuffield Radio Astronomy Observatory, Jodrell Bank, UK.

The library will eventually have a fully up-to-date collection of the literature and other source material on astronomy and astrophysics, and will act as the major reference centre in these areas. It will also provide various services to users from universities outside Pune.

IUCAA  
Foundation Day Seminar



Professor P. C. Vaidya



Professor G.R. Burbidge