

HENRY BLOSSER

August 9, 2000

Jeff Charnley,
interviewer

Charnley: Today is Wednesday, August 9th, the year 2000. We're in East Lansing, Michigan, at the MSU Cyclotron Laboratory. I am Jeff Charnley, interviewing Dr. Henry Blosser, who is the founding Director of the National Superconducting Cyclotron Laboratory here at Michigan State University. The purpose of this interview is to document the history of Michigan State, especially in the last fifty years, for the sesquicentennial of the institution to be commemorated in the 2005.

As you can see, Dr. Blosser, we are tape-recording this interview. Do you give us permission to tape?

Blosser: I do.

Charnley: I'd like to start first with your personal, educational, and professional background. Where did you do your undergraduate work and then graduate work?

Blosser: Well, I did all of that at the University of Virginia. Did a first year straight out of high school in the area of 1945, and wasn't sure of my goals, and so dropped out for two years for enlistment in the U.S. Navy, and then went back to Virginia in '48, finished a bachelor's degree in '51, master's degree in '52, Ph.D. in '54.

Charnley: Was there anything in the Navy that you did that contributed to your later work?

Blosser: Oh, sure, yes, like, the thing I spent the most time of any activity in the Navy was working in a machine shop on a submarine tender. The shop is very like the one that we've had here all these years. Yes, the shop's a key part of a successful cyclotron laboratory.

Charnley: Why do you think you chose the career that you did?

Blosser: Oh, just by accident.

Charnley: How's that?

Blosser: Well, I went to college to study business. My father operated a business, a picture of which you see there on the wall, poultry processing. He had only a sixth-grade education, but my mother thought everybody should go to college, and so I went to the University of Virginia, which was the closest school, and also I went there with the hope of making the football team.

Charnley: And did you?

Blosser: No. [Laughter] I have something like five minutes of playing time in some runaway games. Never got on the traveling squad. Then went off to the Navy, came back, and the football team had enormously upgraded, with all the veterans back.

Charnley: And so you attended on the G.I. Bill?

Blosser: Yes.

Charnley: How was it that you ultimately came to Michigan State?

Blosser: Well, let's see. I went from graduate school to a job in Oak Ridge, Tennessee, working in a group there that used cyclotrons. After a year or two, there was a problem with the cyclotron construction project there, and they offered me the job of group leader in that, which was quite attractive. So, yes, I've made a pattern of making a turn in my career when something attractive came along, inviting such a turn.

That, again, is very much of what brought me to Michigan State, like a couple of guys from the physics department, Bill Kelly and George Beard, came to Oak Ridge looking for people to head up a cyclotron project which was being dreamed about. I had lunch with them one day, and then a bit later, a department head-designate, Sherwood Haines. He was at Vanderbilt but had accepted a position to come to MSU, came over on a day when I was making a presentation at an information meeting about the cyclotron we had built there in Oak Ridge. He came up afterwards and asked would I be interested in a position here, and gave a sales pitch about the attractive administration support which existed here.

So I came for an interview in January of '58 and accepted the job in February of '58.

Charnley: Did you have any early contact with President [John A.] Hannah?

Blosser: Didn't see him on the interview trip. Lot of contact in the early years of the project when we were fighting to get federal money. I particularly remember an interview session in which a research officer from the Atomic Energy Commission had come here to do a site review and asked to speak to President Hannah, and so Hayes and I took this man, Glen somebody--I've slipped on the last name right this minutes--over, and somewhere through the interview the Atomic Energy Commission persons asked Hannah, "Well, in this proposal, you say you're going to provide money to build a building. I'd like to know where you're going to get that money."

Hannah kind of glared at the guy and said, "Young man, this is a large university that has many resources, and if you put your money on the table, I'll put mine." [Laughter]

Charnley: So the building was the last of his worries.

Blosser: So that silenced that line of conversation. I'm sure I'm doing an exact quotation. That's very vivid in my memory.

Charnley: How would you describe when you first got here? Was there a cyclotron here already? So you were involved in the development of the first?

Blosser: Yes, that's right. There were two young faculty members doing nuclear physics research, nobody with any experience in accelerators, and so the idea of setting up a cyclotron laboratory, I learned, came through Muelder convincing Hannah that it was a proper thing to do. Muelder was then the dean of the--let's see, it wasn't called the natural science in those days, it was College of Arts and Sciences. Yes, yes, big college.

Anyway, an administrative decision had been made to try to have a nuclear physics program. The study committee that had been appointed in the physics department had decided that a heavy-ion cyclotron was a window of opportunity, something that the national program was short on. So that committee wrote a report in 1957, which we have ever since referred to as the Ballam Report. Joseph Ballam was the professor who chaired the committee.

Based on that report, an initial \$150,000 was put into accounts under the control of the physics department for the purpose of upgrading the machine shops and hiring a director.

Charnley: And you were that director?

Blosser: Yes. As I understand it, I was the third or fourth person that the job was offered to.

Charnley: Oh, really.

Blosser: Yes. I say third or fourth because two of them were people I worked for at Oak Ridge, and one was from Rochester. All three were significantly older than I was, and they had better jobs and didn't choose to come here. For me it was a fine opportunity. I guess in the spring of '58 I would have been twenty-nine, and so a green kid in many ways, but anyway the university decided to offer me the job after their experiences of how difficult it was to recruit a more mature, established professor.

Charnley: Did you have any preconceptions of Michigan State and the research climate here before you came?

Blosser: Well, the thing that was most attractive to me was the existence of the Mystic computer which [Lawrence] VonTersch and his group of bright young men had built. It was not quite as big as the computer we were using in Oak Ridge, but used the same language, so it was very easy to transfer codes and things to that computer. Yes, it was really the computer work that let us successfully get money to build the cyclotron. We developed a system for improving the way the beam comes out of the machine so that the cyclotron could become a lot more accurate in its use in nuclear physics experiments.

Charnley: When you first developed that, did you do computer modeling? We use that now, and that's what was done prior to development?

Blosser: Yes, that's it. Been doing it ever since.

Charnley: Before you broke out the hardware.

Blosser: Yes, right, and after a year, succeeded in persuading a colleague, Mort [Morton] Gordon, who's also still here, although retired. I worked with him in Oak Ridge. He had come to Oak Ridge as a summer visitor from the

University of Florida. So with a lot of talk, a year after I came, he came for an interview in the middle of the winter from Florida. I helped him put his overcoat on, and it felt like it weighed about a half a pound. [Laughter]

Charnley: Not much protection for the Michigan winter.

Blosser: Yes, it was a pretty cold day when they got off the airplane. Anyway, talked him into it.

Charnley: In those early years, did you face any difficulty in getting funding, or was it relatively easy after the first grant?

Blosser: Well, after the first grant, it certainly got easier. The first grant was to do further computer modeling of the system, and that was a big grant for those days, the biggest one the physics department had had.

Charnley: This is 150,000?

Blosser: Yes. Well, the 150 was from MSU, and that had to pay salaries, like, pay my salary and such things. But this grant was 186,000 from the Atomic Energy Commission.

There was a big contest with University of Michigan. After hearing of the MSU proposal, they decided they needed a new cyclotron. They did have an old one. The Atomic Energy Commission didn't have money for either proposal, but the University of Michigan had a strong friend and congressman from Detroit, whose name I can't immediately say, although it's in the *Congressional Record*, so it could be looked up. Anyway, he earmarked money. "Pork barrel" would be the customary phrase for that. [Laughter] He was chairman of the Appropriations Subcommittee that handled the Atomic Energy Commission, and so, yes, they got the money then through that process in 1960, and MSU was passed over.

University of Michigan made a proposal to Professor Haines that he assign me to work at Ann Arbor on leave. So we turned that down very quickly. Particularly with Muelder, who had become vice president for research, we spent a lot of time traveling to Washington, talking to the Atomic Energy Commission, Office of Naval Research, and the National Science Foundation.

Finally in the fall of '61, NSF made a grant of 700,000, which was approximately half the amount we needed for the cyclotron, but it was labeled as the first half, so the financial situation was then on a firm basis for building the cyclotron.

Charnley: Was there a deadline that you were expected to meet in terms of the actual construction?

Blosser: Oh, sure. [Laughter] [unclear]. Well, when you're doing something that you've never done before, schedules always have lots of question marks on them.

I'm from Virginia and the mountain, the Shenandoah Valley, and the geography of East Lansing, you know, was just the exact opposite of the kind of place I thought I'd like to live. So I came here thinking I'd build a cyclotron in about three years and then move on to someplace else. It took three years to get the money. It took another five to build the cyclotron instead of three. By that time, I'd gotten more used to life in East Lansing. Over the years, you know, I've had a good many proposals from other institutions that wanted to move into nuclear physics, but never came to one that I really liked better than the situation here.

Charnley: Seems to be a common theme in talking with different people, that people came here, Walter Adams, for example, with the expectation that they'd stay for just a short period of time, and then thirty years later they're still here. So it sounds like your experience was similar to that in some respects.

What about the first cyclotron that you built? What were any special problems? Obviously you're starting from scratch. There's no blueprints, or were you working from some ideas that were in existence?

Blosser: Well, we did the design of that machine. Had some good engineering assistance from a group of engineers in Berkeley, California, who had formed a private company. They had been key people in building the early cyclotrons in Berkeley, and then they moved off to a private organization. Brobeck [phonetic] and Associates was the name of that company. I've got a book from Brobeck sticking up there on the shelf.

Yes, working together with them, we developed the engineering details of a cyclotron with this improved extraction system which our computer modeling had developed. So that's what we set about building. Had to build this building first. I have a picture standing right out there with my two sons in an alfalfa field in 1961.

Shaw Hall was the only building in this vicinity, and the site had moved around several times. President Hannah liked his early morning breakfast meetings, and so we had several concerning the location of this building. It was originally planned to be an addition to the old Physics Building on north campus. He didn't like that, thought it would be too crowded over there, and that was a very correct intuition.

Anyway, he'd walk over to the map--these meetings were typically in Kellogg Center for breakfast--and put his finger down someplace, and everybody would march off and develop architectural studies.

Charnley: Check out the site.

Blosser: Yes, check out the site. So finally his finger landed on this place. I think it was the third serious study which he had done, which the university planners had done. Yes, this one looked good to me, and so the building construction--let's see, it took the architect finally like eighteen months to get the bid documents put together. So that was an unexpected delay, but, anyway, then construction started.

It took a bit over a year to build the building, and finally in the fall of '63 we moved into the building.

Charnley: During construction, what was your main work on the cyclotron itself? Were you doing computer modeling at that time?

Blosser: Oh, doing a lot of that. Gordon was the--and we had brought another person from Oak Ridge, Phil Arnette. Initially I wrote a lot of the programs and Gordon guided the mathematics of the process, and then Arnette came in and took over as our first programmer. And another student, David Johnson, who ended up working here something in the territory of forty years before he retired.

Charnley: A student at that time.

Blosser: Yes. A very eccentric student.

Charnley: That first cyclotron, did it meet the expectations that you had intended for it?

Blosser: Oh, it did, yes. It became a big success. We were also hiring nuclear physics faculty and made one or two bad choices, which we corrected, and made a lot of good choices. So these guys, who are now distinguished professors, were largely hired in that first recruiting wave.

Charnley: So the cyclotron itself became a magnet unintended for that expansion of the faculty.

Blosser: Yes.

Charnley: What was the output of that earlier machine?

Blosser: Well, its forte was making more accurate measurements of nuclear properties than anyone else had been able to make. That was a key component of the frontier of nuclear physics at that time. So pretty quickly the lab became known as a leading international center of nuclear physics research, and it was a beehive of activity. You come in now in the evening, and you're lucky if you find one professor in the building. In those days, it would be

typical to have either all the faculty here or all but one or two here working in the evenings with their students. So, lots of energy, the energy of youth, and a machine with some unique characteristics. It's like a better microscope. What you see is something no one's seen before, with a better microscope, and so get in there and see it before someone else catches up, see it and publish it.

Charnley: Your early publishing about it, what was your main venue for publication about your work here?

Blosser: The lab has its two sides: the accelerators builders and then you got a nuclear physics group. So the nuclear physics group would publish in *Physical Review*. That was, and is, the prestige journal of nuclear physics in the world. Then accelerator work was largely published in conference proceedings, so a series of cyclotron conferences. The sixteenth of those is going to be here next May.

Charnley: Has it been here before?

Blosser: Yes, it was here in 1984. So those conferences and national and international accelerator conferences are the places where the accelerator work is documented.

Charnley: In the early years, what was the international component? Scholars from around the world were--

Blosser: Almost immediately we started pulling people. Our first postdoc was from Germany and was in the accelerator group and has become a distinguished citizen of the world community, moved off to be a professor at the University of Maryland.

Charnley: Who was that?

Blosser: Martin Reiser. He's now at retirement age.

Charnley: In developing the funding after you had gotten the first one running, was it easier to get subsequent grants from the government?

Blosser: Yes. Right. In the early years, it was a very nice phase of growth. I think maybe the first operating grant was something like 250,000 for a year, and then they worked their way up to 700,000 by the late sixties.

Then one of the recurring federal budget crunches came along, and things held steady at 700,000. Several nuclear physics laboratories at universities were closed to make the work match the budget. Cyclotrons have a lot of fixed costs, and so if you have two of them and don't have enough money, it's nonsense to run each of them at half pace because of the fixed costs unchanged. So we picked one to close, and that process has been going on steadily ever since. The number of cyclotron laboratories has just been declining in the country. It was down to two, two years ago, and now University of Indiana is being closed.

Charnley: So will this be the last one?

Blosser: So this will be the last university accelerator laboratory. Right now it looks like we have a promising future. A big new project is just being finished. So if that comes to pass, why, or if it operates as it's supposed to, there will probably be ten years of exploitation of that machine. Then there will be another serious crunch point where what we're building now will be an old facility. And what takes its place?

Charnley: Could you talk a little bit about the different generations that the cyclotron has gone through?

Blosser: Well, yes, the first generation--

[Begin Tape 1, Side 2]

Charnley: This is side two.

When the tape ended, we were talking about the generations that the cyclotron's gone through. The first one you mentioned was the K-50.

Blosser: Yes, so that's the cyclotron that came into operation in 1966 and ran here until something like 1979, and had the most precise beams of any cyclotron before or since. It was just exploited by a skillful group of nuclear physics people to do significant important measurements on nuclear properties. We also built a theoretical physics group. Hewitt Menes [phonetic] came from England to Chalk River to MSU. So, yes, those were the K-50 years. A copy of the K-50 still exists at Princeton and is lightly used, you know, not a big star of the physics world, but still hangs in there.

Let's see. Someplace in the early 1970s, we got interested in the possibility of superconducting coils for cyclotrons, and for me that happened when I was visiting Princeton and giving a couple of weeks of lectures on cyclotrons to the physics group there. One of the old professors walked into the office I was occupying and asked, "What do you think would happen if we put a superconducting coil on our cyclotron here?" I had often said, or even gave an important paper saying superconductivity didn't look like it would help cyclotrons much. [Laughter] So that sentence has sometimes--

Charnley: Come back to haunt you?

Blosser: Well, come back for a chuckle. One of my best friends made a slide of it and showed it at one of the international conferences. [Laughter]

Anyway, at that moment, there with the time to do some thoughtful thinking, and I came tearing back from Princeton, getting Dave Johnson to start calculations, canceling a trip to South Africa, which I was going to give

some lectures down there, and just really went to work. After about a year, we had money to build a prototype magnet, wrote a proposal to the National Science Foundation. So that magnet had lots of political overtones.

Charnley: What were those?

Blosser: Well, let's see. We had a few years earlier proposed a big, new cyclotron here, which had just gotten stomped on in the review process. All of these ten or fifteen important nuclear physics laboratories all wanted to grab the next important machine, and so everybody stomped on everybody else's proposals. Nothing got approved.

So I decided that the key to getting something new was to propose it as a development project with the final site for the cyclotron undetermined. That was to be fixed later, and everybody was to have a chance at it. So we got a big group of people to sign the proposal as sponsors and that just got around this tendency to factionalize.

Charnley: Get the reviewers to look at the science versus the political location.

Blosser: Yes, right. Then once the magnet is built, of course, the option of not doing anything with it has pretty much disappeared, so it will go somewhere, rather than nowhere. I think we were here all willing to have it go somewhere else. University of Rochester came out as the leading alternate site, and one of the pitches that MSU made was to say that we would provide positions for the entire Rochester faculty if the site was awarded here, and would they make the same proposal if the cyclotron went there? Their administration wouldn't do that. So in the end, none of the Rochester faculty did come here.

Charnley: But at least it was there on the table.

Blosser: Yes, that was on the table.

Charnley: Whose idea was that in terms of the planning?

Blosser: I think it was mine. Anyway, yes, so then the magnet, we got money to build it with in '75. It came into operation in '77. In '78 MSU was approved as the site for making it into a cyclotron.

Charnley: President [Clifton R.] Wharton [Jr.], was he supportive during that time?

Blosser: Oh, sure. Yes, we just had the strong support of the administration right on through, from Hannah to each president.

Charnley: So when did that cyclotron become operational?

Blosser: I'm slightly fuzzy there, but I'll say '83.

Charnley: Were there any major problems you encountered in construction of that, either in design or--

Blosser: Yes. Let's see. There were some pretty glum days, like one day in the early testing of the magnet, it was something akin to a fire. The fire trucks were called and came to the building. What was going on is that a certain electrical failure had been developed, which caused big lightning-like bolts to fire off in different directions.

Charnley: Were you in the building at the time?

Blosser: Yes, standing there watching it, and the people would run up with carbon dioxide extinguishers and make an arc go out, but then it would just strike someplace else. After the fact, we all understood why that was so. You

know, typically you'd end up with holes in the six-inch-diameter category melted into the equipment where the bolt of lightning was landing.

So, walking home the evening after the smoke had died down, that was very glum-, not yet having an assessment of how much damage there was. Fortunately, the coil itself was not damaged, and so in maybe six months we were back testing again and understood why the previous test had gotten in trouble. So, right, there were some glum days.

Charnley: At what point was there a proposal to use it for medical research, or not just research, but cancer treatment especially? When did that come about?

Blosser: This cyclotron I've just been talking about is the one we call the K-500, with ten times the energy of the first cyclotron, but about the same size, because the superconducting coils let much smaller cyclotrons be built.

Anyway, there was a press conference, and a doctor in Detroit, Williams Powers, heard me on one of the Detroit TV stations or in the *Free Press*--let's say, I'll look it up, I think maybe he just read it in the *Free Press*--that superconductivity allowed us to build smaller, lighter, and less expensive cyclotrons. Very bold guy, he just picked up the telephone and called me and said, "I need one of those." [Laughter]

Charnley: As if you're going to pull one off the shelf.

Blosser: Yes. Anyway, we were already working on the K-1200, which is the third-generation cyclotron, but we started doing the medical project in parallel with that.

Charnley: So that was a separate machine?

Blosser: Yes.

Charnley: It wasn't really portable, was it? Or it could be done in another location?

Blosser: It was portable in the sense that we built it and tested it here and put it on a truck and hauled it to Detroit and put it in a building. This is a model of it over there. The patient is the same scale as the cyclotron there.

Charnley: Is that still operational?

Blosser: Yes, it's at its most successful phase, so, doing a world-leading job on advanced prostate cancer, and that's a big population.

Charnley: Half the population.

Blosser: Yes. Well, and I did slip in the word "advanced" there. Like most prostate cancer, if it's detected early, can be treated with more routine techniques.

Charnley: This is used in extreme cases.

Blosser: Yes, if it's metastasized into the abdominal cavity but not elsewhere in the body, that what this particular-- Category C, advanced, is used to describe--and it's that stage where the neutron beam, which the cyclotron produces, has just been exceptionally effective.

Charnley: These results, were you involved in the publishing in any medical journals as a result of that?

Blosser: Oh, yes, I've got a lot of them. I didn't write any of those articles, but the Detroit people put my name on them as well, because, yes, it's certainly a joint effort. The results could not have been accomplished without the total group.

Charnley: So the K-1200 is the current generation?

Blosser: Well, that's the highest energy cyclotron in the world, highest energy accelerator in many respects.

Charnley: Were there any fears that you had heard expressed around in the university community about the cyclotron and what was happening when you flipped the switch or anything like that? Were there any of those things that you had heard or were aware of?

Blosser: Oh, yes, we had our phase of students demonstrating here. Let's see, for a while on the K-50 we had a research grant from the Office of Naval Research.

Charnley: In the sixties that would have been.

Blosser: Yes, it probably overlapped into the seventies, around 1970. Anyway, one of our graduate students was a leader of this group, so he liked to lead them over here because it made him look more important, I think. Richard Trilling. That's a name I remember. When I last knew of Richard, he worked for IBM in computer design.

Charnley: Didn't lead too many demonstrations over there.

Blosser: Didn't lead too many. Wore a coat and tie. [Laughter] Yes, a changed individual. But, right, so that was a worry. Then there was a stage where there were some concerns that the heavy-ion collisions could turn into a chain reaction that would burn the atmosphere, wipe out the planet.

Charnley: How did you deal with that?

Blosser: Well, this was aimed at a number of facilities around the world, which included ours. It wasn't only aimed at us, but anyway, high-level people in the theoretical physics community made estimates of how this might happen. The same issue would come up when the first atomic bomb was detonated, and so this was a similar fear except with a different trigger mechanism. So it turned out to be an unfounded fear. We had no delays because of that.

Charnley: How long were you the director here? In other words, when did you retire?

Blosser: I would need to get my résumé out to be accurate about that, but I retired once in 1967, and Aaron Golansky was director for something like three years. Then somewhere like '86 or '87, we changed to a co-director system, where Sam Austin and I were co-directors of the laboratory. Then after the co-director thing had lasted five years, why, Sam became the director, and he was director for five years. Then Konrad Gelbke has been director about eight years. So if you work back from that, why, it would be '88 or something when I stopped being a co-director.

Charnley: Are there any areas of research that you're working on right now?

Blosser: Oh, sure. Better cyclotrons. Particularly right now, I'm working on another medical project. The Detroit machine uses a neutron beam to kill the cancers, and the neutron beam can't be pointed very accurately. The particles are neutral and so magnets can't change their direction. An alternate thing, which requires a bigger

cyclotron, a bigger, more expensive cyclotron, is to use protons as the projectiles. One such facility has been built in a hospital. A number of physics lab machines have been used for proton therapy, as it's called. At Loma Linda University they have a 50-million-dollar facility for doing proton therapy in the hospital.

So if something is in a physics lab, it's really not accessible to very sick people. They need the life support and stuff that a hospital has, and so all the medical committees immediately said it's pointless to be putting money into medical facilities in physics labs; get them in the hospitals.

The one at Loma Linda has been running for two or three years. There's one in Boston which we've helped a lot with, which is built by a company from Belgium, and they're ready to run. Right now they're saying they expect to treat the first patient next January. Then the one I'm working on today as soon as you leave is one which a Swiss laboratory wants to purchase from a German company, using a design that we did in 1993, a superconducting proton therapy cyclotron.

Charnley: Are there any other areas that you see in the future besides medical research?

Blosser: The laboratory is changing its directions in a major way right now, from cyclotrons to linear accelerators. I've never worked on linear accelerators, and, you know, I'm seventy-two, and so if I shifted to linear accelerators, I think it would take me five years to get to the place where I would make much of a contribution. So I'm tending to stick to cyclotrons and give the boys who are marching toward LINACs a pat on the back, but not really pitching to help that effort.

Charnley: In reflecting back on your career here at Michigan State, anything that stands out maybe as most important that could come to mind?

Blosser: Most important. Gosh, I don't know.

Charnley: I know that's a tough question.

Blosser: Yes. Well, the support from the administration is certainly a key factor. The lab gradually moved from being an internal group in the physics department to being a department-level unit in the College of Natural Science, to now being a college-level unit in the university. All of that was driven by me realizing that I had much higher probability of getting a request approved as soon as it got to the top administration.

Charnley: Without the filters in between.

Blosser: Yes, trying to get the physics department to vote in favor of something wasn't as an enormously burdensome process. It was a big improvement to just move into a separate department in the college, but, still, in the early years of what we called our phase two effort, why, the Department of Energy was managing the funding, and just needed decisions from people who could sign contracts. So Lee Winder just said, "Sure, we'll make this a college-level entity under me."

Charnley: That simplified the process.

Blosser: Yes, that simplified the process.

Charnley: I want to thank you for the time that you've given me and, on behalf of the project, thank you.

Blosser: Indeed. Good luck.

[End of interview]

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