

BENNIE F. L. WARD

b. 1948, SB 1970 (physics) and SB 1970 (mathematics) MIT, MA 1971 and PhD 1973 (physics) Princeton University; research associate, 1973-1975, and visiting scientist, 1978- , Theory Group, Stanford Linear Accelerator Center; assistant professor of physics, Purdue University, 1975-1978; staff engineer, Intel Corp., 1979-1980; research specialist, LMSC Microelectronics Center, 1980-1985; joined the faculty of the University of Tennessee as associate professor of physics in 1986; professor, 1990- ; recipient, Chancellor's Award for Research and Achievement, University of Tennessee, 1998, for his research on quarks and other building blocks of matter.



My family resides in Augusta, Georgia, which is where I grew up and where I went through all of my education before college. I was a member of a large family, the parents of which are Mr. Enoch and Mrs. Irene Ward. I had nine brothers and sisters at various times—James, Charles, Lee Mark, Grace, Irene, Katherine, Enoch Jr., Joanne, and Peggie, in order of age—spread out over a pretty wide range, so that at any one time only a few of them were at home with me. I think they set a very good example, in that we always did very well in anything having to do with academics. I was able to follow pretty much along in their footsteps. My brother Enoch was the valedictorian of his high school class, for example. He's three years my senior. My sisters have made their own marks as well. One of them—Peggie—has attended and graduated from Smith College, for example. I was continuing in this way.

I got interested in going to MIT because I had an opportunity to do something very unusual when I was a senior. Instead of staying in what at that time was the larger all-black high school in Augusta, Georgia—Lucy Laney High School—I decided to take advantage of the new integration opportunity. I integrated the Academy of Richmond County High School (ARC), which was the larger all-white high school. There were two of them in the town and this was the one closest to my house. It was founded in 1783 and, in fact, was one of the best high schools in the state of Georgia. I gave up the opportunity of being valedictorian, because the rule in my city was that you must be in your school at least two years to be

valedictorian. I gave that up for the opportunity to learn more, to take advantage of the new equipment that they had, the more advanced courses that they had, and in fact the better teachers that they had.

I knew this because the previous summer I had been in the Georgia Governor's Honors Program in mathematics. I had met a student, Bill Austin, from that high school who was also there in mathematics. He and I had swapped notes on what kinds of classes were available and what kind of equipment was in the lab. I found out that there was just such a huge difference that if I had any chance to go to ARC, I would be foolish not to.

So I went, and it was quite rough. There were only six black students out of two thousand in the entire high school. Only the twelfth grade was officially integrated. It turns out that a soldier had



Edited and excerpted from an oral history interview conducted by Clarence G. Williams with Bennie F. L. Ward in Knoxville, Tennessee, 10 February 1999.

two kids, in junior and sophomore year. The school was forced to let them in as well, rather than to deal with the government. But the rule was really just for the twelfth grade. So three of my other friends and myself were the four seniors, and then there were two others who were children of the soldier.

We integrated this school, and it was quite an experience. But what I was amazed at was that in the classroom the teachers really were fair. I can say that my grades were just as high as they were in the other school. They never took away anything. In fact, my chemistry teacher had worked on the Manhattan Project here in Knoxville, at Oak Ridge National Laboratory, under Dr. Sienko from Cornell. She was teaching his freshman college chemistry course as the advanced placement course. It would have been impossible in the black school to even get any opportunity to have something like that. I benefited tremendously from that course and from her encouragement. She is really one of the reasons that I applied to MIT, because a student she had had a few years earlier had gone to MIT from that high school. In fact, he was still there when I finally matriculated. I actually met him.

I think, therefore, that I had tremendous support from my hometown in a somewhat unusual way. Racism was around that year, of course, but it did not have any effect on my ability to do my work. I was able to participate in activities. I was on the high school baseball team as a pitcher, for example. The people were receptive, although there were those special incidences which were not so pleasant. But I think what I took from that was that when one has an opportunity to gain, sometimes it's worth going through a little bit of extra social pressure if the intellectual gain is worth it. And in this case it was.

That high school period, you're talking about what years?

That was 1965 and 1966. I entered MIT in the fall of '66, and I integrated this high school in the fall of '65.

That's quite an accomplishment, knowing what I know about the South and coming from the South myself. Right.

Did you have any knowledge, other than what you just mentioned, about MIT before you actually came to

Cambridge? Did you have any sense about the place at all?

Like I said, this dedicated lady had been teaching chemistry at the school since the Manhattan Project days. Periodically, every three or four years, one of her students was accepted and went to MIT with varying degrees of success. This one who was just before me, for example, had a lot of academic problems. In fact, he barely made it through. I think he finally did finish, but he was on academic probation—or whatever they called it—and he had a lot of trouble with his studies. But she felt like I could manage it. She thought that I would be fine, that I could handle it, and she encouraged me to go there. I was accepted at several other places as well, but she encouraged me to go to MIT. I think that's probably the main reason that I went there, because of her recommendation. I had a very high regard for her professional opinion. She was not beyond the prejudices of the South, of course, but she did not allow that to come into her professional relationship with me.

When you think back, what were your early impressions of MIT once you got there?

My first impression of MIT as a freshman was that it was a place where there was a lot of work to do. I lived in what used to be Burton House, I guess it doesn't exist anymore.

It does.

Anyway, I lived there. I was lucky enough that my roommate was majoring in physics, which I ended up majoring in. He was one year ahead of me, a young Jewish boy—Eric Wolf—from Connecticut. We were roommates for three years, until he graduated. I found that we freshmen felt like we just had a lot of work to do, we needed to concentrate on that work, and we needed to get it done. That's how I remember the freshman year.

My grades started out pretty good. The first set of tests I took I made relatively good marks on all of them, in fact. We were taking chemistry, calculus, and physics, I guess, at that time, and all of them came out quite well. So I was pleased and I continued to work harder. In a couple of the courses, it wasn't clear if I would get an A or not. I was sort of on the borderline. I remember telling my oldest sister Grace, who was an English teacher, "Well, you know, I don't know if I'll get an A in two of those things." She said, "Just do the best you can."

I think that was the way my family looked at it. Whatever I was going to do, as long as I did the best I could, they were going to be satisfied. And in the end I did get A's in all those courses that I just mentioned. That was my first semester, so it was a very successful year for me.

That is not an easy task to do, coming to MIT and doing that well the first semester. That was quite an accomplishment. When you reflect on your life at MIT as a black student there, as an undergraduate, are there any highlights that come to mind?

I thought of my time at MIT as a very pleasant and a very much broadening experience. I was coming from the South, where for most of my life I had lived in a racially segregated environment. Even the movies were segregated. I came into MIT and this was no longer the case. We had started, like I said, integrating a little bit that last year I was there, but MIT was quite a broadening experience.

In my class was Nathan Seely, who now has a Ph.D. in engineering from Stanford. There was also a young lady named Deborah, whose last name I cannot remember. Then I think one other student joined in later on, if I remember correctly—Henry Snelling, I believe. But in any case, we all felt like we were a part of the MIT community. I think one year they made me the social chairman of my floor. I was planning all the parties. All of our parties were completely integrated. There were so few blacks anyway that it would have been impossible to have a party without having it be integrated. But I think we were really accepted at those parties. We were not just there standing on the sidelines watching everybody else have fun. We were very much a part of the Institute.

In fact, everything we did was all-encompassing. That's the thing I remember. I think that was true even in the Black Students Union, when we were forming it. Seely and Shirley Jackson spent more time on that, certainly, than I did—and Sekazi Mtingwa also. Even in that, other types of people were involved. I would say that was my impression of it. It really taught me how to interact with people of all types, all religions, and all colors. We had both liberal and conservative opinions. Just living right next to me we had some very liberal people, we had some very conservative people. We had Jewish people, we had non-Jewish people, we had all kinds of people. I think that was what I learned about during my freshman year, in

particular. We had very rich people and we had some, like myself, who were not rich at all.

I learned that at MIT there was an emphasis on the intellect. This emphasis was not, in our time anyway, associated with any kind of color or religion or ethnic identity or other orientation. It was really all-encompassing. That's the thing I remember most about MIT, and that's why I call MIT the best period in my life. I would say that in that time—in addition to when I got married, I would have to compare it with that—it was really a blissful experience for me. The only thing that compares to it is my marriage.

That's saying a lot. One of the things I've heard from several people, during that period that you were at MIT as a student, was that you were a person who both really performed very well academically and really helped a lot of students in terms of tutoring them, working with them, and helping them to learn some of the physics and chemistry, whatever it might be. Do you recall doing that, helping people like Sekazi and others?

Yes, I do remember that. I helped everyone who asked me any question. We had competition, but that was on the examinations. Outside of the examinations, if you knew the answer to something or if you knew how to do something or if you knew the best way to proceed and someone asked you, you would do it. I did that for black students, but also I did it for white students. I had a double major in mathematics and physics. One math course, which was a little tough, we took as sophomores and juniors—differential topology. One of the white students on my floor was having some difficulty with it. He would come to my room whenever he felt like it, and we would go over the stuff together. It was just the spirit of MIT. So yes, I do remember that.

How did you decide on going into the field that you majored in at MIT?

In high school I liked mathematics, I liked physics, and I liked chemistry. I actually had the best formal training in chemistry, because of this teacher I mentioned to you. So I was leaning toward chemistry. But since I majored in both mathematics and physics, all I did was eliminate the chemistry. I decided to eliminate the chemistry in the freshman year. I did well in the course that we took, but I just found that I enjoyed the math and the physics more. So I majored in those two.

What about the woman who was very instrumental in your coming to MIT, and in working with you?

Ms. Outwell was her name.

Were there any other role models or mentors during that period all the way up to finishing MIT?

At the time I was at MIT, it was kind of interesting. I had focused on the mathematics and physics. I wanted to become a world-renowned scientist, and considered my faculty that. It turns out I wasn't far off. There was this fellow Steven Weinberg and then there was Philip Morrison, I don't even know if he's still there anymore.

Philip Morrison is still there.

Those two people were important. Weinberg I knew at a distance. I was hearing how good he was, and there was some kind of idea that I wanted to be like that eventually. Then Morrison actually supervised my senior thesis. I would say those two probably had the most effect on me as a role model type of thing. It turned out, I didn't know it at the time, that Weinberg and I ended up having the same thesis advisor. I went for a Ph.D. at Princeton and I worked for Sam Treiman, the same man who trained him. But Weinberg has won the Nobel prize and I have not. So it stops at that point. But I did have that kind of role model.

How would you describe your academic performance overall in finishing MIT?

I thought it was okay. I was satisfied with it. We were trying to see who could have the highest grade point average, myself and other guys I knew. I was satisfied with what I accomplished. I saw MIT as an opportunity to really learn a lot, and I felt like I had not wasted that opportunity. I felt like I had really learned a lot. And that proved to be true. When I got to graduate school at Princeton, it continued to show up, that my education at MIT had been an opportunity where I really learned a whole lot. I really did.

You actually had to do very well academically in order to go to Princeton to get your Ph.D. If I remember correctly, you actually went directly to Princeton from MIT.

Right.

This was in 1970, and we know what period that is. That means that wherever you would go in these particular schools, there would be very few—if any—blacks in the arena where you would be. Could you be more specific about how well you did at MIT?

I don't remember the numbers, but they used to have a five-point system.

That's right, still do.

My average was 4.9 out of 5.

I had heard that you did exceedingly well.

I don't remember the fraction, but it was 4.9 or 4.95 or something.

You couldn't be much closer to a perfect score, and we still operate pretty much the same way. Almost all those things are pretty much consistent still. I think that's maybe one of the beauties of MIT. But that's quite an accomplishment, to be able to do that well—at that time, especially.

How was your experience at Princeton? Talk a little bit about that experience and how it compared to the experience you had at MIT. I realize that this is graduate versus undergraduate, totally different in that sense.

It was different in the sense that at MIT we had courses and grades and whatever, while at Princeton they may feel you're some kind of genius and so they don't want to put much pressure in terms of classes and grades. They just have this long general examination that lasts one week, where you're being tested all day long, five days a week or something like that. If you can pass this to the satisfaction of the people you are trying to work for as a research student, then they're happy.

So it was a little bit of a different system. But I think, as far as the opportunity to learn, it was just as good. I felt like I was in a place where I could work. I had narrowed it down to theoretical particle physics that I wanted to go into. I was in a place that was doing things. There was a problem around, when I was there, that is in line to get a Nobel prize now. So I was right at the top of the research arena when I went down there. I didn't work on that problem, my classmate Frank Wilczek did. But the point is that it just was random and I could have worked on it. This was a random thing, that they were assigning the problem and that he got it instead of me.

But they were doing that kind of research. Those men were at the top of the business. Curt Callan, Murph Goldberger, David Gross, and Sam Treiman were the ones with whom I had something to do. They were right at the top of what I wanted to go into, and they had a lot of expectations, a lot of high expectations. That part of it was

similar to MIT. It was just in a very different setting, you know? At Princeton University, the whole campus is different. It tries to be more humanistic, it is a more liberal arts place. In that setting, they had something that was maintaining an academic standard just as high as what I had had at MIT. And I was able to keep up the pace. When I left, I had a record for the time from entry to Ph.D. I don't know if my record is still valid, but I got the fastest Ph.D. on record at that time. That was, of course, in 1973. Whether it has been broken since then, I don't know. Maybe it has been broken.

But I continued, you see. My thesis advisor was very happy with my research, so he got me an appointment at the Stanford Linear Accelerator Center with Professor Sid Drell's group. That, again, was another leading place. During that time I was a post-doc, they discovered a particle for which a guy named Burt Richter did get the Nobel prize. He shared it with Sam Ting of the Institute. So I was right on the top. I was very lucky—not lucky, I guess my work took me to those places. But my work really paid off. The hard work and the academic excellence that I tried to achieve, as best I could, did pay off. It put me right at the top of the things I was trying to work on.

One of the things that comes across very clearly to me is that you are very modest in terms of your accomplishments. A number of your colleagues have talked about you. Essentially, if I hear you correctly, from MIT all the way up to the present, you have been involved with the highest level of research in your field, with those who have been acclaimed with Nobel prizes and all that. Essentially, that's what it amounts to.

That's correct, yes.

I think that's important for the record, because a number of your colleagues have said that to me. You're quite outstanding.

Let me just go back. I have a couple more questions. You are on a major university campus teaching and doing research, so you have a very good sense of the students of today. If you had to give advice to students who are coming on the campus of an MIT today, black students, what kind of advice would you give them in terms of being able to meet the challenge that they're faced with?

My advice would be to tell them to try and take advantage of every opportunity they can to broaden the way in which they accumulate

knowledge, to try to open their minds to every possible avenue that may present itself at a place like MIT. MIT has many avenues for them to actually learn as much as they possibly can during that time. I feel like I learned a lot in my time at MIT. It was the time in which I believe I learned the most. Maybe Princeton was similar, but during that time at MIT I learned the most per year I've ever learned in my life. I'm very grateful for having had the opportunity to do that. I think when somebody is admitted to MIT, if they don't do that, it's a waste of the resource—it really is. That would be my advice.

If you had to say what was best about your experience at MIT and what was worst about your experience at MIT, what would you say?

I would say that the best thing about my experience at MIT was that it opened up such a wealth of knowledge to me that I will forever be grateful. I feel that was the best thing that MIT did for me. It simply opened up such a wealth of knowledge, more than I could have ever imagined as a high school student. I was very much taken with that.

I don't have any way of identifying any worst thing. I don't think, during my time, I can cite any worst thing. I guess I read sometimes in this alumni paper that they sometimes even have a racial incident now, or people being called names. But during my day I couldn't have imagined having a racial problem. In one case recently, I read about some blacks walking in the alley right behind Baker House. I couldn't imagine it. I used to walk back from the libraries and whatever, when we used to study at the student union, and never had a problem. I read that there was some name-calling or whatever recently. But I used to come down that alley at all different times of the night, weekends or whatever, from studying in the student union, which used to have a library open twenty-four hours a day, and I couldn't have imagined someone calling us—me or anyone else—a name. We felt a part of the Institute, and the Institute felt a part of us. That seems to be a little different from the way it is now. There is some more of this tension among the students now. We didn't have this, at least during my four years and in my experience. I don't have anything negative that I can point to.

We still admit close to about a thousand students a year. It's a little bit more now than in your day, but it's not

much more than four thousand students total on the undergraduate level at MIT. That's been pretty much standard. During that four years, during that time you were there, there couldn't have been in each class more than about six black students, is that right?

I think less. In my class, I believe it was less. I remember at one point there were eight or ten people in the undergraduate population, black people.

Eight?

Yes, at one point—eight or ten, something like that. My class was, I think, four—and the one in front was a couple. It was really a small group.

And each one of you were scrutinized very, very carefully. Today, since that time, we've averaged close to about fifty to sixty black students per class.

Oh, very good.

The numbers certainly have changed, and I suspect several other things have changed in regard to that. Sekazi, I think, shares your views on that as well.

Is there any other topic that comes to mind, as you reflect on your own experience and on the experience of other blacks at MIT?

The only thing I can say is the kind of thing that probably MIT doesn't have too much control over. As an institution, it really cannot control people. It can only present an opportunity, it cannot make someone take advantage of it. It can try to stimulate up to a point, but there's the individual freedom that will come in there and block that if it tries too hard. It can just present the opportunity to really excel in the accumulation of knowledge, and to really excel in the broadening of oneself. But it cannot force the students to do that. That's something that is just in whatever the culture is going to provide.

I would say that that's probably the main difference that I can see, looking at it from a distance, from these few magazines or whatever that I do have a chance to look at. When we came through, there was an integration movement. Martin Luther King had just recently been stopped, but his ideas were around. When we arrived there, he was still active and there was a mood in the country for people to try to come together. There was a sense of everybody coming together and trying to make things better, trying to create a "great society."

That kind of mood doesn't exist today. Today is different. There are people out there who are

saying that everything has been even now since the anti-discrimination laws were passed, and that there's no need for any special actions. It's just a different attitude. You can find all over the country now people who have a totally different orientation toward themselves, toward other people, toward people who look or don't look like themselves and who worship or don't worship. It's all different. It's not like it was when we came to MIT.

I think a lot of the trouble that students now have taking advantage of MIT can be traced back to the fact that this culture has changed. If I was seen in a lab with a white student, I didn't get anybody asking me a question about that from a social perspective when I went to dinner. There was no thought of anything like that. But I know, from having had students when I was an instructor at Princeton—and that was some time ago—that such a question would conceivably be raised in today's environment.

That is the kind of thing I would say, that I believe the Institute is doing the best it can given the culture. I would simply ask the students, given this culture, are they going to let the culture stop them from taking advantage of MIT? I would ask the question. You asked me for some advice. Well, my advice is simply a question—are they going to allow the culture from which they came, from their high school or wherever, to stop them from taking advantage of the great opportunity that MIT has to offer them? That's my question, and I leave you with a question.

Well, it's an excellent question.