THE IUCAA STORY 1987-1992
The Background
by Jayant Narlikar



Dr. Jayant Narlikar

Professor Jayant V. Narlikar (b. 19 July 1938). After graduating from BHU, he went as JN Tata Scholar to Fitz William House, Cambridge, where he took the Mathematical Tripos examination, becoming a Wrangler in 1959, winning the Tyson Medal for astronomy. He did research under professor Fred Hoyle. He received his B.A (1960), MA (1964) and Ph.D (1963) degrees, later was awarded Sc. D. (Cantab) in 1978 for distinguished research. He was Fellow of King's College and became a Staff Member of Institute of Theoretical Astronomy at University of Cambridge in 1966, where he won Smith's Prize (1962) and Adam's Prize (1967). Dr. Narlikar's early work with Hoyle was on the Steady State Theory of the universe. This work provided, for the first time a working theory for describing continuous creation of matter within the frame work of Einstein's general relativity theory. Hoyle and Narlikar also gave a complete description of electrodynamics at the quantum as well as the classical level, using the concept of action at a distance, which is now known as the conformal theory of gravity. Recently he has been engaged in the study of quantum fluctuations in the vicinity of space-time singularities at the origin of the universe. Apart from his scientific research, Professor Narlikar has written books and articles at the non-technical level to popularize science in Marathi, Hindi as well as in English. In 1988 Professor Narlikar was appointed the first Director of Inter-University Centre for Astronomy and Astrophysics (IUCAA) set up in Pune by the UGC.

India's independence in 1947 saw the beginning of a rapid growth in the science and technology base in the nation. Thanks to the perception of Jawaharlal Nehru, and visionary scientists like Shanti Swarup Bhatnagar, Homi Bhabha and Vikaram Sarabhai, a number of national institutions, research centres and laboratories sprang up all over the country. Today the list of R&D organizations makes impressive reading. In addition, national agencies like CSIR, DRDO, DAE, DST, DOS, DOE – fund science and technology projects on short and long basis.

There is a striking gap in this multipronged approach, a gap that did not exist in 1947 but which came about shortly thereafter and has widened steadily. The universities have missed out in the overall growth of S&T both quantitatively and qualitatively. And the serious repercussions of this widening gap are now catching up with the overall system. The most serious of these is the manpower problem.

Universities in ideal situations provide an environment where a two-way interchange of ideas, question-answer etc. exists between the teacher and the taught. The teacher with his experience informs and motivates the student towards the challenging and exciting aspects of the field. The student, with his freshness and curiosity may ask questions that make the teacher think again. We see these idealized conditions in the successful universities in most of the developed nations. The authors of articles in scientific journals of repute and writers of classic text books come predominantly from the universities' environment where they are engaged in teaching as well as research.

Unfortunately due to social and political pressures and outmoded management practices our universities find themselves far from these ideal situations. Because of the widening gap mentioned above they are not able to realize their full potential in motivating the younger generation towards achieving excellence.

This is the main reason for the present problem of manpower not only in our universities but also in the research institutions. These institutions with their better research facilities confine themselves at most to the Ph.D. programmes and as such have no direct contact with students who could be motivated to do Ph.D.s in science. On the other hand the universities, where students exist in abundance, are troubled by infrastructural problems and lack of a research atmosphere.

How can one find a way of resolving the issue?

The Inter-University Centres

What attracts the talent to an academic institution? The ingredients include good salary and living conditions, a low bureaucratic profile, autonomy of operations and last, but not the least: good facilities both in terms of 'man' and the 'machine'. After the 1980s revision of pay scales the universities have not done badly. The scales in the university system no longer compare unfavorably with those in the national laboratories. So far as

bureaucracy and autonomy are concerned, however, the universities have a long way to go to evolve an efficient working system.

What about facilities? A scientist needs good working conditions and a healthy interaction with like-minded colleagues. The exchange of ideas with other is as important as having good equipment to work with. With sufficient funds both these problems can be solved.

However, it is clearly not possible to provide top class facilities to all subjects in all departments of all universities. Take an example from astronomy. To maintain a good quality telescope a university department needs to be given far greater support than is usually possible. However, the prevailing conditions within the university make it difficult for the facility to be used optimally. So how does one create attractive facilities in the university sector?

The answer lies in the creation of centralized facilities to be shared by all universities and managed by autonomous institutions specially created for the purpose. These 'inter-university centers' are thus meant as national coordinating agencies in specific fields. An IUC is a registered society with a Council and a Governing Body, the latter being a subset of the former. It is governed by a set of rules and a memorandum of association approved by the Government of India. Within these rules the IUC makes its own by-laws for day to day functioning and is thus provided with an autonomous structure that allows it to function much more freely and flexibly than a university can.

Through an amendment in its act by the Parliament, the University Grants Commission came to be in a position to set up such autonomous centres of its own. The IUCs follow the guidelines of the UGC Act No. 3, Section 12 (CCC) of 1956 and Regulations of 1985 and the Registered Society Act of 1860. The first IUC to be set up was the Nuclear Science Centre in Delhi. The second was IUCAA: the Inter University Centre for Astronomy and Astrophysics. Why an IUC for astronomy and astrophysics?

The Birth of IUCAA

Astronomy and Astrophysics (A&A) have received considerable thrust world wide and are regarded as rapidly growing parts of physics. Although the dividing line of interest between these two subjects is never very sharp, we may broadly identify astronomy with the observation of the cosmos and astrophysics with the physical interpretation of what is observed. Advanced countries like those in Western Europe, the United States, Canada, Australia, Japan etc. have astronomical programmes of a kind that would have been considered highly ambitious a generation ago but which are becoming realities thanks to the rapid developments in technology. Most facilities are either national or multinational, the latter applying to the more advanced facilities. Rarely is the usage confined to a single institution or a university. Even where the management vests in a particular organization, the 'guest observer programme' encourages outside observers to use the facility in question.

The physical interpretation of data also has advanced dramatically. On the theoretical front astrophysical models demand sophisticated ideas from physics, advanced techniques of mathematics and highly developed computing software. Although human ingenuity and intuition are still at a premium, the back-of-the envelope calculations have to be followed up by detailed analysis.

These exciting developments have found echoes (albeit modest ones) in India too. The 2.3 m Vainu Bappu Telescope at Kavalur is one of the biggest optical telescopes on Asian soil. The 1m infrared telescope at Gurushikhar has the benefit of a very good astronomical site. The 10m dish at Bangalore is equipped for state of the art work in millimeter wave astronomy. And perhaps the most ambitious project is the Giant Metrewave Radio Telescope being erected at Narayangaon, near Pune.

Significantly, none of these facilities fall within the university sector. Although university users could, in principle, have access to some of these as guest observers, the existing framework does not make it easy for them to do so. Moreover, the more glaring question is 'Where are the users of tomorrow?' With most student manpower residing in the universities which, as a whole, have a very low profile for A&A in the form of teaching and R&D, it may well happen that good facilities will go unused for lack of astronomers!

Thus in the mid-1980s there was a growing need for an IUC in astronomy and astrophysics. With the siting of the GMRT in Narayangaon with its academic offices in the campus of the University of Poona, the UGC felt that the IUC should also be sited there and Professor Yash Pal, the then Chairman of the UGC initiated prompt action.

Preliminary discussions between Professor V.G. Bhide, the then Vice Chancellor, University of Poona, Dr. Govind Swarup the Senior professor-in-Charge of the

GMRT Centre, and a few leading astronomers and astrophysicists held on September 21, 1987 were very fruitful in crystallizing the idea of IUCAA. This meeting was followed in October 16,1987 by another at which Professor Yash Pal was able to provide important inputs on behalf of the UGC. From these discussions an "Outline of a Proposal" to set up the Centre was prepared and submitted to the UGC by the Vice-Chancellor of the University of Poona. This outline envisaged that till such time as the centre acquired the status of Registered Society, it would be a unit of the University, with a Steering Committee presided over by the chairman, UGC, to manage its affairs. In a resolution passed on 19 December 1987, the Executive Council of University of Poona welcomed the proposed setting up of IUCAA and agreed to the terms of interim management with the assurance that it will not modify any recommendation made by the Steering Committee of the Centre without prior approval of the UGC.

The UGC then formally accepted the setting up of IUCAA and the Chairman, UGC constitute a Steering Committee. As a first step towards realizing the goal a Project Coordinator was appointed to prepare the Project Report. Dr. Naresh Dadhich on deputation from the University of Poona took up this assignment on February 10, 1988.

This report was prepared after consultations with several colleagues and some members of the Steering Committee. It set out the detailed requirements of the Centre in manpower and facilities both in the immediate future as well as over a longer time span of 10 years.

This Project Document was approved by the UGC in July 1988 and the Centre's Memorandum of Association and Rules were approved by the Government of India on November 18,1988. Thereafter, on November 22,1988, IUCAA became an Autonomous Registered Society.

Meanwhile Professor Jayant V. Narlikar from the Tata Institute of Fundamental Research, Bombay had taken charge as the Honorary Director of IUCAA from July 19, 1988. He had already initiated efforts to acquire a suitable plot of land for siting IUCAA's buildings. These efforts bore fruit when through a Cabinet decision in July, 1988, the Government of Maharashtra allotted about 8 hectares of land to IUCAA, of which about 4.3 hectares were made available to the Centre on September 5, 1988. This plot of land is on the campus of the University of Poona and in close proximity to the National Centre for Radio Astrophysics which is in charge of the GMRT project, thus facilitating a close interaction between the three institutions.

The Buildings

While progress was being made on the land front and the registration front, another important question was also fortunately answered. Could we find an architect with vision who would do justice to the IUCAA- concept? Charles Correa, the eminent architect of international standing was approached and he readily agreed. The present magnificent complex of buildings became crystallized after he had several brainstorming sessions with the prospective users wherein they tried to answer his basic query: could they convey to him some of the exciting aspects of the cosmos that he would translate into an architectural concept?

These building include (i) the residential complex called Akashganga (The Milky Way) (ii) institutional complex called Devayani (Andromeda : the large galaxy neighbouring our Milky Way) and (iii) Aditi complex which includes the first IUCAA building : a shed of about 2000sq.ft. area and a 500 seater auditorium.

Today, with a build-up area over 150,000sq.ft. it is difficult to imagine how IUCAA started in 1988 — in one room of approximately 100sq.ft. area in the Golay Bungalow of the University of Poona. In August 1989 the shed Aditi was built to house the administrative offices and the budding computer centre. Through the courtesy of their neighbours, the small academic staff of IUCAA including its Director had offices in the NCRA's newly constructed buildings for over a year.

Early in 1991 the offices shifted to the Akashganga houses which were built first. Some residences were used as staff quarters, some for accommodating visitors while some were used as offices and library. The Aditi shed was retained for the Computer Centre and the Instrumentation Laboratory till they were shifted to the Devayani Complex. This final shift of all offices took place in the second half of 1992.

These upheavals were accompanied by shifts of a different kind. Large trees, mostly bunyans, which came in the way of buildings to be constructed were shifted to other locations on the IUCAA campus where they added to the charm and elegance of the landscape.

These buildings with their open interactive environment are ideally suited to IUCAA's multipronged programmes.

The Eightfold Way

IUCAA has been planned with an eightfold objective. To begin with, the Centre will have a small core faculty, a few post-docs and research students of its own engaged in basic research and participating in teaching and developmental activities. This is essential if IUCAA is to have credibility as a national coordinating centre. As a major research centre in A&A IUCAA will organize schools and workshops in frontier research areas where national and international scientists will participate as resource persons.

But growth of activities at IUCAA must be matched by on-campus nucleation and growth of A&A in the universities. To this end, IUCAA's next objective is to establish a dialogue with the university departments through regional meetings wherein the problems faced by them in implementing a vigorous A&A programme are discussed. For example, what should be the framework of an ideal M.Sc. Physics syllabus with specialization in A&A? How can the course be supplemented by experimental aids and projects? Can A&A be introduced as a compulsory ingredient of the B.Sc. Physics curriculum so that students at least get introduced to these areas? IUCAA will help find practical answers to such questions.

This leads to IUCAA's third and fourth objectives– the training of manpower in A&A and promoting the culture of astronomical instrumentation. Thus teachers need to be trained or reoriented for the teaching of A&A. So IUCAA needs to plan introductory or refresher courses for university and college teachers at various levels. And, it is equally necessary to organize elementary schools for undergraduates to acquaint them with exciting developments in A&A. To encourage development of astronomical instruments like detectors, cameras, photometers etc. IUCAA has an Instrumentation Laboratory where faculty and research students from universities can participate in specific projects.

To some extent IUCAA is patterned on the International Centre for Theoretical Physics at Trieste, with a small core group and a large flux of visitors. As its fifth objective IUCAA has an Associateship Programme like that in the ICTP. An associate of IUCAA can visit the centre for long and short durations to take advantage of its centralized facilities or visiting resources persons. The travel and living expenses for such trips are borne by IUCAA. Directed at the university and college teachers, this programme is expected to improve mobility amongst the associates, increase contacts and promote interactions between scientists who might otherwise feel isolated.

IUCAA's sixth and seventh objectives are geared towards promoting the use of major astronomical facilities for research by the staff and students of universities and colleges. Since the siting of IUCAA in Pune was dictated to a large extent by the location of GMRT at Narayangaon, IUCAA's sixth objective is to bring the university community into a closer interaction with the GMRT. And, to encourage the use of the guest observer programmes at other major facilities in the country and abroad by the university community, IUCAA will act as a catalyst for potential astronomers in the University sector.

The eighth and final objective strikes at the root of it all : to participate in science popularisation through the interaction with amateur astronomers, young students and the general public. At present there is hardly any exposure to A&A at the school level while even amongst the general public a desire to know about the scientific discoveries in astronomy is coupled with superstitious beliefs in astrology. IUCAA can play a vital role in this area through information dissemination, practical demonstration, astronomical slide shows etc.

From Objectives to Action

The clock of IUCAA's academic activities started ticking even as its concept was beginning to crystallize, back in 1988. By today it has held several schools, workshops, regional meetings and conferences to focus attention on the various aspects of A&A. These meetings have been held all over India ranging from Trivandrum to Guwahati. As a result several scientists from universities and colleges have become aware of what can be achieved through the inter-university mode.

At Pune IUCAA boasts of what may soon become the best working library in A&A in the country. Thanks to its associateship and visitor programme its users come from all over India. The electronic mail and remote logging on computers in a worldwide network have broken national barriers to bring our Indian community of astronomers in close contact with their international counterparts. The IUCAA instrumentation laboratory has begun with a do-it-yourself project of making an automated telescope. The DIY element involves the users from universities and colleges as active participants in telescope making.

At the time of writing this account

towards the end of 1992 with a core faculty of nine, a comparable number of post-docs, forty five associates and a large number of other passing visiting scientists, IUCAA is aspiring to be the main hub of astronomical activities in the country. But the proof of the IUCAA pudding will ultimately lie in its eating — by the academic in our universities!

The UGC has set up the IUCs with high expectations in the hope of arresting and reversing the widening gap in higher education mentioned in the beginning. The success of the experiment depends on the users themselves. Thus, to make the associateship programme work, the universities must come to look on IUCAA as their own field station so that a staff member who has come to use its facilities is treated as on-duty. IUCAA's overtures to university departments for strengthening the A&A will need to be reciprocated and taken advantage of.

To summarize, IUCAA is like the hub of a wheel, with the universities lying on the rim. Both the hub and the rim need to be connected so that the wheel rolls along.

You cannot teach a man anything.
You can only help him to discover it within himself.
Galileo