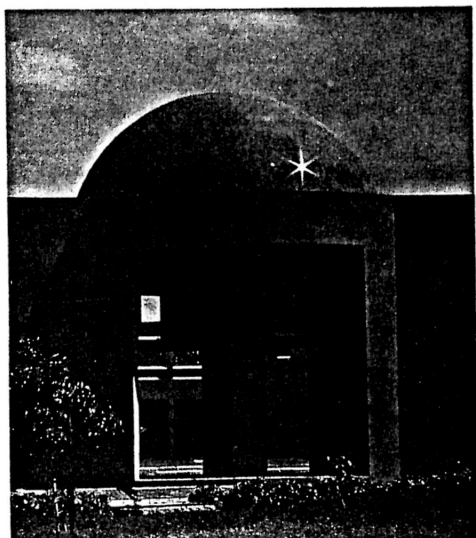


The Inter-University Centre for Astronomy and Astrophysics

by Jayant Narlikar

When India gained her independence in 1947 there was a rapid growth in the new nation's science and technology base. Thanks to the perception of one her great leaders, Jawaharlal Nehru, and visionary scientists like Bhatnagar, Bhabha and Sarabhai, a number of national institutions, research centres and laboratories sprang up all over the country.



Dome of the Inter-University Centre for Astronomy and Astrophysics. The dome has been pierced to allow sunlight to shine through. Standing under it one gets the impression of standing under a starry sky. The star pattern depicts the distribution as it existed on IUCAA Foundation Day, 29 December 1988 at 8.30pm. Photo courtesy Jayant Narlikar.

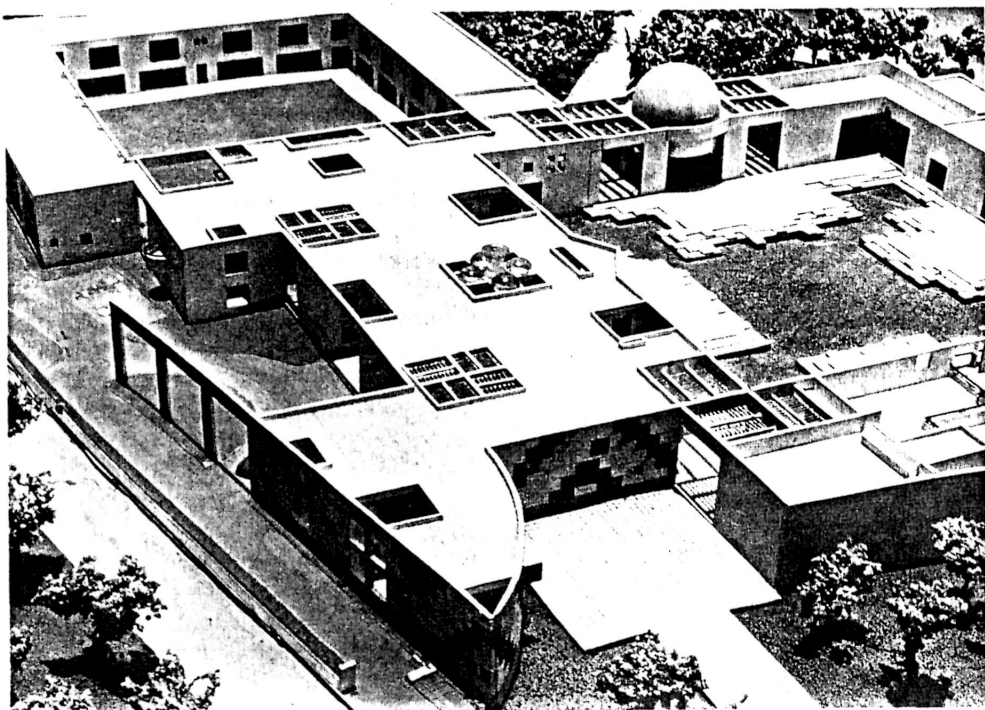
of this situation in the successful universities in most of the developed nations. The authors of articles in the leading scientific journals and the writers of classic text books, come predominantly from the university environment where they are engaged in teaching as well as pure research.

By the end of the last decade, India found herself with universities full of students whose potential in the basic sciences was being left largely unencouraged due to relatively poor funding and facilities for pure research. Leading research facilities were also faced with declining manpower and under-utilisation, as only candidates at the PhD level were considered suitable for training at these institutions. Many fine students have been overlooked by this unfor-

tunate arrangement of resources. What was clearly required was a means of reorganising the existing allocation of resources to ensure the best possible use was made of the various facilities available.

The birth of the Inter-University Centres

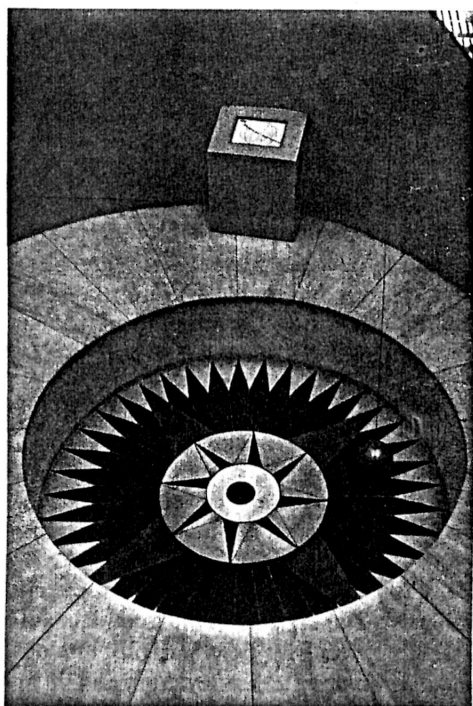
In 1985 the University Grants Commission through an act of Parliament, set up a number of centres designed to act as national coordinating bodies to create centralised facilities, shared by all universities and managed by the autonomous 'inter-university centres' (IUC). The first IUC to be established was the Nuclear Science Centre in Delhi. The second, our own, Inter-University Centre for Astronomy and astrophysics (IUCAA).



The model of the IUCAA completed during 1993, faithfully represents the built-up area. Photo courtesy the author.

One drawback in this multi-pronged approach was the unexpected failure of the universities to fully participate in this development. Since 1947, the gap between commercial progress and the academic infrastructure to nurture students of the basic sciences, has widened and the serious repercussions of this widening gap are now catching up with the overall system.

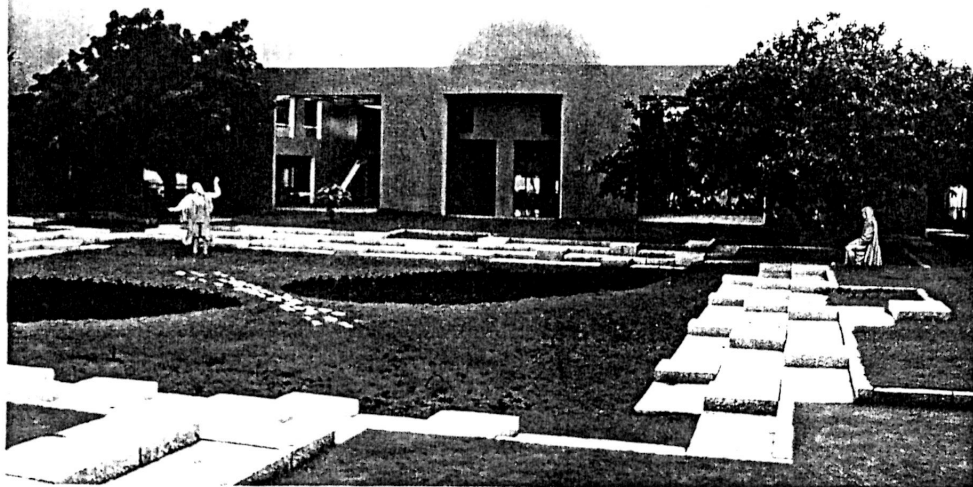
Traditionally universities provide the ideal environment for a two-way exchange of ideas. Both teacher and student benefit from this environment of mutual exchange. While a lecturer uses his experience to motivate and inform the student, the student with his freshness and curiosity may sometimes raise questions that cause the lecturer to re-examine his own ideas. We see the benefit



The Foucault pendulum is the central part of the office block named after Indian astronomer Aryabhata, whose statue also stands outside the building in the central courtyard. The pendulum tells us how to measure the Earth's spin about its axis without looking at the rising and setting stars. Aryabhata was the first astronomer to show that the Earth spins about its axis and the stars are fixed. Photo courtesy the author.

The IUCAA was set up to ensure that the very real interest in astronomy and astrophysics in India can finally attract the resources required to enable us to pursue research programmes comparable to those in other countries. In Europe, the United States, Canada, Australia and Japan, astronomical programmes considered highly ambitious a generation ago, are becoming reality thanks to rapid developments in technology. Most facilities in these countries are either national or multinational. Rarely is usage confined to a single institution or university. Even where management is vested in a particular organisation, the 'guest observer program' encourages outside observers to participate.

These exciting developments had found echoes (albeit modest ones) in India too. The 2.3 m Vainu Bappu Telescope at Kavalur is one of the largest optical telescopes on Asian soil. The 1m infra-red telescope at Gurushikhar has the benefit of a very good astronomical site. The 10m



The dome at IUCAA with statues of Galileo on the left and Newton seated under the tree at right. Photo courtesy Dr John Hearnshaw from the University of Canterbury, NZ.

dish at Bangalore is equipped for state-of-the-art work in millimetre wave astronomy. And, perhaps the most ambitious project, the Giant Metre-Wave Radio Telescope, an initiative of the National Centre for Radio Astrophysics. However, until the establishment of the IUCAA, these facilities were associated with a university only very tenuously, if at all.

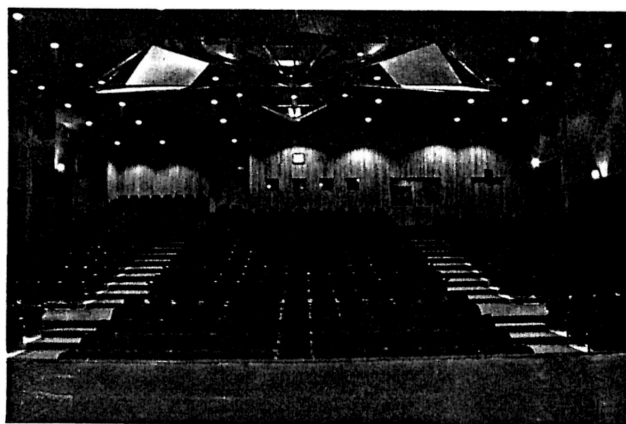
Setting up the IUCAA

Once the decision had been made to establish the Centre for Astronomy and Astrophysics, we made rapid progress on the practical side of things. Late 1987 and all of 1988 were incredibly busy, with meetings

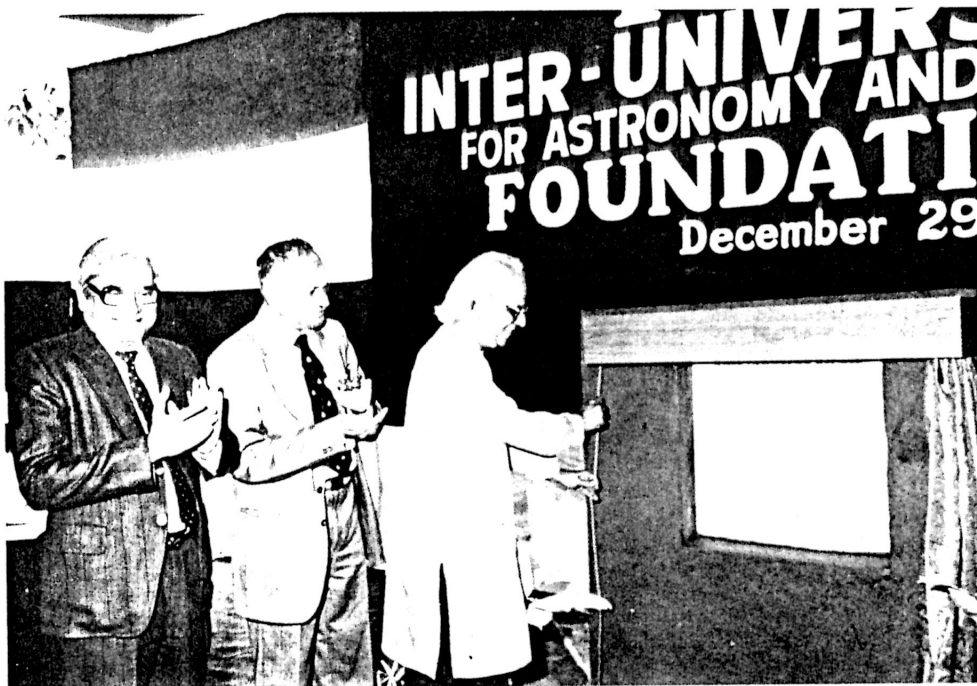
setting out management guidelines combined with the equally pressing need to acquire suitable land for the new buildings. In July 1988 I became Honorary Director of the IUCAA, after many years with the Tata Institute of Fundamental Research in Bombay. In July also, we were granted 8 hectares of land near to the campus of the University of Poona, by the Government of Maharashtra. The site is close to the National Centre for Radio Astrophysics (NCRA) thus facilitating a close interaction between it, the IUCAA and the University.

Charles Correa, an outstanding architect of international repute was chosen to design the IUCAA buildings. Correa studied at the University of Michigan and MIT before returning to Bombay to begin his very successful architectural practice in 1958. Apart from his many projects in Bombay, Delhi, Ahmedabad and other cities on the sub-continent, he has been one of the pioneers in developing low cost shelter in the third world. One of his most ambitious projects, was his involvement with the development in the seventies, of New Bombay, a modern city built across the harbour from the metropolis of Bombay.

The final design for the IUCAA was arrived at after many intense meetings between Correa and potential users as we wanted to achieve functionality as well as capturing some of the spirit of our enterprise. The result has been magnificent, a



The auditorium is designed to seat 500 people and stands across the road from the Devayani complex. The exotic structure in the ceiling depicts a bird flying out towards the sky. The wings of the bird however, serve a useful purpose for acoustics. Photo courtesy the author.



Foundation Day, December 1988. Professor Yash Pal unveils the Foundation Plaque while the author and Professor R G Takwale, Vice-Chancellor of Poona University applaud.

tribute to Correa's vision and our workers' skill in implementing it.

The IUCAA now comprises the residential complex, Akashganga, the Milky Way; Devayani, Andromeda and the Aditi complex which includes the first IUCAA building, an unglamorous shed of about 2000 square feet and a 500 seat auditorium.

Today, with a built-up area of over 150,000 square feet, it is difficult to imagine how IUCAA started in 1988—in one room approximately 100 foot square in the Golay bungalow of the University of Poona! During the hectic building schedule, IUCAA staff were accorded every assistance and courtesy by our colleagues at the University, often using space in either the University or NCRA as we awaited our own offices. To enhance the appearance of the new buildings we assisted Nature by moving several large trees, mostly Banyans to the new site. Amazingly they have all survived and flourished in their new locations.

The Future for the IUCAA

To some extent the IUCAA has been patterned on the International Centre for Theoretical Physics at Trieste (ICTP), with a small permanent core faculty and a large number of 'visitors'. With this model for our institution we have eight major objectives we hope to fulfil. Our first commitment is to producing a core group of students and lecturers, capable of interacting with their peers in universities and research

institutes. Secondly, by communication with other groups we hope to be able to devise and implement lasting programs for the introduction of astrophysics to students at all levels. Even youngsters at elementary levels will not be overlooked. Our third and fourth objective is to train current teachers and lecturers to be even more effective in

their teaching of astronomy and astrophysics.

The fifth objective for the IUCAA is the establishment of an Associateship Programme such as that run by the ICTP. Under this arrangement an associate of IUCAA can visit the centre for long or short periods to take advantage of its centralised facilities or visiting resource persons. Travel and living expenses for such trips are borne by IUCAA. Directed at university and college teachers, this program is expected to improve mobility amongst the associates, increase contact 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. One of the facilities which will enable us to deliver practical, observational programmes is the development of an automated photometric telescope and related detectors. A prototype with 14 inch aperture is ready. During the year groups from the universities of Bangalore and Gujarat will assemble similar telescopes in our laboratory for their own use. We already have plans to further upgrade the prototype by adapting it for imaging and photometry with CCDs.

As observational activity picks up, a telescope of around 1m aperture will be developed to cater for the needs of universities



The Golay Bungalow where the IUCAA began its activities was formerly the residence of Mr Golay, Registrar of Poona University. Photo courtesy the author.

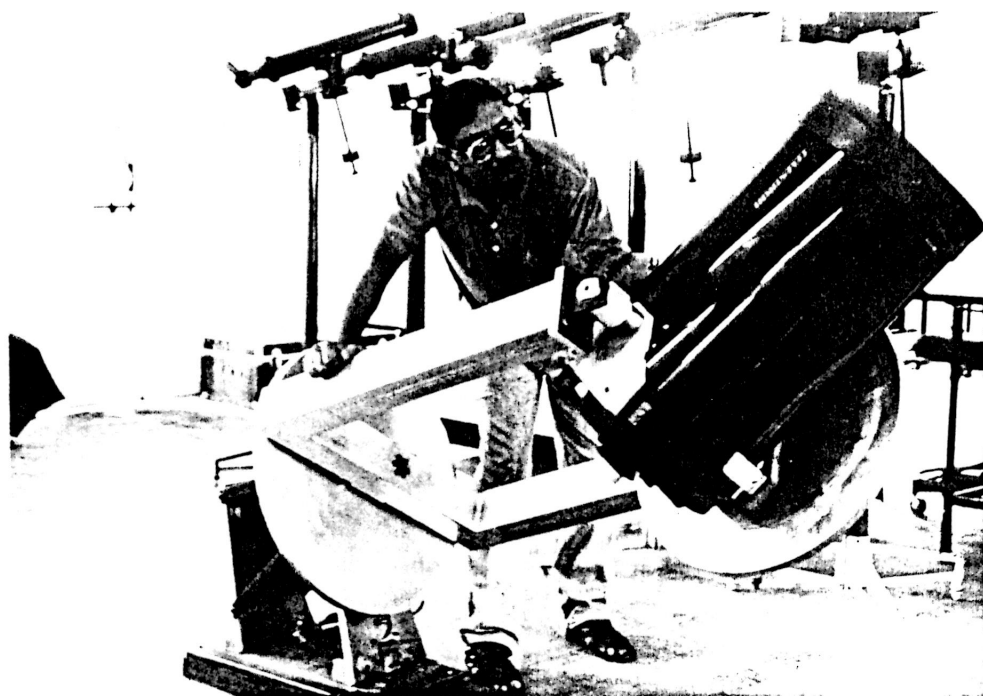
over the next few years. Among other instruments under development is a liquid nitrogen cooled CCD camera. Designed as a low noise device, it will be used on existing national telescopes. We will then use the experience gained by building this instrument to provide compact, thermoelectrically cooled CCD cameras for smaller telescopes sited at various universities. Since the siting of IUCAA in Pune was dictated to a large extent by the location of the GMRT at Narayangaon, IUCAA's sixth objective is specifically to bring the university community into closer interaction with the GMRT as well as encourage guest observer programmes at other major facilities in the country and abroad by the university community. In many ways, 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 the popularisation of science through the interaction with amateur astronomers, young students and the general public. At present there is hardly any exposure to astronomy and astrophysics at the school level. To redress this situation we have designed several programmes especially for school children. These include summer projects, monthly lectures and demonstrations for school groups. For the general public we have organised popular lectures and night sky viewing. To further stimulate our active amateur community we now hold workshops on a broad range of topics, from the practical aspects of building your own telescope to introductory astrophysics. We also encourage the creation of planetaria all over the country as a means of bringing the night sky to the public, free from the constraints of bad weather. Through these initiatives we hope to feed the sense of wonder people feel, while educating them about science.

Progress to date

With the progress on the building front, all the IUCAA facilities are now in place. There is an up-to-date astronomy library which also includes books from other related areas, a computer centre with worldwide electronic mail linkages, a data centre that allows for remote-logging of foreign databases, and an instrumentation laboratory which we hope will foster a 'build your own instrument' culture amongst the university academics.

After the initial backlash against a new institution (and the fear that it might take funds away from universities) there has been a growing acceptance of the inter-uni-



The 14-inch reflector designed for use at India's low latitudes. Shown here is Dr Ranjan Gupta the scientist involved in its fabrication. Photo courtesy the author.

versity centres generally, and of the IUCAA in particular.

The annual academic calendar of the centre has several workshops, schools and other informal meetings in various parts of astronomy and astrophysics both on the IUCAA campus and on the campuses of universities and colleges. The usage of telescopes on Indian soil by university members has been given great impetus through the lead provided by the IUCAA.

On the international scene the IUCAA has begun to be known through its academic programmes and its quarterly bulletin, *Khagol* (the celestial sphere).

International profile

In August 1993 the IUCAA and the NCRA jointly hosted the 6th Asian Pacific Regional Meeting of the International Astronomical Union. This meeting had more than 300 participants, many of them leading researchers from the region. It was a wonderful opportunity for scientific exchange and to introduce the newly completed IUCAA to our colleagues.

More recently, in January this year the IUCAA hosted the International School for Young Astronomers of the IAU. Thirty-five students from 12 countries including Russia, Iran, Vietnam, Turkey, South Korea, Bulgaria, Argentina, Ukraine, Ireland, Nepal and the USA attended. The teaching faculty included, apart from the ISYA Secretary, Professor Donat Wentzel and the

IAU representative Dr M Gerbaldi, Dr S Isobe from the National Astronomical Observatory, Japan, Professor Peter Eggleton from the Institute of Astronomy, University of Cambridge and six Indian scientists. The school covered a wide ranging syllabus in astronomy and astrophysics and included observing with the IUCAA's 8 and 14 inch telescopes.

In the first year of its full operation the IUCAA has demonstrated that it can and does fulfil the requirements for which it was designed. By fostering both the theoretical and practical aspects of astronomy and astrophysics the Inter-University Centre for Astronomy and Astrophysics will have a profound effect on the direction of these sciences, not only in the academic environment, but throughout the wider community. ■

Professor Jayant Narlikar is Director of the IUCAA. His major research areas involve cosmology and he is one of a team working on the quasi-steady state cosmology. Apart from pure research, Professor Narlikar has written many works on astrophysics which have been published in Marathi, Hindi as well as English. His scientific research has not prevented him from indulging in a favourite pastime, writing popular works of science fiction.