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Dr. Bahcall discusses Congressional reaction to Space Telescope proposals ca. 1975-77. He reviews early proposals for a Space Telescope Science Institute, and describes lobbying and committee activity in favor of the idea, ca. 1972-77. He discusses the Hornig and Keller reports of 1976-77 on Institutional Arrangements for ST, and the resulting NASA Announcement of Opportunity for university consortia to build and manage an ST Institute. Finally, he describes at length Princeton's role as a site for the Institute proposals of three consortia, compares the five final competing consortia proposals, and discusses Princeton reaction to the selection of the AURA-Johns Hopkins proposals as the winning Institute bid.

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SPACE HISTORY ORAL HISTORY

With: John H. Bahcall

By: Paul Hanle

Date: March 22, 1984

Place: Institute for Advanced Study, Princeton University

Hanle: I am with Professor John Bahcall in Building E again, the Institute for Advanced Studies, March 22, 1984. I am going to ask about the establishment of the Space Telescope Science Institute, and also instruments on the Space Telescope. I wanted to ask first another question about the selling of Space Telescope.

When you were selling ST, were you aware of certain favorable sympathies of some committees for astronomy?

Bahcall: Oh yes. I kept a book on every person, appropriation, and authorization, so I knew what their interests were, and I knew whether they were favorable or not to our project, or in general.

Hanle: How about committees other than authorization and appropriation for NASA?

Bahcall: Relatively few. There were some people who are important people in the Senate, whom we would talk to, because they are favorable to astronomy, and get to talk, like Barry Goldwater. Goldwater was pro-astronomy because of Kitt Peak, and he has a picture of Kitt Peak in his office. And we would use his favorable offices, but that was the minority of the people.

Hanle: When you were selling the telescope, did you have a sense at all that there was a competition between you and some of the other space science programs? I'm thinking especially about planetary.

Bahcall: It was at best marginal and was never explicit. It wasn't a serious issue that I remember. It was not raised as a serious issue by us. We never said this program is better than any other space science program. We always stressed the merits of our program, knowing that we had to have everybody backing us.

Hanle: I would think it would be your strategem not to raise it, because it's to your disadvantage. But someone else might raise it. I wonder if you ever had to diffuse that?

Bahcall: I would have tried to avoid the issue, that has been my tactic, and I don't remember it ever being an important issue.

Hanle: One place it came up was with the Jupiter Orbiter Probe, which was supposed to have a new start the same year as Space Telescope in '78. Things were being discussed in '77 for fiscal '78 start. And I saw one letter from an astronomer in favor of Jupiter Orbiter Probe, and I wonder, did you write any letters in favor of it?

Bahcall: Yes. I'm sure I did. And I'm sure that I was quoted as favoring it.

Hanle: Was there a confusion in the minds of many Congressmen between so-called deep space astronomy and the planetary program? Was it all thought of as astronomy?

Bahcall: Probably. I think even more things were thought of as astronomy that you and I might not link together.

We benefitted from the confusion between astronomical space satellites and satellites designed to monitor military installations. That was a benefit to us, for example.

Hanle: To your knowledge, is that a genuine confusion, or is there a link?

Bahcall: There was a belief that the link was more direct than it is. Astronomical satellites are not used for, are not appropriate for, monitoring purposes, terrestrial monitoring. However, there is definitely a technology transfer which is mutually beneficial.

Hanle; This is something we are trying to analyze with unclassified sources, of course. One astronomer said, on the record, in fact, it is interesting, you can tell what the Air Force has not done by what had to be developed in Space Telescope. And he pointed to the Fine Guidance System, and to polishing the ultraviolet mirror.

Bahcall: Yes.

Hanle: I wondered if there were any other aspects that one might be able to look at, and you would be willing to say?

Bahcall: No.

Hanle: Okay. Why don't we talk about the Institute.

Bahcall: Good.

Hanle: Have you ever heard of the Ramsey Committee Report of 1966?

Bahcall: Yes.

Hanle: Were you aware of it when you first got involved in Space Telescope?

Bahcall: I don't know. When I first got involved, probably not, although I really can't say.

Hanle: Let me rephrase that: Were you aware of it pointing to the need for a space telescope, for an institute to run space astronomy, when you became concerned about operations of Space Telescope?

Bahcall: Again, I don't remember how much I knew. I as one time or the other discussed the Ramsey Report with Norman Ramsey, who was interested, among other things, in having Fermi Lab have a major role in the Space Telescope Science Institute. And he was helpful to us and encouraging to us. But at what stage I knew about that, I don't know. But certainly at a reasonably early stage I knew about it, because we talked, Lyman and I, or certainly I did, maybe both of us, talked to Norman Ramsey a year or two before, very early in the positioning stages before there was an AO for a science institute.

Hanle: Let's see, that would have been somewhere between '72; you entered the ST picture about '73, I think; isn't that right? Late '72?

Bahcall: I don't know (not clear).

Hanle: And in '75 or so were a series of reports that were written in a period when you started in the LST Working Group.

The earliest I've seen is: Bob O'Dell wrote a paper about 1972, very early on, proposing that there be a science institute. More significantly, he set up a subcommittee that I think Arthur Code chaired. Do you remember that committee to discuss the institute? It was sometimes dubbed the uncommittee.

Bahcall: I may or may not remember it. It didn't make much of an impression on me, if so.

Hanle: Let me ask something which is not keyed to times, but rather attitudes over time. Do you recall the idea of a broad-based institute for all kinds of astronomy being discussed in the early '70s?

Bahcall: I recall arguing then that the best scientists would provide the best service work because they would be dedicated to making the instruments most effective for themselves. We needed the best scientists, because those

were the people who were the most strongly motivated to utilize the telescope, to understand its functions, to provide good facilities for analyzing and archiving the data, and otherwise make it convenient and good to use. The best scientists would do the best service work, we felt. The second part of that syllogism was that the best scientists in astronomy would not work for NASA. In practice, I may have been wrong in both my arguments.

Hanle: Did you anticipate that you might have trouble getting the best scientists to do any service work?

Bahcall: No. I felt that the Space Telescope Science Institute would be such an exciting place that many of the best scientists would want to work there; that it would be an attractive environment in which to do science, and you could get the best people.

Hanle: Do you think, in principle, it's possible to have a service function which is the major responsibility, and in addition be able to offer a substantial fraction of time for research?

Bahcall: I don't know about the "in principle." I don't like to address that, but I think there are laboratories where that happens; NRAO is one. And I think they have excellent scientists there. Kitt Peak is a second one, and they have had, and continue to have, some very good scientists, some excellent scientists there. But those were in astronomy. Certainly, places like Fermi Lab and SLAC and Brookhaven all provide some services to outside users. They are a user-oriented community, SLAC, Fermi Lab, and Brookhaven. And they have great scientists there. So I think some national labs are able to do it.

Hanle: Some national labs, among them some that you have mentioned, are able to do it by having separation between the service function and the research function, separate organizations. Are those that you have mentioned, are they usually successful by separating service from research people?

Bahcall: To the extent to which I know those four organizations, I know different parts of those four organizations. There is no separation among the groups that I know, physics and chemistry at Brookhaven, at least among the scientists that I know. They provide some services. They are not the accelerator people there, although there are some people who work on the nuclear accelerator, and they service outside people.

At NRAO, there is some separation, but all the scientists do some service work. The best scientists do some important service work. At SLAC I am sure there is some separation, but some of the people that I know do both. I

don't know Fermi Lab, hardly at all. I think it's not atypical at those organizations to expect that 50% of your time is devoted to general service work, and 50% of the time to research, just as it is in a university. And that was the stated goal that the sciences do.

Hanle: Do you see, though, differences between the way that is implemented at a university and the way it is implemented at a laboratory whose existence is for the service to the community?

Bahcall: I don't think those laboratories exist just for the service to the community, in any case, less so than the Space Telescope Science Institute for sure. Or perhaps Fermi Lab is more in that way, and maybe Kitt Peak and NRAO are also strongly servicebound, but a university is different from a laboratory.

Hanle: Right.

Bahcall: It has different functions. And the spirit is different. Concern in a laboratory is more with the current research problems and less with the education aspects of the subject, so there are differences. But I'm not sure, if you counted up the hours that a person spends doing research, a good person in the university may spend less time free for research than a good person in one of the best laboratories.

Hanle: At the university the requirements of service are not as rigid. They may be greater at some times, but they are not as rigid as they are in a laboratory dedicated to service. I wonder what you believe, whether that's right or not?

Bahcall: Well, I don't know. I don't think the general rule is ever important. It's only important in what is true for the individual. And if an individual has to decide between a university or a national lab where research and service co-exist, I think his personal situation there is going to be the most important thing for him, in addition to other considerations of prestige and colleagues.

Hanle: I guess, what I was trying to get at is the likelihood of setting up a Space Telescope Science Institute that would be a great center of excellence in research.

Bahcall: Yes.

Hanle: What about it? How likely is it? What determines this?

Bahcall: Well, (cross talk) you know, I only know of one example, and there it is.

Hanle: Where is it? (laugh)

Bahcall: There it is in Baltimore. And that's the only example of a Space Telescope Science Institute I know. Whether the course is inevitable, I don't know this. You can't play history twice.

Hanle: Okay, let's talk about the one case. Where is it on a scale of scientific excellence right now?

Bahcall: So far, I think the director and his principal associates say that they made a major effort to get the best people in the field, and they have often not succeeded. I know things only second hand, from what I have been told, but Riccardo says that many of their first choices have not come. And it's not for lack of trying. That's just a fact.

Hanle: Do you know what it is? Why is it?

Bahcall: No. I mean, I haven't been involved in the recruiting.

Hanle: Perhaps you know some people who declined, and what their reasons are?

Bahcall: I know lots of people who have declined. And the reasons, I think, are variable, but I shouldn't speak for them. They should speak for themselves, because again, it's secondhand. It's what they've told me.

Hanle: Okay. Have you seen an emerging concern that it is difficult to do research, especially excellent research, in a government laboratory, even if it's contracted government laboratory?

Bahcall: No one has said to me such a theoretical statement, that a government lab is a difficult place to do astronomy, and that's why I didn't go to the Science Institute. But I haven't asked many of the people who haven't gone.

One of them who didn't go is Scott Tremaine. He will be here next week. You can ask him. James Binney will be here soon; he is another one who didn't go. Ray Soneira didn't go. Lots of people you know here have not gone.

Hanle: You gave me an argument for why you wanted to have an institute. And you spoke in terms of "we." Who were the major advocates of the institute idea: that is, who were you speaking of?

Bahcall: I can remember at one point that Lyman and I and George Field went down to see Frosch about it. That was at a rather crucial point. I think lots of people were advocates of it; but at that point we had a particular advantage in talking to NASA, because we had been successful in selling the program. We were regarded as friends of the program. We

were well known. I organized that particular visit, in the sense that we all agreed on what we would say ahead of time. And I called on everybody. Everybody had a little part. I had this part; George had that part; and Lyman had another part. But we divided it up ahead of time. But almost anybody you talked to then in the astronomical community felt that it was important that the science institute not be inside NASA.

I don't know whether the opinion is as universal now among the people who are peripherally involved with Space Telescope, as it was then. But surely we were all convinced of that then.

Hanle: Was this a concern that Goddard would operate Space Telescope? Was it focused on Goddard?

Bahcall: Goddard was the logical candidate, but my concern had nothing to do with Goddard in particular, but in NASA in general, and I remember, Al Boggess dissenting at some Working Group meeting where we passed some resolution to this effect, that it was better to have it outside of the NASA gates. And Al Boggess dissented, because he felt that it could operate just as well within NASA gates. And I am sure not, that my position wouldn't be different.

I'm not sure now that NASA couldn't have created a very appropriate environment for doing Space Telescope Science Institute work, under NASA aegis. But it would have required imagination within NASA. It would have required NASA doing things differently within NASA. But it's not clear to me now that that wouldn't have been a perfectly acceptable solution, but I was fundamentally opposed to it then.

Hanle: There seems to have been fairly strong opinion. You had an IAU colloquium here in '75, I believe it was.

Bahcall: I remember the year, '76 (inaudible).

Hanle: In any event, Noel Hinners spoke.

Bahcall: Yes.

hanle: And in the paper he said that there appeared to be a body of opinion against the idea of establishing something at Goddard. He mentioned Goddard specifically, and he wanted to talk a little bit about the excellence, in effect to defend Goddard astronomers, but also to try to diffuse the concern on the outside.

My question is: Was it your perception that not only you, but many of your fellow astronomers on the outside then...Well, did you have a concern that Goddard astronomers were not as excellent as the rest of the astronomical professoria -- that they didn't measure up to the standards of the astronomical profession? They might not operate Space Telescope as well and as fairly in service to the whole

community?

Bahcall: I don't think fairness was ever a concern. At least, I hope it wasn't, because if I have to make a statement on the basis of my experience to date, I would say that I would have the greatest confidence in the group of people who are associated at Goddard with running space astronomy, in their fairness. Certainly, what they did in IUE has, and that whole organization, I think, has been wonderfully fair, and has managed to service the astronomical community in a way which is immune from charges of bias. And that's a really remarkable achievement.

Also, they've gotten an extraordinary amount of good science out of an inexpensive mission, with benefits for scientists everywhere -- especially outside Goddard.

I think there is no doubt that the Goddard community is above average in their astronomical achievements and there are some real stars at Goddard in astronomy, really outstanding excellent people.

I think the assumption that we made was that you could get people at the level of the very best university groups, you could get people at that level to run Space Telescope sciences. But that was the sort of dream that we had.

Hanle: There is a view of Goddard as the organization that is trying to acquire an institute, if there is to be one, or at least to operate Space Telescope; and then a kind of reaction on the part of some astronomers on the LST working Group, and those others who would be interested in Space Telescope, that this would not be the best way to do it.

Bahcall: Yes. I think that there were certainly active groups at Goddard very strongly trying to get the running of the Space Telescope to Goddard within the gates.

Hanle: Bob O'Dell signed a report on an institute in 1975, along with Bill Keathley, the project manager.

Bahcall: I know Bill, sure.

Hanle; And George Levin.

Bahcall: I remember George.

Hanle: The project manager from Goddard.

Bahcall: Right.

Hanle: In which there was presented an idea for an institute. And it appeared in this report, again, that O'Dell and Levin, together, were presenting a picture of an institute that could very easily be placed at Goddard. Do you remember this report that I am talking about?

Bahcall: Not immediately, no. I'm sure I read it, but I don't remember any details about it.

Hanle: What were the attitudes of the Goddard scientists -- you mentioned Boggess -- in response to the proposal to have an independent institute? Were there any scientists in particular who were opposed to that notion?

Bahcall: There was the impression, and I think the fact, that Jack Brandt was working hard to have the Science Institute brought within NASA at Goddard.

Hanle: Was the Goddard organization interested in doing that, above Brandt, do you know?

Bahcall: I don't know. I mean, the Goddard institution changed over time, and I was never quite sure, anyway, what exactly they wanted.

Hanle: How about Headquarters? What was the feeling at Headquarters toward an institute and where it might go?

Bahcall: I think there was an initial hostility to an institute at Headquarters, just because it was not the way NASA did business. But I think Headquarters correctly perceived that the astronomical community, and in fact, the scientific community, so far as it knew about it and was concerned about it, believed strongly that the only way to have a maximally effective science institute was through scientist-run independent institute. I think that was a correct assessment of the judgement of the overwhelming majority of the astronomers and physicists at the time.

Hanle: Were there any dissenting from that view, by the way, that you can recall, whom we might interview?

Bahcall: If there were, well, certainly I think Jack Brandt would have dissented from it. And I think Art Code may not have seen it in as extreme a light as most of us. Art, I think, felt that there was nothing wrong with being just outside the gates, and I'm not sure that he objected to being within the gates of Goddard.

Hanle: You are familiar with the Hornig Report?

Bahcall: Yes.

Hanle: The Report was commissioned by the National Academy of Sciences to study the idea of an institute.

Bahcall: Yes.

Hanle: How was that received by the astronomers?

Bahcall: Very well. It expressed all of our prejudices and very eloquently.

Hanle: Was it written specifically to do that?

Bahcall: I think it expressed the convictions of the people that composed that study group.

Hanle: Was the study group composed largely of people interested in space astronomy, the Large Space Telescope?

Bahcall: No. In fact, Hornig was not himself.

Hanle: I know.

Bahcall: No, there were a number of people there who were not particularly associated with the Space Telescope. I remember it being discussed as to whether I should be a member of that committee or not. And in the end it seemed most appropriate that I not be.

Hanle: But all were professional scientists, is that right?

Bahcall: I don't remember. I wouldn't be surprised if there were university administrators among them. Hornig is a professional scientist, but also a university administrator. There may have been university administrators who were not professional scientists. I don't remember.

Hanle: I think he was also a former President's Science Advisor.

Bahcall: That's right.

Hanle: Do you remember the Keller Report which was written in response?

Bahcall: Sure.

Hanle: Was that distributed to the scientists, to the astronomers?

Bahcall: Oh, yes.

Hanle: By the astronomers, I'm thinking, in the first instance, the LST working group. But I suppose there is a larger constituency of astronomers, too.

Bahcall: How widely distributed it was I don't know. I certainly saw it and reviewed it in more than one stage, even before I was supposed to see it, and was very happy with it. It's a wise and thoughtful document.

Hanle: What, in your view, was its purpose in being written?

Bahcall: Well, I think Warren Keller was assigned the job of assessing what was the best thing to do with Space Telescope Science Institute from the point of view of a professional who had the responsibility of making that decision; namely, from the NASA administration's point of view. And I think the administrator, or other people in NASA really wanted to know really what their committee would think of the various options. Keller is a thoughtful, perceptive administrator and his views count with everyone.

Hanle: So, in effect, it was to be the official response to the Hornig Committee, which was viewed as somewhat independent.

Bahcall: The official response, or the document which the deciding parties in NASA would use to guide their decisions.

Hanle: Noel Hinners, of course, had to decide on that, and he wasn't the final person to decide, but he was in the middle and one of the main decision makers. He accepted the Keller Committee recommendations, for the most part, I believe. Is that right, to your recollection?

Bahcall: Yes, I think that they were the principal guide for him.

Hanle: Was he already predisposed to an institute, however?

Bahcall: If I had to answer that question, I would say, yes. But I would find it difficult to document that.

Hanle: Did he have an opportunity to hear about the institute earlier than the Hornig committee, and the discussion in '76?

Bahcall: Oh, I'm sure that those of us who had his ear talked to him about it.

Hanle: Did you have a chance to talk to him about it?

Bahcall: Of course.

Hanle: And did he give you any feedback when you spoke about it, either in favor or not?

Bahcall: I don't remember, but I'd be surprised if it wasn't favorable.

Hanle: Someone suggested more or less to ratify the results of Art Code's own committee for the LST Working Group.

Bahcall: The Hornig Committee Report was the focal point. It was what we supported. It embodied our goals and aims and

views. It may have been coincident with the Art's statements, or the statements of many of us at that time. But the group with the prestige was the Hornig Committee report. I don't remember the Code Report being discussed in that context. I'd be surprised if NASA felt they had to respond to it in the presence of an official National Academy report headed by the President's former Science Advisor.

Hanle: There was some concern about this time that Goddard appeared to be emerging as the contract monitor for the Space Telescope Science Institute. In other words, in effect, the institute would be a wing of Goddard. Back to Goddard for a moment: But this is the period when this is relevant. Were you concerned that Goddard not be contract monitor, but that Headquarters should be?

Bahcall: Yes. That was a point which I made repeatedly and often, that I felt that the Science Institute should be -- certainly the director of the Science Institute should be -- responsible to Headquarters, because they had the national and international responsibility for science, for the mission of NASA. I didn't feel it would be useful to have to find a way through the labyrinth of factional disputes that exist among NASA centers. That was very strong in my opinion at the time.

Hanle: For the sake of the record, how did that play itself out?

Bahcall: I lost.

Hanle: You lost. Did you lose overtly; somebody say "no?"

Bahcall: Yes, I remember -- well, I think they repeatedly said no. But I sued to make the point all the time.

Ivan King organized a seminar to inform the various consortia about Space Telescope Science Institute at the time that there were sort of four or five or six consortia that were considering bidding. And there were NASA representatives who sat in on that. I gave the opening talk there, the sort of background talk. and I stressed again my feeling -- that I can remember -- that proposals ought to contain this direct link to Headquarters. But that we lost just in the AO. That just isn't the way it was done.

Hanle: I believe, in fact, it is a matter of policy in NASA not to have contracts be directly responsible to Headquarters, for the most part.

Bahcall: Yes. Their reason, it seemed to me inadequate, but specific. They claimed that there were not people at Headquarters who could monitor contracts. That seemed to me to be true, but an inadequate reason. I didn't see any reason why they couldn't hire people or move people from

where they were to monitor the contracts under the aegis of headquarters, which then presumably had a broader point of view than would any center.

Hanle: Then, there probably were other reasons for NASA to make its decision. What were they?

Bahcall: I wasn't privy to the justification. I never heard a justification which I found adequate. And in fact, when I used to think about these frequently, it seemed to me that the inevitable evolution would necessarily be toward Headquarters, since the issues would cut across all interests at NASA. It may well be that the decision was made because support, prestige and money needed to be parcelled out among the different centers, and more or less weighted in equal fashion. And this was the plum that Goddard would get. That may have been it. I don't know.

Hanle: Do you feel that Goddard's role in the decision, since it was the contract monitor and deciding center was crucial to the selection of Johns Hopkins and the AURA proposal?

Bahcall: I think the constitution of the group or perhaps, more fundamentally, the nature of the AO, predetermined the selection. The AO did not list the criteria, the major criteria that were listed by the Hornig Committee. There were no points given for intellectual ambiance, or strength of local astronomical community, and various other academic and intellectual criteria, which were stressed by the Hornig Committee. There were no points given in the selection for that. So I think, given the way the game was being played, probably didn't depend upon...It damn sure did not depend upon which group administered it, as long as they adhered in a legalistic sense to the roles as defined.

And the Princeton Proposal, as I look back on it, was just irrelevant. It was a proposal in response to the Hornig Committee report and not in response to the AO particularly. We stressed the things that were important in the Hornig Committee report and not the things that were important in the AO, probably.

Hanle: How about the Keller Report, which was after all, a NASA official reply to the Hornig Committee report?

Bahcall: Well, again, I think the Keller Committee report again stressed intangibles which were difficult to judge by, rather than the much more specific criteria that were stressed and defined in the AO. And it's natural; they were different kinds of documents.

Hanle: It seemed to me that AO emphasized a great deal of the management structure.

Bahcall: Yes.

Hanle: Did you consider getting an outside management consultant, perhaps, or somebody to do that?

Bahcall: Yes. We did. We were approached by CSC before they approached anybody else, and we were offered a deal whereby we would give them a certain fraction of the guaranteed contract, and they would then use their experience and expertise in handling NASA contracts to help us write a better proposal, or write the winning proposal.

And I believe Ed Groth was very strong against that. Lyman opposed it. And I opposed it.

Tape 1, side 2

Bahcall: I certainly agreed with Lyman and with Ed that we should make no deal with CSC, but we wanted in the Science Institute people who were the best scientists, not necessarily people who had had a lot of experience in writing successful NASA proposals. So we made a conscious decision, and it seems to me that that was the decisive decision that led to the success of the AURA proposal, because they relied heavily on professionals, people who dedicated themselves to writing the proposal, were experienced in writing proposals, and knew what NASA wanted. And they had some astronomers who worked full time on it. And they had professionals familiar with what NASA needed or wanted, or judged by, to help them write the proposal. We didn't. That was a conscious decision, and I think, led inevitably to the great disparity in the quality of the proposals.

Hanle: Did you hire CSC on simply a consultant basis? Or would they not be hired that way?

Bahcall: First of all, they then went with the best offer outside of Princeton. But we generally felt that we could do a better job than hired guns, although my role at that time was minimal. The principal role and the compilation and drawing up of the details of the proposal: The at large role was played by Ed Groth, but also by Lyman. And at AUI by two AUI employees -- Vic Bremankamp and Karl Emthor. Well, one is the treasurer, is still the treasurer today, and the other -- both are still there. And they took everything. We provided only first drafts. And they rewrote everything, not necessarily showing it to us. And they were the ultimate people responsible for the AUI Princeton proposal. And Lyman was not allowed to see anything except the first drafts, which he prepared, because he was involved with other proposals. And I think the same was probably true of Ed. I was not allowed to see anything but, perhaps, I was allowed to see the science part not the management part, because I hadn't contributed significantly to that. But those people were the dominant people. And I complained somewhat to the

AUI authorities that it seemed to me that there ought to be more decisive involvement by the scientists, but they felt that Karl and Vic would do a better job, given our divided loyalties, than we could have.

Hanle: Was Bremankamp an astronomer?

Bahcall: No. Vic had a background in science, but not in astronomy.

Hanle: Basically an AUI administrator.

Bahcall: Yes, and so was Karl. Karl, I believe, was treasurer.

Hanle: There were two steps to the process. And the first one was that you proposed to two various consortia, I believe.

Bahcall: That's right. And at that stage I had a big role. My role diminished because I was very heavily involved in science during the period of the proposal writing. And I had practically nothing to do with the proposal writing. I wrote very few paragraphs, few sections.

Hanle: What was your goal in writing this proposal of a Princeton site to the various consortia? You wanted to convince them, obviously. But I mean, to whom did you address your proposal?

Bahcall: We wrote it as we would have written a proposal to NSF to science colleagues. That was the audience that we were considering. And I think the things that we wrote subsequent to that, as a response to the A0, certainly the things that I wrote, were largely addressed to an audience which would have been our colleagues, not the people that were actually reading the proposal.

Hanle: Was it true that most of those who were reading those had at least some scientific background, though, and in some cases were themselves working astronomers?

Bahcall: Not in the majority of cases. Certainly not the chairman.

Hanle: You are talking about the source evaluation board?

Bahcall: The source evaluation board. Jesse was there as a visitor, but nonvoting, just to see that everything was done in proper fashion. So he could certify it to the community afterwards that it was done in a fair way, but he was not an active -- he didn't vote.

Hanle: Did you know in advance who was on the source

evaluation?

Bahcall: Yes.

Hanle: Before even the proposals went in?

Bahcall: That I don't know. Probably, yes, I think we did, before the proposals went in. I think that's right.

Hanle: Did you find that this process was easy or hard to deal with, of preparing and defending a proposal? Now, I'm talking about a proposal to NASA, and so, as you pointed out, a lot of it is AURA. But you had some role in figuring it out, too, and so I wonder what your feelings are?

Bahcall: No, my role was pretty minimal at the time that the proposals were being written in response. My role was major at the time that we were trying to sell the proposal to our science colleagues.

Hanle: Okay. When you were trying to do that, was that before the AO went out?

Bahcall: Yes, before, or certainly before the responses, before the various groups, consortia, had decided upon which site. I played a major role in trying to persuade various consortia and groups that Princeton was the best place for them to propose, and played a relatively minor role in the proposals by the consortia proposing Princeton as the site. Not enormously minor, but certainly well below the role played by their administrators and by Lyman and Ed.

Hanle: Yes.

Bahcall: That is certainly my perception of it. Maybe Lyman and Ed have a different perception, but my feeling is that, let's say, even somebody like Ed Jenkins played a bigger role, perhaps not conceptual role, but certainly contributed more material to those proposals than I did.

Hanle: I think you are talking mostly now about writing up of the proposals.

Bahcall: Yes, that's right.

Hanle: So there had to be some kind of interaction, maybe on a day-to-day basis with the consortia, with AUI?

Bahcall: Yes, certainly I had. I don't know if it was day-to-day -- but frequent interaction with AUI, and I would give my opinions about things. I don't know if you have discussed with AUI people that were around at the time, but they --

Hanle: Jerry Tape.

Bahcall: Jerry Tape and Bob, what was his name? The present president.

Hanle: Hughes.

Bahcall: Bob Hughes. Both were involved in the AUI.

Hanle: How much of the philosophy, the attitudes, that were in that proposal reflected your opinions, your positions?

Bahcall: Well, certainly, anything that differed with my position I would have thought about. But I wasn't terribly interested in the details. I think I regarded it in the same way that I regarded science proposals, that it didn't really much matter what you said, that they looked at who you are and what you had done, and decided on that basis. Until I said, okay, let Lyman and Ed do that, and I think that Princeton will do just fine, because, you know, we are so desirable. And I didn't worry about the details. I was happy to go and do science, but on matters of philosophy, there was one particular matter which I discussed with Lyman at my initiative and several times since, on which I strongly disagreed with him.

I told him that the Institute for Advanced Study would not participate if it were not changed in his draft. Lyman had in his initial draft, which he circulated to all three consortia that proposed Princeton, that for the first few years of the Science Institute the employees would not do any research, in exchange for being allowed to work there. And I said I simply wouldn't support that. And that if he wanted to propose that, he would have to propose it without the Institute for Advanced Study, because that was not consistent with my concept of the Science Institute.

So when I felt strongly about something I insisted on it, and he changed it. In retrospect, he was just putting down on paper what was almost inevitable. Certainly, under the present situation.

Hanle: Did you go to the debriefing afterwards?

Bahcall: No, I did not.

Hanle: Did you see the letter to AUI regarding the debriefing?

Bahcall: Yes, I'm sure I did. But I probably did not read it carefully.

Hanle: There were four points of weakness. And one of them was, not enough resources to go into research.

Bahcall: I see.

Hanle: Do you think that NASA was concerned that these apparent weaknesses in the management structure indicated a lack of interest in management?

Bahcall: I really don't know. All I'm convinced of, in short, with regard to the decision is that it was fair; that it was not close; that on the basis of the criteria which NASA laid down, we were not competitive; and I believe that we would have won, had we hired first rate professionals like CSC, by giving them a significant fraction of the contract.

Hanle: You believe you would have won, had you done that?

Bahcall: Yes, because I think we had greater natural advantages than Johns Hopkins. They won by having a better way of writing a NASA proposal. I don't think AURA was perceived as being a better organization at the time. I think just the opposite. But they didn't have the professional NASA support, NASA knowledgeable support.

Hanle: At the time the proposal was written, the expected launch date was 1983?

Bahcall: Yes.

Hanle: And that meant that there was very little time to get an institute operating?

Bahcall: That's right.

Hanle: And I believe I've seen viewgraphs in your files that indicated you were worried that there was not enough time.

Bahcall: Maybe; I don't remember that.

Hanle: The question really is: Do you recall if the shortness of time was noted and affected the form of the proposal to NASA?

Bahcall: I'm sure it did, but I don't remember the specifics.

Hanle: Who was the principal person at AUI who handled it? Was it Tape?

Bahcall: Jerry handled it more on a day-to-day basis, but Bob Hughes was very informed, and Bob Hughes would have had to control it, if it had been won by AUI. So Jerry was the man that got it started, but Bob was the man who would have had to continue it. They were both well-informed.

Hanle: Let's see, there were three other organizations,

USRA, URA, and Battelle.

Bahcall: Yes.

Hanle: And Princeton ended up being mentioned on two of those three. I've forgotten which one it wasn't on.

Bahcall: Let's see, Battelle chose Princeton. Is it USRA is the Fermi Lab? Then there was the Lunar Science Institute-type people; they also chose Princeton. Then there was the Fermi Lab for which their science group --

Hanle: That's URA. Fermi Lab is URA.

Bahcall: Fermi Lab is URA. USRA and Battelle chose Princeton in addition to AUI. URA chose Princeton; that is, their science group chose Princeton, but their board of trustees overruled their scientists which we thought just killed their proposal, because the science committee recommended us. Their board of trustees felt they ought to have something in the Midwest. They overruled their scientists. Then AURA chose Johns Hopkins over Princeton, in a close ballot.

Hanle: AURA chose Johns Hopkins, knowing it was weak, if not nonexistent, in astronomy.

Bahcall: Yes.

Hanle: They therefore had an alternate strategy, consciously chosen, in their proposal, one has to assume, which was that they would not emphasize the environment and scientific excellence, but rather something else. The question is: have you been able to figure out that something else was since then?

Bahcall: My attitude toward things like this is that you don't look backwards. When it was accessible to me, I didn't read the AURA proposal.

Hanle: Would you do a proposal for a big organization like this again?

Bahcall: Sure. I mean, first of all, I didn't personally invest a lot of time in the actual writing, so that was fine with me. I did my thing, my science. But the Space Telescope is such a wonderful and exciting and important project that yes, sure. If there ever were a project which seemed to be as important and as exciting as Space Telescope, I'd be willing to be involved in it. I'd be delighted to.

Hanle: What was the second reason you thought that the proposal was not successful?

Bahcall: Well, the first reason was that I think we didn't make an arrangement with a professional group like CSC to help write and shape the proposal in exchange for a major part of the contract. That I think would have -- somebody who really knew how NASA wanted AOs written; that was the major reason our proposal was less good than AURA's.

The second reason, I think, was that we made the conscious decision that we would let anybody who wanted to propose -- we would support anybody who wanted to propose Princeton, and we would give our support to any of those groups. That was one of the reasons why AURA did not choose us, even though the balloting was close between us and Johns Hopkins, because they quite rightfully perceived that our support would be diffuse and our loyalties divided at best among the many groups that were proposing Princeton. There were at least three other groups at that time that were going to propose Princeton, so there were only so many hours a day. They figured they wouldn't get more than their small share. I think that was a tactical mistake on our part. I still believe that the two principles that we used in making these decisions were correct; namely, we believed that the Science Institute should have been shaped by scientists primarily, and not by people whose major expertise is in writing NASA contracts. And I as believe that we were correct in saying that we should provide support to anybody who felt that our scientific environment was the best for the Space Telescope Science Institute. Both of those were in the best interest of astronomy in principle. In practice, I think they worked out to the disadvantage of the Princeton location, decisively so. Perhaps, in the end, not for the good of the science.

Hanle: It's a little bit of a contradiction. You said earlier that you put in a proposal, basically what you think will sell within the larger constraints of what you want to do, that you are willing to have the proposal go in and not pay too much attention to the details of writing it. Would it not have been possible to have a proposal that would be more attractive to NASA, but still was within the constraints of those two principles you just described?

Bahcall: Yes. First of all, when I said, attractive widely, I think that the proposal that we wrote and the parts to which I contributed were mainly addressed to our colleagues, not to operations.

Hanle: Yes. (cross talk)

Bahcall: For management people.

Hanle: That is, the proposal you wrote to the organizations which would then propose to NASA.

Bahcall: Yes, and at that stage I did have a major role. And just my attitude toward proposals in the past, I think,

was not appropriate for this competition.

Hanle: You did get some assistance from an outside organization on a sort of time available basis, I guess it was. On an as you needed it basis, and that was the OAO company.

Bahcall: I believe that after it became apparent that CSC had a major role in the AURA proposal AUI responded by getting some help from this OAO, or whatever it was. I forget what they were called. But I never met anybody there. Maybe I did, but if so, it was just briefly. I never had any serious interaction with them. They provided help to Vic Bremankamp and to Karl Emthor, but not to us.

Hanle: Would you have preferred to be with AURA, if you had only one choice, prefer to be with AURA than AUI?

Bahcall: No.

Hanle: So your decision for going for a multitude of organizations might simply have narrowed down to AUI. Was there one in particular you really wanted to go with?

Bahcall: I remember the discussions among us suggested to us that up to that time AUI had done a better job of administration of its national laboratories than AURA had. And that was more or less institutional in the way that the board of trustees for AURA was. It was so diffuse, so many people, a large number of university administrators; and it just seemed like a cumbersome administrative tool. So I think we were favorably disposed to AUI, but we made the conscious decision not to go for any body, because we felt that we shouldn't choose a consortium. That should be chosen by NASA on the basis of their management ability. Otherwise, it would be us choosing, and we felt that that was not the responsible thing for us to do.

Hanle: I understand the Johns Hopkins people played a fairly big role in helping to write the AURA proposal. And you didn't, as you have described.

Bahcall: Certainly. In Princeton, the loyalties and time were distributed among three groups. And I did not play a particularly big role in any of those; maybe in the philosophy, perhaps. It is difficult for me to judge and remember, but certainly not in the writing.

Hanle: Okay. How much effort did you have to take to convince your colleagues at Princeton that there should be a Space Telescope Science Institute here at all?

Bahcall: At the university it was a fairly easy thing to do. At the Institute for Advanced Study there were some questions

about it, and some misunderstanding. But once the correct information was in the hands of the faculty here, I think it went very smoothly. I did, of course, talk personally to essentially every faculty member about it. I explained to them what was involved.

Hanle: Yes. Were there any strong voices of dissent, even after you spoke to them?

Bahcall: Not strong, but puzzled voices. There was one mathematics colleague of mine, who is still a colleague today, who asked me first of all: is it true that many of the theories which this telescope will test may not be correct? And when I said, yes, that was one of the exciting things about the project, he wondered if the Institute should be in that business at all, because shouldn't we be in the business of just concentrating on things which were true? Why should we be concerned with things which might not be true.

Hanle: That's curious.

Bahcall: I found that point of view interesting. (laugh) In fact, he is a very pleasant and extremely productive mathematician. A brilliant theorist of abstract concepts. And he called me one day and invited me out to coffee to discuss this problem, because he was puzzled about it. Why should the Institute be in the business of concerning itself with theories which might not be true? I can understand him; but I think we straightened it out.

Hanle: Let's see. Maybe I could just ask a couple of more questions about Princeton. How much effort did you make to get the New Jersey political establishment behind the Princeton bid?

Bahcall: We had a breakfast meeting with the Governor and some business leaders, and I spoke to them.

Hanle: Did it have any effect?

Bahcall: No, I don't think so.

Hanle: Why did you do it? I mean, why did you seek support?

Bahcall: I thought it might be a useful filip in the proposal.

Hanle: Addressed to whom? Who would care?

Bahcall: Whoever read it would care that there was a state or other authorities who were backing the proposal and would see that we were rounding up support for the Science Institute wherever we could, so it would be more prominent

and better supported, have a wider audience and have a greater generality of effect.

Hanle: Did this reflect, perhaps, a concern that there might be some political forces in general coming to bear on the decision?

Bahcall: No. I think we did everything we could, and everybody I know who was closely involved did everything they could to see that there were no political forces brought to bear at the time of the decision, because we felt that if there were, it would be disastrous for astronomy. It would go to some place which had absolutely no relation to astronomy.

Hanle: On the other hand, if you were already convinced that politics might enter, you would want to defend in favor of astronomy.

Bahcall: Yes, but we weren't convinced, and it never did, to the best of my knowledge. Politics played no role at all in this issue.

Hanle: Okay.

Bahcall: That's not the universally held opinion at Princeton, but it's my very strong opinion. There are some people in Princeton who can't understand how you can choose any place outside of Princeton for reasons other than -- for any objective reason (chuckles).

Hanle: Did the data and operations part of the proposal get considered fairly, in your opinion, by the SEB?

Bahcall: In my opinion, the SEB did a completely fair job on all aspects of the proposals?

Hanle: Was the data and operations -- you said you didn't read the AURA proposal.

Bahcall: No, and I probably didn't read large parts of the Princeton proposal, either.

Hanle: At one point Noel Hinners offered to visit not only here, but several other places, when the institute was being discussed back in '76. I wondered if he ever did come here and look around.

Bahcall: Noel came here to give a talk, but he emphasized it had nothing to do with the science institute. He was here on the visiting board for the geology department.

Hanle: Frosch came in November 1979, and there was an interesting article in the Newark Star Ledger. They asked

him about whether this bode well for Princeton, and he said that it really didn't have anything to do with it. He was only giving a talk and that this was not a site visit.

Bahcall: Yes. I remember that. I had dinner with him that night.

Hanle: But they also said, I believe, that some Princeton people met with him. Did you, do you know?

Bahcall: I had dinner with him. I do remember the dinner. I don't remember much more than that.

Hanle: Did you talk about the institute at the time?

Bahcall: I don't remember what we talked about.

Hanle: Do you know if there was any criticism that followed from this article which looked rather funny? That is to say, he was after all, visiting Princeton, even though he said it wasn't a site visit, and I wondered if there was any repercussion that way?

Bahcall: Certainly no criticism in Princeton.

Hanle: Certainly not. The headline of the article was: "Princeton's Chances Incerease with Visit of NASA Administrator," or something like that.

Bahcall: Yes, well, we didn't make it.

Hanle: I wanted to talk about the question of directorship of the Institute, and we can do that, more or less on or off the tape, depending on what you want. But what I wanted to ask you.

Bahcall: Go ahead.

Hanle: There was a point at which I believe you were designated to be the future director for the Institute, if AUI got the proposal.

Bahcall: Where did you find that out?

Hanle: I can't say, although I thought it was common -- I thought it was public.

Bahcall: I believe it was public, but I have never volunteered that information. It certainly was known to number of people, because it was made as a result of -- there was a decision about it in the committee, in the AUI committee, so it was communicated to people. So therefore, anything known by a few people is known by a few people is known by many, I presume. But I have never really discussed

it.

Hanle: What I wondered about was if that had any effect on the consideration of the consideration of the proposal.

Bahcall: No. That designation was made months after the SEB decision was made. The final decision was communicated to me only a few days before Frosch's decision was announced. As you remember, his decision was delayed until almost the time he left office, and I believe AUI had planned to delay their public announcement until they found out if they won the competition or not. There was no point in making an announcement, if they didn't win the competition. But they had a board meeting which was just a short time before Frosch was to leave office. Frosch had to make a decision before he left office. They couldn't delay until their next board meeting, because then they wouldn't be able to talk to whoever they designated as director, so they made a formal decision reluctantly. They made the public decision just before Frosch was to leave office, because he had forced their hand. But there was a time at which one of the SEB members told me informally that AUI could do well by announcing that they had made a director's choice, if it was a choice that would strongly appeal to the SEB.

Hanle: Yes.

Bahcall: But that did not happen. And I think the AUI did a good administrative job on that.

Hanle: There was an acting director in the proposal. I think it was Tape named as acting director.

Bahcall: Either Tape, or maybe it was Karl Emthor? Was it Karl Emthor? The plan was that Karl Emthor would come to Princeton, either Karl or Vic, I forget who, and live here for the first year or something. And they could have been the principal AUI on-site person.

Hanle: Okay.

Bahcall: By the way, I'm not sure that Lyman knows, for example, that I was the AUI designee. Does he?

Hanle: Yes, I think so.

Bahcall: Because he and I never discussed it. He discussed with me his ambitions, but I must say I didn't reciprocate.

Hanle: I have looked at the organization as AUI proposed it, and there are two very strong second positions there, second and third, in fact. One of them is associate director for, I believe it is research and support.

Bahcall: I really didn't pay attention.

Hanle: One of them is in management, associate directorship, and the other was a scientific associate directorship.

Bahcall: Yes.

Hanle: And in fact, the scientific associate directorship was someone really to make sure that the scientific life of the place was great, viable. And I wondered if there were considerations for that position already, since that would be an important one, and also, for the third position.

Bahcall: I personally had not made any such decisions in my mind. I had, for the previous year as my family will tell you, really stewed over whether it was the appropriate thing for me to do or not. And it was not clear to me what I should do. Let's put it this way, it was certainly not clear to me at that time that I would have taken the job, by no means. I certainly wouldn't have given it more than 50% in my mind at that time. It may have been true that I would have certainly have done it. I think that's Neta's conviction. But Neta, for example, during that whole time never would express an opinion as to whether I should do it or not do it, nor would she express an opinion as to whether I should do it or not do it, nor would she express an opinion as to whether or not I would do it, if I were offered the job. So for me it was premature to have made any such judgements about other people. Incidentally, it is clear to me in hindsight, Hal and I would have taken the job of director.

Hanle: You phrase it in terms of appropriate, whether you thought it was appropriate for you to do. What would have been the attraction for you?

Bahcall: Excitement; difference from what I'm doing now; the importance of the project; that a conviction that I could do a really excellent job; the opportunity for creating an organization from the start which would be excellent in science, and would make a major impact on scientific life in the country. That was a real challenge, and I felt I could do it well.

It was just that I love doing science, and it wasn't clear to me that I wanted to make the personal and scientific sacrifices that would be necessary to do that administrative job.

Hanle: It strikes me that, if you took that job, you would almost be forsaking science as you do it now.

Bahcall: Yes, there's no doubt about it. That's why, as I say, I never came to that problem.

Hanle: The decision you mentioned was made by Frosch to choose AURA. The SEB had made a recommendation before, presumably it was the same thing.

Bahcall: Yes, identical.

Hanle: Do you know what the timing was? Was it a couple of days?

Bahcall: No, I think it was in Frosch's office for quite a while.

Hanle: Yes. So, is it fair to say that you were designated as director after the SEB had made its recommendation against AUI?

Bahcall: That's right, but AUI didn't know which way the decision had gone. To the best of my knowledge, their intention was, and I think correctly, not to designate anybody until they found out whether they won or not. But there was this problem that their board had this meeting which was going to come just before Frosch resigned, but not another meeting for a long time afterwards. So they had to make their formal decision before the announcement.

Hanle: Do you think AUI really thought they would be chosen?

Bahcall: Yes. Yes.

Hanle: Yes, in a strong sense.

Bahcall: I think they were very surprised. I think all of us in Princeton were astonished.

Hanle: Were there any advance hints that you would or would not be selected?

Bahcall: It was very well-kept secret. It was known that one of the finalist; it was known first of all in the early stages of the five, and that one of the proposers was known in the stage of the finalists that one of the proposers was very much ahead of the others. But we all in Princeton assumed it was Princeton. I don't know if AURA assumed it was AURA or not, but we in Princeton assumed it was Princeton.

Hanle: Okay, so you were surprised. How did you first find out?

Bahcall: I was called by somebody at Johns Hopkins. The ultraviolet astronomer, Art Davidson, called me.

Hanle: That's not the way to hear, is it?

Bahcall: Oh, well, it was as good a way as any. Art is a good friend. I admire his science very much, and admire him as a person very much. Art had said that he would like to come to Princeton and work in the Science Institute here, if Princeton won. And he called to express sympathy. We have had good working relations all along. It didn't cause any problems between us. Art strongly proposed me for director to the AURA. He sent me a copy of the letter. I don't know if you have seen it, that he wrote to Margaret Burbidge, proposing me for director under the AURA proposal. So we were good friends and I knew all of his science, admired greatly his science.

But I must say, for that day in Princeton I was the most relieved person in Princeton. Jerry Ostricker was very concerned about Lyman, and to make sure that I spoke to him in the right way. Neta was absolutely crushed, and everybody was surprised. But for me there was no longer this terrible dilemma, science or no science. And suddenly it was an irrelevant question.

Hanle: But Art Davidson must have called you thinking that you knew?

Bahcall: Yes, Art called me, thinking that I knew.

Hanle: So NASA hadn't told you did NASA tell you shortly thereafter?

Bahcall: I don't remember that.

End of tape #1. To be continued.