

# Face to Face

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This section features conversations with personalities related to science, highlighting the factors and circumstances that guided them in making the career choice to be a scientist.

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## Face to Face with Professor Jayant V Narlikar\*

*Prof. D J Saikia talks to Prof. Jayant V Narlikar*

Dr. Jayant Vishnu Narlikar known for his field of Astrophysics is the Founder-Director of Inter-University Centre for Astronomy and Astrophysics (IUCAA). Former President of the Cosmology Commission of the International Astronomical Union (IAU), Prof. Narlikar, who has also served as the Chairperson of the Advisory Group for Textbooks in Science and Mathematics published by NCERT, is globally known for his work in cosmology, specifically championing models alternative to the popular Big Bang Model. Prof. Narlikar is a champion of science education in India and is a prolific author.

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**Dhruba J Saikia (DJS):** It's a pleasure speaking with you today. You have been an inspiration to many of my generation and the ones that followed. Could you tell us a little bit, for the young readers of Resonance, about your early life at Banaras, and what motivated you to take up a career in science?

**Jayant V Narlikar (JVN):** Well, I can say that I was brought up in an academic environment because my father was a professor in mathematics at the Banaras Hindu University, and my mother was a scholar of Sanskrit. So both these sides were what I would call motivators. As you know, many times young people are motivated by their father or mother. So in my case that certainly was the case. I remember, in third standard, we were asked by the class teacher to tell what our father was doing. Most of the children in the school were from the University faculty. So they would answer that their respective fathers were in this subject or that. When my turn came, I remembered that my father was called a professor; so I just said that he was a professor. So, my teacher asked me, "Professor of what?" I was stumped because I did not know what his subject was. So the teacher said to enlighten me, "You should know what your father teaches. He's a professor of mathematics". I was a bit ashamed that I did not know the

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answer, but I was also happy that my father was teaching the same subject that I liked best. In a sense, the other way round, I was knowing that I like mathematics, but I didn't know my father was a mathematician.



**Prof. D J Saikia with Prof. Jayant V Narlikar**

**DJS:** So, your love for mathematics started very early on in life?

**JVN:** Yes. My house was a kind of open house for people coming for academic visits. In those days, the university guest houses were not so well equipped. So when some professors came for either examination purpose or some other academic purpose, they would stay with somebody they knew on the campus. Thus my father had a lot of such visitors, and I felt very happy talking to them. Although they were very senior people, they liked to chat with little boys or girls around. They sometimes set me a puzzle to solve or tell me a mathematical story. So, this sort of environment was one in which I always thrived in. I felt that that was the right kind of place.

**DJS:** So, this was intellectually very stimulating. I remember you mentioning that two of your uncles also came and stayed with you and did their MSc over there.

**JVN:** Oh yes. I should mention that my maternal uncle, whom we called 'Moru mama' because his name was Moreshwar, was going to spend two years in our house to do the MSc mathematics course. He had come to BHU with very good marks from Bombay University and he was fond of mathematics in various ways. So, when he came to live in our house, he saw that there were a couple of blackboards on the wall. So, he asked me "What are these for?" I said, "We use them for anything like drawing or making maps or for geography, all



kinds of things". My father had said, "You use these boards for whatever you want". That's what we were doing. So, he said, "Can I use it occasionally?" I said, "Yes, surely you are most welcome". At that time there was one small board and one large board. The small one was taken over by him. He wrote a problem on it and titled it as a challenge problem for JVN, that is me. So when I saw that I asked him, "What is this?" He said, "You read this problem and see if you can solve it. If you solve it, you win. If you don't solve it, or can't solve it and I have to help you to solve it, then I win". That's how he put it. So, I took it as a challenge, as said on the board, challenge problem for JVN. So after a lot of effort, I managed to solve it. My uncle was quite happy. He said, "I am glad that you did not give up". I thought that was the end of the matter, but the next day, there was another problem on the board. And he kept on occasionally giving me some such dose of mathematics. I wouldn't say medicine because it was very pleasing to actually have such problems.

**DJS:** Sure. And you managed to solve all of them?

**JVN:** No, I would say I might have solved 80% or so, for 20% he might have given me some hint. But it was fun doing this kind of thing.

**DJS:** Sure. That was the period when Banaras Hindu University was also probably in its golden era. During 1939 to 1948, I think, was when Sarvepalli Radhakrishnan was the vice-chancellor. Do you have any recollections of that period of the University as such?

**JVN:** When I was in school, the vice-chancellor was Radhakrishnan and he had an awesome personality. He would give lectures on Bhagavad Gita, which were very scholastic. He was friendly with my father. So, they used to have a lot of discussions. I remember once that Dr Radhakrishnan was strolling along the streets, and at one place he found a lot of people listening to a speaker. So, he went in and stood outside to see what was happening. This was a Sikh religious get together, for I think it might have been Guru Nanak's birthday. My father had been invited to speak. He was very well-informed and well-read in different religions. He gave a very good talk on Sikhism, and all that time Dr Radhakrishnan was standing outside and listening. He was very impressed that somebody, who was not himself a Sikh, knew so much about the religion. My father, of course, was not a professor of religion but a professor of mathematics; but his readings were such that he would be able to give good talks on various occasions. Anyway, Dr Radhakrishnan was the first person that I saw from a distance as vice-chancellor.

**DJS:** You had mentioned about going abroad, and your choice of Cambridge was almost automatic after your early studies at Banaras. Could you tell us about your motivations for going to Cambridge and what was the background?

**JVN:** Well, first of all, my father was a Cambridge graduate, and he had performed very well in Cambridge. He was a student of Eddington and Larmor, who were senior professors there. I wanted to go into mathematics, and I felt that Cambridge provided the most competitive examination system for going into mathematics. So, I applied for that and my father, of course, wrote a covering note. And finally, I got into Fitzwilliam College, the college my father had been in. They usually like to have the son going to the same college as the father. Anyway, I got into Cambridge because of this motivation to go for mathematics.

**DJS:** You went for mathematics, but then you also got motivated to work on astrophysics. What were the most exciting pieces of work?

**JVN:** What happens in the Cambridge system is that, there are three parts of the mathematical examination – the Tripos – of which the first two parts give you a very wide base of mathematics, both pure and applied. You don't specialize in the first two parts. But for the third part, you choose those subjects which you might consider useful to you for a future research career. Astrophysics and astronomy were the areas I felt that I would like to go in because the lectures of Fred Hoyle and others were very interesting. Many times, based on how the teachers present the subject, you form your own impression of its importance. I also went to public libraries. There were popular books by Fred Hoyle, *Frontiers of Astronomy*, *The Nature of the Universe*. I read those, and I found them extremely interesting. So, I decided that I would go for this specialized group of subjects in my third part of the Tripos, the last one. Thus in the third part, I specialized in astronomy. They had a special medal called the Tyson Medal, which was given to the person who excelled in the astronomy part of the Tripos. There was a similar prize called the Mayhew Prize for those who did theoretical physics. Since I had opted for astronomy, I ended up getting the Tyson Medal, which my father had also got before. As it happened, from his time to mine, no Indian had got it, so it was something of a novelty. Anyway, that was my beginning in astronomy.

**DJS:** During your work at Cambridge, which piece perhaps excited you the most?

**JVN:** Okay, when I started my work under Fred Hoyle, he gave me a list of around five problems. They ranged from various parts of astronomy because Hoyle had a very wide kind of influence on the subject. I noticed that he did not mention the steady-state theory. So I asked him whether I could work on a problem in steady-state theory. He said, "There exist a lot of possible problems if you want to", but he personally did not want a fresh research student to get into something controversial. That was the reason he had not mentioned it. I did not insist at that time. And we discussed the problems he had suggested, of which I selected one.

It was about spinning universes. The problem was by Heckmann and Schucking, who were claiming that such universes will oscillate without singularity. So Fred wanted this to be

checked because they had not solved the equations. He asked me to look at those equations, which they had given and find out how they had derived it, and if the model was correct. The next part was to see how nucleo-synthesis worked in such an oscillating universe because when it is contracting you would expect atomic nuclei to break up, whereas while expanding you have the fusion. So it was basically an interesting problem. He was shortly going abroad, as he used to visit Caltech for three months in a year. When he came back, I had the solution to the problem saying that their claim that the oscillation of a spinning universe was free from singularity was not correct. It has a singularity, and it cannot oscillate. Thus the whole subsequent part was not applicable. So he said, “Okay. We will find another problem”.

While this was going on, there was the problem Hoyle had with Ryle about the counting of radio sources. Ryle claimed that the 4C catalogue showed that the Universe in the past had more radio sources per unit volume than there are today. So it was indicative of not steady-state, but an evolutionary Universe. That was the challenge to Fred that the radio data disproved the steady-state theory. So, Hoyle was expected to reply after Ryle had presented his paper at the Royal Astronomical Society. Hoyle said that we would work out a model which matched Ryle’s data, but was not inconsistent with steady-state. It looked like a tall order, but we managed to get a model like that and I made a few slides for projection. He gave me a shock at that point when he said that he won’t have the time to go and speak at the RAS because he had already committed to giving a talk somewhere else in London. So he said, “You talk in my place”. I was very scared that I had no experience in terms of public speaking, especially in England and on a topic where my adversary was going to be a very respected and experienced person. So I felt that I would make a mess of it. Fred said, “If you believe what you have done is correct, then you have only got to present it and tell them this is our mathematical solution. They can’t say anything about it”. So, I did that and I gave a talk of 10 minutes, the time allotted to me to present. People generally appreciated what I had said, and it gave me good confidence that I could present work in front of very experienced astronomers and astrophysicists. The second thing was that I was willy-nilly brought in to work on the steady-state theory which Hoyle was trying to avoid, and it was certainly controversial. But it came very naturally, so I continued on that.

**DJS:** That period also saw Hoyle establishing the Institute of Astronomy at Cambridge, which is a world-renowned institution today. What aspects of institution building do you think Hoyle paid particular attention to while laying the foundations of the Institute?

**JVN:** Hoyle was the Plumian Professor of Astronomy in Cambridge. He was that way quite influential, but at the same time, he found that the prevailing University rules made it very difficult to carry out any work in collaboration with people. Thus research was being done in a very old-fashioned way, and Fred was seeing how efficiently Americans were handling this.

He wanted that culture to come into Cambridge. In the old days, you had people like Eddington or Larmor who were individually very good, but their research had no financial support at all of any kind that the American professors would have. So he wanted an institution which was free from a lot of those old-fashioned rules. He attempted to have it done in Cambridge and with the help of the government support. Now there were Labour and Conservative governments; at that time there was a Conservative government, and he managed to convince the education minister that it would be good to have an institute like this. But a month or so after he was convinced, there was an election and Labour party came into power. He had to work again. The Labour party was willing to support astronomy as Fred wanted, but they wanted to do it in other universities, not in Cambridge or Oxford because the feeling was growing that these two universities got all the cream while other universities did not get any support. The Labour government wanted to support them. So they said that they would support an institute, not in Cambridge, but near the Herstmonceux Castle, where a new university had come up near Brighton, the University of Sussex. They agreed to fund an astronomy centre at Sussex University, and they wanted Hoyle to be the Director of that. But Hoyle felt that the real atmosphere for high-class work was in Cambridge.

So, he did not go to Sussex. Somebody else became the Director of the Sussex centre, and Hoyle in the meantime went to private agencies and private foundations. The Nuffield and Wolfson Foundations gave him money for building as well as for the first five years of running the institute. After that, it was his business to see how to continue it. So, Hoyle said, "Okay, if the institute is so constructed and does well, then there won't be any problem for continuing it. If it doesn't do well, then if it folds up, it doesn't matter". So his was a kind of sink or swim attitude. And he put this institute into operation. And it worked very well for the first five years. After that, they said that they would continue to support it. The government agreed to support, and they combined the observatory with the institute. It used to be the Institute of Theoretical Astronomy; that changed to the Institute of Astronomy because 'theoretical' was dropped. Hoyle was not completely happy. He felt that the University's astronomy facility till then was very poor, not like Mount Wilson or Mount Palomar in the U.S. So he felt that he would be carrying a lot of load which was not productive.

At the same time, a new professor was to be appointed for observational astronomy because Prof. Redman had retired. Hoyle wanted Wall Sargent to be the professor. There was a lot of manoeuvring behind the scene, and they finally appointed Lynden-Bell. Hoyle was of the opinion that although Lynden-Bell was a very bright astronomer, he was more a theoretician than an observer. So, he felt that this was the wrong choice. He resigned in protest, and that meant he was out of the usual circuit. He did not care. He liked to work by himself, and he bought a house in Lake District, where he liked to go hiking, and he would work there by



himself.

**DJS:** That's one of the very beautiful parts of England.

**JVN:** But I think it was a wrong decision to resign. He should have continued to work there in Cambridge. His presence would have inspired a lot of college students to join.

**DJS:** The Institute of Astronomy over the years has contributed immensely on both the theoretical and observational fronts.

**JVN:** Yeah. I mean he had this unique character.

**DJS:** Could you tell us a little bit of your working relationship with the stalwarts of the time like Hoyle and Burbidge, the kind of work that you really enjoyed doing at both the professional and personal levels?

**JVN:** Of course. I had worked with Hoyle and Burbidge worked with Hoyle, but the three of us working together had not really happened except towards the early 1990's. That time we used to meet in Cambridge. So, I went from Pune, Geoff Burbidge came from San Diego, and Fred came from Bournemouth where he had shifted. So all three, we used to meet at what they called the Greenwich Observatory, which had later shifted to Cambridge. Margaret Burbidge, who was a leading observational astronomer in England, had been the Director of the Greenwich Observatory. She used to be given facilities to work whenever she came to Cambridge. She had got this huge room in which all four of us could sit; the Burbidges, husband and wife, and Fred and I, four of us worked there. Geoff discovered a new way of preparing manuscripts. We were working on a paper. So each evening, he would handwrite what was done, and he would fax it to San Diego. It would be morning in San Diego because of the time difference. His secretary would be coming in for work and she would get these faxes. She would type it and fax it back in the afternoon from San Diego and that fax would reach Cambridge the next morning. We had the whole thing typed and ready for further work. Again, the same thing would be repeated at the end of the day. So the time difference was put to good use. If we had given it to a secretary in Cambridge to type, she would have been behind in the typing race because in the evening she wouldn't be working. Doing it across the eight-hour time difference was indeed very clever.

**DJS:** So what was the particular problem you were working on?

**JVN:** Oh, that time we came up with our modification of the steady-state theory, which we called the quasi-steady-state cosmology. That was explaining everything. We could also explain the microwave background. We could explain dark matter and everything. So this work was published in separate papers as well as eventually together as a book.



**DJS:** Could you elaborate on how the quasi-steady state might explain the cosmic microwave background radiation?

**JVN:** Yeah, you see in the case of old steadystate theory, there was no process known which would produce the microwave background blackbody radiation so precisely. So how to get that thing? So what we had was the following: over and above a long term expansion in this quasi-stead- state model, it had short term cycles of expansion–contraction. In each of these cycles, you will have stars burning out, they will shine but then they will burn out; then in the next cycle again new stars will be born, and the same thing happens. So you have in a sense, radiation from stars knocking around for a long time. We then showed how it gets thermalized, and we got a temperature which is about 2.7 K. Now in Big Bang cosmology, although you explain microwave background, you don't get the temperature necessarily as 2.7 K; you have to take it as a given data. There is no process which tells you why the temperature should be 2.7 K, whereas, in our model, it could be shown quantitatively that all the relic starlight could be thermalized to give you microwave background with the observed temperature.

**DJS:** You also explored the formation of structures in this quasi-steady state scenario?

**JVN:** Yes. We can go further that when the stars are burnt out, what is left is seen as dark matter because it's no longer shining.

**DJS:** On the theme of cosmology, today we have entered a regime of what is called precision cosmology where the parameters in the current cosmological model have been determined to a greater accuracy than probably ever before. So what in your view are some of the outstanding issues that we still need to address in our understanding of the Universe today?

**JVN:** Well if you take the classical Big Bang theory, the problem still remains. What was this event which is identified as Big Bang and what kind of physics operated? If you think that at such a small level you should have quantum gravity, then we must have a formal theory of quantum gravity, which we don't. So the whole thing is going around with several unproven or not understood kind of statements, which, therefore, makes me feel very uncomfortable with the whole scenario. If you had something like a singularity-free oscillation, then one can go on for infinity and there won't be many problems. This is what I feel. Also, I have a suspicion that there must be stars around which are older than the 14 gigayears that one associates with the whole Universe. These stars which are so old will appear in different parts of the Hertzsprung-Russell diagram, and one needs to do more study of such stars in our Galaxy.

**DJS:** So far we have not found any such stars.

**JVN:** So far they've not been found, but they have not been looked for also because what people say is that according to cosmology there can't be anything older than 14 gigayears. So



if I said look for a star of that age, people are not very keen to look.

**DJS:** On a broader canvas, cosmology is one aspect of it, but in astrophysics, besides cosmology, what do you think are the key astrophysical issues and problems that we need to understand today?

**JVN:** See, if you look at cosmology today, it stands apart from the rest of astronomy. If you take even galactic structure, that is the largest kind of system which you study, you will find you are using different kinds of arguments, than when you only do cosmological studies because cosmology is made up full of unproven assumptions. Like what you call non-baryonic dark matter or dark energy. They are not known in normal physics, but you are putting them in as a kind of assumption which actually has not been proved. So I feel it is a different sort of discipline than the rest of astronomy.

**DJS:** They have been introduced to explain the observations, but the nature of dark matter and dark energy is not understood.

**JVN:** Yes, the nature of dark matter is not understood, and the question is when you understand it, you must also know how it got there.

**DJS:** What do you think of dark energy?

**JVN:** Dark energy, is because of the supernova observations that you get an accelerating universe. Now in our cosmology, one can explain the supernova observations without having to bring in an accelerating universe. We have actually given a detailed analysis of how it can be done. So we feel that there is no need to have strange kind of matter or strange kind of energy to understand cosmology today.

**DJS:** Coming to TIFR in 1972, you were there in the Tata Institute from 1972 to 1989. So, could you tell us a little bit about your motivation for coming back to India to TIFR and also the challenges and the successes you faced in setting up a very active group in theoretical astrophysics at Bombay?

**JVN:** Well, I had long been feeling that I should get back to India to help in the growth of astronomy there. Now that communications were so easy, I felt that I would not be isolated if I went to a place like Tata Institute which had good contacts with the outside world. So I felt that I should give it a chance and if it works it's fine. I came on that basis, and in the first few years, I could settle down. And again, my brief was to grow the astrophysics group at TIFR, and I managed to get some good students and good faculty who were part of the group. So I felt that on the whole, the effort was worth it.

**DJS:** Were there any specific challenges you think you faced?



**JVN:** When NRIs come back, there are all kinds of problems. I also faced them. For example, the gas cylinder needed for cooking. When I went to the office, they said that there was a long waiting list. TIFR said they will give me a free telephone but the line was not available. So if I could get a line from Bombay Telephone, TIFR will provide the facility. Bombay Telephone said that I can't have a line until 5 years. Five years waiting list for a telephone! At that stage, I wrote a letter to Yashwantrao Chavan who was especially interested in getting me to come to Bombay, and I mentioned to him the telephone problem. He said he will speak to the concerned authorities. He was himself a minister. After a couple of days, I got an SOS from Bombay Telephone saying that they had a sanctioned line for me.

I wanted to get my daughter into the first standard of the nearby Central School. The Principal said that I was the last priority because the admission was primarily meant for services' children, and the second priority was the children of transferable central government employees. I was thus in the 'left over'. He said he will do his best to get my daughter admitted in the school, but he could not promise until the admission process was over. He also said that I should write to the Commissioner of Education who was in charge of the central schools in Bombay area. His office was in IIT Bombay. I wrote a letter to him requesting his approval. After I wrote, about two to three days later, I got a phone call from him. He said that he had attended my lecture in Bangalore about 10 years ago when I was visiting India. "I was very impressed by the talk", he said to me, and went on to say "It gives me great pleasure to say yes to your request". That was how it happened. So I told my wife, "See, this is the advantage of lecturing on astronomy".

**DJS:** Getting onto other aspects Jayant, public outreach has been one aspect which you have laid a lot of emphasis on.

**JVN:** Yes. I have always felt that to get your subject into a more popular vein, we have to get it closer to the common man. And that is what I have been trying to do.

**DJS:** You have laid a strong foundation of IUCAA's public outreach program as well, with a lot of emphasis on it. But nationally I think there's a lot more that we need to do. What do you think or what would you suggest?

**JVN:** When we were making the rules for IUCAA, I felt that I should put this in as one of the things that the Centre should do. And certainly, this worked, although we had to get money from other sources because the government grant doesn't cover school education or general public outreach. So we had to get private help, and that came gradually. As you saw, P. L. Deshpande and his wife Sunita Deshpande were very impressed by our work, and they gave money for the construction of the science center building, which we named Pulastya. Pulastya also contains Pu La, the initials of P. L. Deshpande. That has been a very successful venture,

and we are getting grants from various other sources to continue this work.

**DJS:** That has been doing very well, but nationally, I think we are still way behind in terms of different institutions emulating such models or doing it on large scales, although Science Day is being celebrated more than it used to be earlier. Would you have any comments or suggestions on how one might increase even further the outreach programmes?

**JVN:** My feeling is that what we are doing now at IUCAA is something that could be easily repeated by other institutes or laboratories. And I feel that it is necessary to do it, to build trust in science and reject pseudoscience, which can be dangerous.

**DJS:** On the topic of pseudoscience, which one keeps hearing about at all levels including meetings at the Indian Science Congress, one important aspect is obviously inculcating scientific temper amongst the general public. You've also been a crusader against superstition, particularly astrology. Would you like to tell us about experiments which you did or your steps to show that astrology is not science.

**JVN:** We had conducted an experiment just to see if accurate predictions can be made based on birth charts. To test this we managed to get about a hundred birth charts of mentally challenged children and hundred birth charts of very bright scholarly children. We mixed them up and took out two groups of 40 birth charts at random, and we offered them to astrologers to see if they could tell from each of the 40 birth charts which category they belonged to. About 50 astrologers took part in it, of which finally some 30 really completed the test. We had told them that in order to be statistically significant, they must be right 28 out of 40 times. We found that they fell far short of what was the statistically required minimum. Instead of 28 out of 40 to be correct, the maximum they got right was about 18 to 20 out of 40. So they did not succeed in predicting correctly. The idea is to use similar techniques for more tests, which I hope will be possible in due course.

**DJS:** But I think these results and tests should actually permeate to the general public as well so that they get to know about it and question it.

**JVN:** The public is of two kinds: those who believe in astrology and those who don't. And my feeling is that we are in a state where these are firm views. So those who believe in astrology will continue to believe it even if you give them very sound evidence against it but maybe we are making some headway at the younger age; school children I think are probably better off today.

**DJS:** They are still thinking and curious about the world at large.

**JVN:** Yeah.



**DJS:** In terms of scientific temper as well as rational thinking, I think we also need to get a lot more of our ideas and thoughts and scientific writings into regional languages. You have been writing extensively in both Marathi as well as Hindi, in addition to English. Akashashi Jadale Nate is one of your books in Marathi which has been very well received. Could you tell us your views on how we might actually promote regional language writing at a much wider level than what is being done right now?

**JVN:** I feel that one should have perhaps more awards available for people who do this kind of writing to encourage them to do more. That is one possibility which I can think of. The other is at the school level. My suggestion is that during one period in the week, students can ask any question and they can be answered, and in general, anti-superstition ideas can be given. You don't need to have a full story, but you can have discussions, questions and answers.

**DJS:** Jayant, you also found time to write science fiction, and I think one of your early attempts was participating in the competition by the Marathi Vidnyan Parishad, where you wrote under the pen name of Narayan Vinayak Jagtap. Could you tell us about what motivated you to write science fiction and how that might also help in the larger scheme of inculcating scientific temper amongst the citizens?

**JVN:** Well, I had seen my supervisor and mentor, Fred Hoyle, writing some good science fiction like 'Black Cloud' and 'A for Andromeda'. I felt that I should also try the same thing, but in Marathi, because Marathi had very few science fiction type of stories. So I took part in a competition for writing science fiction. It was conducted by Marathi Vidnyan Parishad. The idea was to invite from general public science fiction stories of about 2,000 words long. The stories were to be judged and the best story given a prize. I decided to take part in this competition, but I felt that the organizers would know my handwriting if I sent it, and I didn't want them to be in any way affected by the fact that I was one of their candidates. So I asked my wife to write it in her handwriting, as her handwriting would not be known to them. I also used a different name –Narayan Vinayak Jagtap – the initials are the reverse of my name Jayant Vishnu Narlikar. I sent my entry from a different address. After some time, I heard that it got the first prize. So then I felt confident that I could write some stories. So I then revealed that the story was written by me. After some time, I heard that Durga Bhagwat, a distinguished lady writer in Marathi and the chairperson of the Marathi Sahitya Sammelan, referred to this story and said that it was encouraging to have new ideas like science fiction coming into Marathi, "We welcome that". This was a big boost for me to write.

**DJS:** What was the name of that story and what was it about?

**JVN:** The story was called 'Black Hole' (Krishna Vivar). It used the property of going close to the black hole and circling and then coming out again. So long as you are outside the horizon,

you are able to come out. This was the basic story.

**DJS:** Among the ones you've written, which is your favourite one?

**JVN:** Well, I wrote one which is called Ujavya Sondecha Ganpati, Ganesha whose trunk is to the right. The Ganesha's idols usually have trunks to the left. So this was about an idol of Ganesha, with trunk to the the right hand side. How was that achieved? The story was that of a machine which changed your parity on entry. The story starts with a bowler who is not very effective anymore and is likely to be sacked. But the bowler is allowed to play his last test match. The bowler who is a right hander decides to play with his left hand in his last match. So he bowls with his left hand leaving all the batsmen completely confused. He goes on to win the match for the country. That was the start and then the story goes on to tell about how this happened.

**DJS:** Let's get on to IUCAA, Jayant. This is an institution which you established and it has grown very well, and it is internationally one of the best centres for research in astronomy and astrophysics. Could you tell us about your motivations for starting IUCAA, and what led to it, and the institutional structures that you tried to put in place to really establish a world-class institute?

**JVN:** Well, while working in TIFR, I always got the feeling that certainly I was having a good job in a good environment and so forth, but I was aware that a large number of university population was unable to access good data or good facilities. So could something be done for the universities as a whole? I used to just worry about it; I could not do anything by myself. And then one day it so happened that Yash Pal, who was the chairman of UGC, said that he would like to consider having an inter-university centre in astronomy and astrophysics. The idea was to create a centralized facility to be shared by university academics. This came very close to what I had been thinking. In the brainstorming and thinking about it that went on, I was able to make some contributions. Ultimately, it came to writing a report on how to create such an institute. And Yash Pal said to me after he saw the report, "The report is good, but I would support it only if you take the responsibility to achieve it". I was really taken aback. Yash Pal further said that he knew that people in TIFR (because he was there before) when they went outside TIFR, they would come back saying they were not happy working elsewhere. He wanted a commitment that I won't come back. So I said, "If you give me the freedom to work on this institute, then I will certainly work. I have certain ideas which I want to put in practice. So if I am given that freedom then I will be happy to work without any lien on TIFR". So he said "Yes, I give you that commitment". And so it worked out and I took up the responsibility of building that inter-university centre. I framed the rules, which were in general accepted. In some cases, some modifications were made. I remember asking one of the joint secretaries,



who was in charge of IUCAA from UGC's side, whether I could do this or that. He said, "Sir, don't ask us whether you could do it or not, if you think it's good for the institute, you go ahead and do it and we will later on support you. But he further said if you ask us in the first place, we may not know whether it is good or bad, and so we may not give you the right answer".

**DJS:** That's a very enlightened view from a bureaucrat actually.

**JVN:** Indeed, this was a very enlightened bureaucrat. So it worked well. I got an ideal kind of basic structure which I think they're still following.

**DJS:** When you said you were trying to put progressive rules and regulations in place that was largely to give academic freedom, encourage academic work, encourage universities to interact over here, is there any specific aspect of the rules and regulations, which you mentioned that you would like to highlight?

**JVN:** IUCAA was created to be an institution from Pune which advises or gives useful advice to people who are interested in astronomy and astrophysics from the university side. At the same time, our mandate is to encourage them to work using these facilities so that they should not complain that they don't have any facilities. Their travel was paid for, and they could use the facilities like the computer or the library or instrumentation centre. All these facilities were available. The success of IUCAA depended on how much they are used. And this is what I am satisfied with that there are a fair number of users. We had anticipated about a hundred. So that hundred has been crossed and more and more people are using IUCAA facilities. Their quality of work has improved as well, as we see from the publications in good journals and so on. So this is what we had hoped for from IUCAA and that is happening.

**DJS:** We suppose the location of IUCAA was also influenced by the GMRT being built by Govind over here?

**JVN:** Yes. Yash Pal was very keen on it. If such a big national facility like GMRT is being built near Narayangaon, he preferred to have the IUCAA facility in Pune, so that GMRT could be accessed easily. In fact, he was hoping that universities could be employed in the actual construction of GMRT as per our thinking or discussion. I don't think that happened. But after GMRT was built, there have been users from the university sector, which is a good thing. We certainly gained by having NCRA next to IUCAA as an alternative place to work or go for lectures.

**DJS:** There has also been a joint graduate school and collaboration between the faculty members.

**JVN:** So I think this is a good development.

**DJS:** Yeah, this is a good development. And the inter-university centre was also a relatively new concept when IUCAA was set up and that has worked well.

**JVN:** Yes. I think on the whole it has been a very positive experience.

**DJS:** IUCAA has actually grown quite a bit, and as you said today, the number of associates has crossed 160, and IUCAA is also taking part in several major observational projects. It has grown in both observational as well as theoretical aspects, including projects like LIGO-India, TMT, SALT, part of the Square Kilometre Array (SKA) as well. Is there any aspect that you think we should pay a bit more emphasis on as far as IUCAA is concerned in the next five to ten years?

**JVN:** Well, what I am about to say can be highly personalized. I have seen the Institute of Astronomy grow from very modest size to what it is today. And if you go there today you will find, it's quite big. I don't somehow feel very comfortable in that kind of sized institute. And now there is a talk in IUCAA to grow, to have another campus and that kind of thing. I feel that in many cases, small is beautiful. This is a good principle and too much expansion is probably not a good thing. You can certainly have more institutions like IUCAA elsewhere in the country and link them together, rather than have one institution with so many branches. I think TIFR has done the same thing, it goes on giving franchise. I kept telling Professor Swarup that he should go for an independent GMRT or NCRA which is not a part of TIFR. But he wanted to have it connected with TIFR. I said, "Your status is already so good that you don't need TIFR to back you up". So this kind of argument used to go on.

**DJS:** Like the Institute of Astronomy, both IUCAA and NCRA, we started from Golay Bungalow, a very small place in Pune University, and have grown. On the aspect of TIFR, obviously, there will be debates both ways. But one of the interesting things which has happened is that NCRA is getting a reasonable number of good students from the TIFR channel as well now, which has been a positive thing. But I'm sure there will be arguments both ways. We will not take too much more time. I just wanted to probably touch one or two things on a personal note. I first met you during the famous summer school of 1976, when you travelled with us on the bus to Ooty and gave us puzzles to solve. Not that I managed to solve many, but this was probably a very similar philosophy to what you mentioned earlier about Moru mama writing puzzles for you on the board. It was fantastic to be able to interact with you as a very young student. And whereas that is not the kind of culture we see in many of our institutions of higher education, which are very hierarchical and often the interaction between even senior faculty and junior faculty leaves a lot to be desired, let alone the students. So, how do you think we bring about a change in culture in our institutions of higher education, where there is far more interaction between students and faculty, it's more egalitarian and more transparent in its functioning?

**JVN:** I think there should be more interaction at all levels. For example, I had made a rule that when I was the Director one could come and knock on my door. If I was free, I would certainly talk to the persons whenever they came. If I was not free, I would tell them when I could see them. So I didn't want to be inaccessible. I would rather be a person who is sort of always available. That was the thing. And the other thing is that in many cases, in government institutions and science institutes, you find that people don't like to contradict the superiors. They mostly always side with him, and this I have always discouraged. According to me, if you feel you are scientifically right, then you shouldn't be afraid of your boss. So I avoided hierarchical attitude in IUCAA.

**DJS:** That's absolutely fantastic. I mean learning from both you and Govind, I probably adopted very similar policies when I was the Vice-Chancellor of Cotton University where even the junior-most faculty or staff members could come and argue with me, and I had an open door for everybody. But in most universities that is not the case, and I think we need to see how to bring about the culture which you have set up in IUCAA into a larger number of institutions.

**JVN:** Yes, I think what one needs is a sense of humour, then you are much better off.

**DJS:** I mentioned about the first time I met you. The first time I got a letter from you was when we as young students, Vasant Kulkarni and I had written a paper on angular size evolution, and we sent it to you. You sent us a very encouraging reply back. It was a very ordinary paper, but your words were very comforting and encouraging to us as young students. I think you reply to almost every letter that you get and that is also a fantastic culture.. What led you to it and why do you think that is very important?

**JVN:** I feel that if you engage in correspondence or talk to them, they feel much more at home with you or your institution or establishment. It is many times the case in India, that writing a reply is considered demeaning, where you are downgrading yourself. This is not the right attitude; you should, in fact, interact with the person, make him feel comfortable. Above all, you should respect his ego. That is what I think.

**DJS:** That's really fantastic. You mentioned about a sense of humour a little while earlier, and perhaps we could end by something humorous. I remember that when I was pouring my woes out to you at Guwahati when you and Mangala visited us, you recounted a joke, where a sage was not getting his food because of a dog. Perhaps we could end with some interesting incident or some humorous incident from your life.

**JVN:** It is difficult to remember suddenly, but that dog story was supposedly from some version of Ramayana. The story was that in Ramrajya, there was a dog who came to the king and said to Rama, "I have a complaint". When asked against whom, he said, "There is a sadhu or

sannyasi (sage) who is outside. He kicked me unnecessarily”. So they called the sannyasi and told him that the dog says that you kicked him without any provocation. The dog itself looked very ugly and ferocious. So the sannyasi said, “This dog kept following me wherever I went for bhiksha. The lady of the house who would give me something, the moment she opened the door and saw the dog, she would shut the door and not give me anything. So I got very hungry and all because of this dog accompanying me. So I kicked him to make him go away”. He said, “I am sorry that this dog has not caused any problem, but he looks so ferocious that people did not give me anything to eat. So I was angry, and you can give me any punishment you like”. So Rama asked the dog, “What do you want to punish him with?” So he said, “You create a university and make him its vice-chancellor”. Ram was surprised as this is a position of respect. “Are you going to give him a good position instead of punishing him?” asked Rama. At this, the dog aid, “No, no, once he becomes a vice-chancellor, he will know how there are different problems to solve, and he will be all the time worried about answers. That is why I am suggesting this punishment.” So this was the story I was telling you, and as vice-chancellor, you can appreciate the humour behind it.

I will just tell you one more episode involving another vice-chancellor. I won't tell you from which university. I was invited to give an important lecture in a university which the VC was to preside on. It was meant to be at 11 o'clock in the morning. I was told to come to the VC's house and then we would go together. So I came to the VC's house at quarter to eleven, and he was there. It was only a five minutes' ride from where we were, the VC's lodge to the main auditorium. When it became too close to 11, I said, “Should we go now?” He said, “No, no, sit down, would you like some tea?” I said, “No, I don't want any tea, I've come now for lecture at 11:00, so I should be worried about people waiting there”. He said, “No, don't worry; let us see, let us wait”. So when it was half-past 11:00, he said, “Now we can go”. Why late? “Because unless you make them wait for you, they don't realize how important you are”. That was the attitude.

**DJS:** That was very sad. Thank you very much Jayant, thanks a lot.

