Interviews of the Margaret MacVicar Memorial AMITA Oral History Project, MC 356
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Shirley A. Jackson – classes of 1968 and 1973

Interviewed by Madeleine Kline, class of 2020

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MIT Libraries

Margaret MacVicar Memorial AMITA Oral History Project

Shirley Ann Jackson (SB Physics 1968, PhD Physics 1973) was interviewed by Madeleine Kline (SB Biology and Chemistry 2020) at MIT on June 9, 2018 in the office of Professor Margery Resnick (director of this oral history project) in Building 14. Ms. Richie Hunter, President Jackson's Vice President for Strategic Communications and External Relations, was also present.

When Dr. Jackson, president of Rensselaer Polytechnic Institute (RPI) since 1999, earned her SB in physics at MIT in 1968, she was one of the first African American students to graduate from MIT. She subsequently became the first African American woman to receive a PhD from the Institute when she earned her degree in elementary particle physics in 1973. One of her influences was Margaret (Scotty) MacVicar, after whom this oral history project is named. Dr. Jackson continued at MIT for her graduate work in part to help increase the number of minority students at the Institute and improve their quality of life on campus. As she discusses below, she was a founder of Project Interphase, now Interphase EDGE, a two-year scholar enrichment program at MIT.

After her years at MIT, Dr. Jackson completed a post-doctoral fellowship at the Fermi National Accelerator Laboratory (Fermilab), studying subatomic particles. She also spent a year at CERN, the European Organization for Nuclear Research in Switzerland, studying neutrino physics. In 1976, Jackson began working at the AT&T Bell Laboratories, where she made important discoveries in condensed matter physics concerning two-dimensional systems. She held a faculty position at Rutgers University from 1991–1995 while continuing to consult to Bell Labs. From 1995–1999, Dr. Jackson served as Chairman of the Nuclear Regulatory Commission, where she implemented major organizational changes.

Dr. Jackson served on the New Jersey Commission on Science and Technology, was on the Smithsonian Board of Regents and chaired the President's Intelligence Advisory Board. She is a fellow of the American Academy of Arts and Sciences, has been involved in the leardership of the American Physical Society and the American Institute of Physics, and was awarded the National Medal of Science in 2016.

KLINE: I'm interested in hearing about your childhood—where you grew up and what your influences were. I have heard you speak about your father a few times, about collecting bees and that first experience with science. I was hoping you could talk about your dad and what he was like, and maybe what your family was like growing up.

JACKSON: Well, I grew up in Washington, D.C., and there were four children; there were three girls and a boy. My brother was the youngest. Unfortunately, he passed away about 34 years ago. But all of us grew up together, and my parents made sure we had a pretty close-knit family.

My mother was the language arts person. She actually had gone to college and even graduate school. She had all of us reading by the time we were in kindergarten. We were kind of doing that anyway, but she encouraged us to read and read to us a lot. I had the interest in science and math.

My father was not a high school graduate, but he was very skilled mechanically. He did a lot of things with our house; he could fix anything. And he was really good with numbers and things like that, in his head. And I, interestingly enough, am going to talk about a little of this today [during a speech to the members of the class of 1968 as a part of their 50th reunion activites].

My father was in World War II, actually. But he was an older soldier in World War II. He was at Normandy, and because of the time, he was in a segregated unit. There were these rudders on the landing, on the boats that brought the troops in to shore, and a number of them broke. They could not quite figure out a way to fix things, so he figured out a way to do a special mechanical splice that allowed them to create another kind of rudder. It actually helped save a lot of lives, and so he ended up getting a bronze star, both because he was there and it was unusual for the time. They taught his method in France for fixing things.

When we were growing up, I used to collect live bumble bees and did my various experiments with them, looking primarily at how light and darkness affect their rhythms, circadian rhythms. And then also, how diet affected them. I mainly had bumble bees, but I also would put in wasps and yellowjackets to see how they behave with each other. I kept detailed logs. We had a crawl space under our back porch, and there was a little part where I could keep my jars. That is where I kept them—but I tried to let them go before they died.

I was always, as well, very interested in math and science generally, and my father encouraged that. We also built go-karts and tried to work on what kinds of things would improve the aerodynamics of them. We would race them, and we always had really good ones because our father helped us a lot.

As I went along, I ended up being tested in the sixth grade. It was an IQ test, apparently, although they changed it after that because it was controversial. We were placed in tracks, and so I ended up in an accelerated honors program, which put me through the usual college prep sequence by the end of the 11th

grade. In those days, we did not have the AP this and AP that. But I did take calculus and college-level economics and advanced grammar and composition and things like that. So I had a pretty good preparation. And when I took the SATs, I did well.

My father originally suggested MIT. He just showed me something he had found about it, and he thought it might be a place I should think about. And then I was further encouraged by a vice-principal for boys [at my school]. With those two supporting me, I did apply.

We did not have the money for me to really come here, but there was a Masonic lodge that gave out a scholarship every year, and so I won the scholarship. Back then, the predecessor to Lockheed Martin was Martin Marietta Corporation. They gave out scholarships to high-achieving science and math-oriented students in the D.C. area. They gave out one to someone from the Maryland suburbs, one from the Virginia suburbs and one from Washington D.C., and so I actually got the one from Washington D.C. My high school counselor recommended me and I actually had to go to Baltimore to be interviewed by this long table of guys—but I got that.

Interestingly enough, all three winners of these three scholarships came to MIT. The one who was from the Virginia suburb came here, and I think he ended up in engineering. The guy—and they were two guys—from the Maryland suburb ended up here and studied math, and then I came and I studied physics.

KLINE: Were your sisters older than you, any of them?

JACKSON: One of my sisters is older, one is younger.

KLINE: Did they participate in any of your experience with the bees, or did they have a similar interest in science?

JACKSON: Well, not so much the ones with the bees. That was my particular interest. But all of us were involved with building the go-karts and racing them, particularly my younger sister and I.

KLINE: And did your older sister go to college before you?

JACKSON: My older sister actually did not go to college before I did. She actually went to work, and then she was married moved to California. Then she started going to college. And she ended up getting a bachelor's degree from UCSD, the

University of California at San Diego, La Jolla, she did very well. Then she went on to grad school and got a master's, and she has a doctorate from Pepperdine.

My younger sister also went to college. She graduated from the University of Michigan, and she is an attorney. She went to the University of Michigan Law School, and that is where she got her law degree.

My brother went to college as well. He did not finish, but he was still doing it. He went to American University for a while.

KLINE: Your interest in science seems to have been pretty self-driven, and probably influenced mostly by your father but not really by your siblings around you?

JACKSON: No, I mean, it was just an interest I had. But I was also interested in languages. I took Latin for six years, and I loved that—I had straight A's, but I basically had straight A's anyway. So I had a wide range of interests.

I used to read a lot. I read everything I could get my hands on. I enjoyed reading things in Latin, not just for classes, but just because I like to do it. And I like doing math problems and things like that.

KLINE: Were there any specific teachers or mentors that you had in your high school years?

JACKSON: Yes. My math teacher, her name was Marie Moss-Smith. I had her the whole time I was in high school. What is interesting is that because of being in the honors program, none of my classes had more than about 15 students—and many of them had as few as about 10. So we had a special math class and a lot of attention. She both encouraged us and gave us really hard problems to work on.

Similarly, I had the same Latin teacher the whole time I was in high school, but I had started Latin a few years earlier. I went through the whole sequence within the last year. If there was not a formal course as such, I just did readings in Latin. Her name was Mrs. Davenport, Norma Davenport. They were two of the biggest influences. And then there was Helen Blackburn, who was my economics teacher. She was very motivational. I hope you noticed that all of them were women, and all of them were African American women.

What had happened was that I actually started school when schools were segregated, and then they became desegregated. And when the schools in Washington were desegregated after the *Brown v. Board of Education* [1954

U.S. Supreme Court] decision, the school system actually went around the country looking for teachers with particular backgrounds, very strong teachers, the best they could find to recruit them into teaching, because they wanted their experiment to work with integration. That is something that is important to know about me and my experience, which is that it is virtually impossible to dissect my being a woman from my being African American. And there are things that have happened to me from being a woman, but things happening to me from being an African American, but being an African American woman as well, including some things that happened here.

KLINE: I've heard you talk about your physics teacher, or one of the physics teachers that you had in high school.

JACKSON: Yes.

KLINE: You still fostered an interest in physics above everything else in high school. Did you know going into college that that was what you were passionate about?

JACKSON: Not especially. Now what did you hear?

KLINE: I heard that you taught a physics class, that your teacher would ask you to teach.

JACKSON: Well, my physics teacher in high school was not the greatest. He would just come in and say, "Well, you teach the class today." And at one time, we were studying wave motion, and so we needed a ripple tank. So he just said, "You need to build a ripple tank." Fortunately, I had my father, and so my father, in fact, helped me design and build a ripple tank.

That teacher tried to give me a B one time because I kind of expressed to him I did not think he was fair, but my parents went to school and I got the grade I [thought I] should get. So I had a strange experience.

I liked physics and I did very well, but I was more in love with math. So when I came to MIT, I was planning to do math and philosophy—well, originally, math and the classics. I was interested in Greek and Latin because I had loved Latin so much.

But once I came here, I took a physics course. It was called "PANIC," believe it or not. It was called Physics: A New Introductory Course; that is what "PANIC" stood for. It was taught by a professor who had come from the U.K., his name was Tony French [Professor Anthony French; Professor of Physics from 1962-

2017; President of the Association of Physics Teachers 1985-1986; fellow of the American Physical Society]. He was phenomenal the way he taught the class.

So I was kind of being drawn into physics. And it was an interesting and important way to apply math to understanding physical phenomena. I actually started in electrical engineering and took network theory, but I decided that was not really for me, and around the same time, I was taking quantum mechanics. I loved quantum mechanics, and so I switched.

KLINE: When you got to MIT, did you live in McCormick Hall?

JACKSON: I lived in McCormick Hall the whole time I was an undergrad, and for a few years as a grad student. I was the physics tutor in McCormick Hall. I lived first in the West Tower, and then I lived in the same room, actually, for four years. And I worked here in the summers, all except for one summer, and I lived in the same room then, too. And then I moved to an efficiency apartment.

In the East Tower, they had this little setup with the rooms around a common space. But just outside of that, were the efficiency apartments for the tutors. So I was the physics teacher for a couple of years in McCormick.

But then I needed to live in the real world, so I got an apartment down behind where the old Polaroid building is, down near, I guess we used to call it the BU bridge, on Henry Street, and that is where I lived.

KLINE: You stayed in McCormick for so long. Did you think of it as a community? Or it was just sort of where you lived?

JACKSON: Well, I would say as an undergrad it was kind of a mixture of just where I lived, but then it became more of a community. When I was first there, the women in my class were not especially friendly, the ones I met. And so people would-- You probably have seen that [in other interviews with me]. They would not necessarily eat with me, and some of them would get up and leave. And others would never sit if I was there first. I was not that happy. So I actually spent a fair amount of time away from campus. I did volunteer work at what was then Boston City Hospital, which is now Boston Medical Center. And I did tutoring in Roxbury, at the YMCA; I tutored kids there. And then I pledged a sorority off-campus, Delta Sigma Theta. And I was actually elected the president of a chapter, which I did for two years.

So with those community service things-- Then the Deltas had their own community service activities, so I did a lot of that. And I was involved in some

activities on the campus, but not so many. So my life really was about doing my work, my academic work, doing the volunteer things, doing the Deltas. And then I actually worked in a lab here to earn a little money—initially, in what was called Food and Nutrition Science. It became the Applied Biological Sciences Department, which does not exist anymore. But that is where I worked. Then I started working in the Materials Science and Engineering.

KLINE: I'm interested in hearing about your sorority and the women that you met through that—and how that affected your experience as an African American woman.

JACKSON: Well, Delta Sigma Theta is one of the older African American Greek organizations. The oldest is the AKAs, Alpha Kappa Alpha. But they were all founded around the same time. I think the AKAs in 1908 and the Deltas in 1913. And it became-- That is where my real friends were. I would say it did three things for me. One, that is where my friends were. Two, it gave me support and validation, although none of the women were in science or math. And third, it reinforced my interest in and focus on trying to help someone else.

Because, actually, it was in trying to help other people, particularly when I worked in the Boston City Hospital, that it took me away from concentrating on myself and why I might be unhappy and wallowing in that. Because it taught me that everybody has struggles, and I think that helped me a lot.

The second is that, because I worked and did the work in Boston City Hospital, it reinforced that I was, in many ways, lucky because I had my health. And the third, it taught me leadership; the chapter had gone down to a pretty low membership, and then we had to build it back up. We organized a lot of activities, our community service projects, social activities, because we were not campus-based and so it was a New England regional chapter. We actually pledged for six months, which was unheard of. But we had sorority sisters and pledges who came, and I will tell you some of the schools, from Brown, down in Providence. From Yale, of course from Harvard, but it was Radcliffe at that point. From UMass-Amherst as well as Boston University, Northeastern—and I was the first one here.

And the other thing is that it kept me from just being in a bubble that was MIT, because these women were from all these different schools, and so they were having their own experiences. But some of the women had grown up in the area, and so their parents kind of adopted me. They would invite me over on the weekend and I would go for meals. So they became my family away from my family.

KLINE: It's so important to have a community like that. Did you have mentors at MIT?

JACKSON: I got to know Margaret MacVicar [for whom this oral history project is named]. She was the physics tutor in McCormick Hall when I came, and so she and I got to be pretty good friends. She was one who got me interested in materials science—she almost recruited me! She was an undergraduate in physics, and then had gone on to get her PhD in materials science, so she was trying to recruit me along that path. But even though I did the bachelor's degree in physics and materials science, I decided I wanted to go the physics pathway. But watching Margaret—we called her Scotty at that point—it was very good. And she was the one who introduced me to the lab I worked in and so forth, because she had done her PhD work in that lab.

KLINE: Did you work in that lab for all of your time as an undergraduate?

JACKSON: Pretty much. It was the lab of Bob Rose [Professor Robert Rose, SB Physical Metallurgy 1958, ScD Metallurgy and Material Sciences 1961; Professor of Material Science and Engineering]. He was a junior faculty member at the time. I worked during the academic year just to do it. That was before the real advent of UROP [MIT's Undergraduate Research Opportunities Program, begun by Margaret MacVicar in 1969], but then later on maybe get a credit. And then in the summer, I got paid. So I stayed here.

It is interesting for a person who felt alone and so on, it is interesting how much I stayed here. The summer after my freshman year, I think, I worked in D.C. for the public school system, actually. I will tell you about that, it was interesting. But then after that, I stayed here. It might have been after my sophomore year. I have to check; one or the other.

But it was an interesting job because we worked for the superintendent of schools. So you know what the job was? To read books. To read books in education, and about trends and so on, and then to write them up. Write up a synopsis and what the main points were. Well, that was right up my alley, just to read them to be paid to read. It was good!

KLINE: So studying physics and material sciences and math at MIT, do you feel like your passion for languages and classics was satisfied?

JACKSON: Well, I took some philosophy courses. And I was interested in existentialist philosophy. I originally thought I might try to do a double major in physics and philosophy, but the professor did not get tenure. Yale, actually, at that point,

had a program in physics and philosophy, a PhD program, and I thought about applying. But then, again, I made a choice to do the straight physics route, so I did not apply to Yale at all.

KLINE: You've spoken a little bit about staying at MIT even though you were felt kind of alone, and then you chose again to stay at MIT for graduate school. Could you speak about that decision?

JACKSON: Now you are making me give away my talk for today, but that is fine. Well, it kind of went this way: I did this work in what was then called solid state physics. That is how I happened to do the joint bachelor's. It is now called condensed matter physics, so I will call it condensed matter physics. So I was taking these courses and that is how I met Millie Dresselhaus, and so she was another influence on me.

[Professor Dresselhaus, a pioneer for women in science and engineering who was also a trailblazer in carbon science and carbon nanostructures, was associated with MIT for 57 years. She held professorships in two departments, Electrical Engineering and Physics, and was MIT's first female Institute Professor. Among numerous other distinctions, she was awarded the Presidential Medal of Freedom in 2014.]

When I was a senior, I took what was really a graduate course from her in the electronic properties of materials, and I loved it. I did very well in the course, and I had been doing well in physics. So I had an adviser in physics who said, "Well, you have been doing well enough that you could come to graduate school here. Except, why would you do solid state physics? You should do nuclear, or particle." And I said, "Oh, I am interested in solid state." So I actually applied to the graduate schools related to that. Now, because of Margaret's influence—Margaret MacVicar—I actually applied to Materials Science here, and to Physics. And then I applied to Harvard (all the rest is physics). I applied to Harvard, to Penn, to Brown and to the University of Chicago. And I applied to those because part of my thesis was on modeling what was called the tunneling density of states in superconducting niobium titanium alloys. That was what we now refer to as conventional superconductivity, as opposed to high-temperature superconductivity.

Anyway, I was very deliberate about it. I applied to Harvard because it was Harvard, MIT because it was MIT. But the theory of conventional superconductivity was worked out by Bardeen, Cooper and Schrieffer—John Bardeen, Leon Cooper, Robert Schrieffer. Now, I did not want to work with

Bardeen and I could not see going to the University of Illinois anyway. But Leon Cooper was at Brown and Bob Schrieffer was at Penn.

This was before they got the Nobel Prize, but they were already well-known. So I applied to Penn because Schrieffer was there, to Brown because Cooper was there. But then the BCS theory [the theory of superconductivity presented by Brown, Cooper, and Schrieffer in 1957] was based on what is called many-body theory. A big contributor and a well-known person in many-body theory was a gentleman by the name of Leo Falicov [Leopoldo Máximo Falicov, Argentinian condensed matter theoretical physicist; Professor at the University of Chicago 1960-1969; UC Berkeley Professor from 1969 onward], and he was at the University of Chicago. So I applied and I got into all of these places. I was, in particular, invited to come to both Brown and Penn to visit and to potentially work the summer before I actually started grad school in a lab. I thought, "Oh, gee, I might have a chance to work with Schrieffer or Cooper."

So I actually went to Penn. It was in April of 1968. And on the way back—and this is true, from the airport—we had the radio on, and one of my sorority sisters was driving me to the airport in Philadelphia. We heard that Dr. Martin Luther King had been shot, and then, by the time I got to the airport, that he had died. So I was pretty upset about it because I was a child of the King era, and I was still in high school when the March on Washington occurred.

So I started thinking that I had been too quiet here [at MIT]. I was a pretty quiet person. And I, as I said, focused on the things I described. But I thought maybe I could try to make MIT a little more hospitable—both for women and for minorities, particularly African American students. But I thought the greater need at that point had to do with African American students. So I decided to stay for grad school. I had been admitted and gotten some financial support and so forth.

And so I stayed [at MIT], and I was one of the founders of the Black Students Union. And my first year as a grad student, I spent a lot of time working. We had presented some proposals to the administration. There was a task force set up on educational opportunity. Paul Gray [SB Electrical Engineering 1954; SM Electrical Engineering 1955; ScD Electrical Engineering 1960; Dean of Student Affairs 1965–1967; Associate Provost 1969–1970; Dean of the School of Engineering 1970–1971; MIT Chancellor from 1971–1980; President of MIT from 1980–1990], who had been on sabbatical, when he came back was asked to chair it. So I was working with him, he asked me to join. So I was on that task force, and we would meet every week. It was pretty intense.

Then a group of us went out to go around the country to recruit students—African American students and other minorities. So I traveled around the Midwest. I went to Cleveland, and Detroit, and Akron, Ohio, and so forth. But then, after that, and we started the Project Interphase, which I guess is now Interphase Edge. [Interphase Edge is a two-year program for minority students that begins with a summer program prior to the start of freshman year. Interphase provides academic support and career guidance for incoming students.] I taught in it the first year—I taught physics. And the second year, I was then asked to be in charge of it, and so I did [head it up]. I kind of shaped the curriculum and taught it. And so, again, it was another chance to be a bit of a leader and to organize things, both with being on the task force but then running this physics program.

But having stayed here, there were people doing solid state or condensed matter physics, but it was not in its big heyday. What was [in their heyday] were nuclear and particle physics, and so I started to join a group in nuclear experimental. But then I decided, again-- Remember, I was always very interested in math, that theory would do better; I would do better. And so that is what I did.

KLINE: I guess I'm going to jump a little bit around now, because I would like to hear how you think your legacy has impacted MIT, and especially with Interphase Edge and the programs that you were a part of starting. Also, how you think things have changed from when you were here. I would also like to hear about your work at RPI and the connections to MIT.

JACKSON: You are skipping over a whole part of my career!

KLINE: I know. I want to be mindful of your time!

JACKSON: Well, I think I helped to diversify MIT, and Paul Gray felt I had a big influence on him. He was a big one who pushed very hard to diversify MIT, but also to make MIT generally more hospitable to students, particularly undergraduate students. He and [Gray's wife] Priscilla did a lot of that. But he said it was very—and I believe him—influenced by the work we did on the task force.

Then we went from having three to five African American students in a freshman class to 57 the year after we went all around recruiting and put into place various programs, including Interphase. So while we still all would like to see more under-represented minorities, I mean the numbers speak for themselves.

Then I also got involved in some things with supporting women. And women are huge here [now]—almost half the class. Maybe more sometimes.

And then the fact that the number of the programs themselves remain, but we did not just focus on recruiting students, but also faculty and administrators. And I know that the dean of this school is an African American woman [Melissa Nobles, Kenan Sahin Dean of the School of Humanities, Arts, and Social Sciences and Professor of Political Science]. But over the years, there have been a number of high-level administrators, obviously women today, and underrepresented minorities.

I do not like to take credit for everything that has happened, but it was a period of change and I think that has had a big effect. But I think, also, I have had the chance to be a member of the MIT Corporation (except for a four-year hiatus) almost continuously since 1975. Because of that, I have been able to influence things in various ways that MIT does. And I am a life member of the Corporation today. So I will always have a connection, because once I am too old to be a life member, I will be a life member emeritus anyway, and still be on committees or whatever.

I think my legacy here also has to do with the overall career I have had. And perhaps the model it represents. This is something—and Richie [Richie C. Hunter, RPI Vice President for Strategic Communications and External Relations for Rensselaer Polytechnic Institute] knows this about me—I am actually sensitive about the fact that when people talk to me, they want to talk about what I did and the struggles at MIT and all of that. But I think if this is going into the Archives, I was an excellent student, both as an undergrad and as a grad—even as I did all of these things. Even as I was in my sorority and did the volunteer work, I was an excellent student, and even more so as a grad student. I just went straight on through. And I had to work by myself. I did not have a whole lot of help, but I was an excellent student.

And then I went off and I got my PhD at a time when there were not a whole lot of jobs in particle physics, and not many in physics period, particularly in theory. But I got a post-doc at Fermilab. I did some good work there. I was invited to CERN by a woman—her name was Mary K. Gaillard, who is a Professor Emeritus at UC Berkeley. She invited me to come. She had been at CERN. She was on a leave at Fermilab, and she invited me to come and spend the year at CERN. I did that, and I was able to get support from the Ford Foundation to do it. And then CERN supplemented it, because it was expensive in Geneva.

[At CERN] I did some interesting work on neutrino physics and started—remember, always think about the math link-- I was interested in how topology played into the properties of certain high-energy models. But then it occurred to me that they could have application in condensed matter systems and models, because then the physical phenomenon could display actual, topological properties.

So when I came back from Europe, I decided to try to get back into condensed matter physics. I had been at theoretical physics summer school in Colorado and met a theorist at Bell Labs. Through a combination of things, I was invited and got, essentially, a senior-type post-doc at Bell Labs. I did end up discovering some topological properties of certain models of two-dimensional systems. And that is what got me my permanent job.

So I did a lot of things and a lot of work on the electronic and optical properties of two-dimensional systems. But I have always been a person, while I have been doing the academic or the research, I have been engaged in other things. I got involved in issues of science, technology, and public policy, initially, in the state of New Jersey through various means, including the New Jersey Commission on Science and Technology.

But I also was active in the professional societies. I had become a fellow, because of my work on two-dimensional systems, of the American Physical Society. And later, the American Academy of Arts and Sciences. And I was active in the governing council of the American Physical Society and on the executive committee of the American Institute of Physics. That is the umbrella organization that has the APS, the American Physical Society, the American Association of Physics Teachers, and the American Association of Physicists and Medicine. So I was involved with them.

But I spent 15 years at Bell Labs just doing theoretical physics research. And then when I indicated to some colleagues that maybe I was interested in academia, I was immediately invited to Rutgers to give colloquium and chat and interview, and they offered me a tenured, full professorship. By that time, I had had my son, and he was growing up. This actually gave me more flexibility. It did not mean I worked any less hard, I worked probably even harder because I actually still was working part-time at Bell Labs!

But then, because of my involvements, I ultimately ended up on some corporate boards when Bill Clinton was elected. I have never worked in a political campaign, but I was asked to come and chair the NRC [Nuclear Regulatory

Commission]. I did a lot at the NRC; you should come and hear my talk today if you can.

But then it is because I was a change agent that I was asked to come to, and because I had been a presidential appointee to come and be president of Rensselaer [RPI, Rensselaer Polytechnic Institute in Troy, New York].

So now, you can ask a question!

KLINE: Thank you for that.

JACKSON: Because I think it is important when you record the life of a person, that it is not about the struggle, per se, that is not the sum total. It is significant when a person has to break through barriers, but if you look at Madame Curie or Maria Goeppert-Mayer [German-born American theoretical physicist; Nobel laureate for proposing the nuclear shell model of the atomic nucleus], they had to deal with certain challenges. But I am sure what they are remembered for and want to be for are for what they did. And that is really important, because that is what you will deal with in your career. As you go to break through barriers and work through your own confidence, and hopefully have that confidence, you want to be able to make the difference that you want to make.

KLINE: How did you continue to make the difference that you wanted to make as you went into Rensselaer?

JACKSON: Well I have transformed Rensselaer. I mean, it is actually the oldest of the technological universities. It has graduated some very famous people and people who have done a lot of things to build the country and the infrastructure and breakthroughs in any number of areas. But it had five presidents over a 14-year period. And one who, when that instability started, the prior president had died in office. His name was George Lowe. He was the operations director and associate administrator who ran the Apollo program that put man on the moon.

But Rensselaer needed some change. There were a lot of things there that had to be done and getting us into new intellectual arenas, particularly hiring new faculty. Also, focusing in biotechnology and the life sciences, and computational science and engineering. But then we have spread it out into a whole panoply, including in media, the arts, science and technology, among other things.

But also, to change the student experience, because I felt that is very important. It ranges from how we bring students in. MIT is talking about the first-year experience; well, we have had a dean of the first-year experience and a whole

program for almost the last 20 years. And we have class deans for every class. And once the freshmen become sophomores, there is a class dean assigned and that dean stays with the class until that class graduates. They really work with the students and they are their advocates. They see that they get what they need, and so forth.

So I would say that in terms of research focus, growing the research, we have 22 new academic programs. Applications have quadrupled, research has tripled, we have hired almost 400—for us, that is a large number—new faculty members. We have physically transformed the campus. I already did a $1.4 billion capital campaign. We have another $1 billion campaign. Now, MIT has a $5 billion. But if you scale it, it is a pretty big campaign.

So my job today is not about doing the science, per se. It is about using my background in science and then all the things I have done to help give some guidance in terms of where we need to go. But then to support those who are the ones actually doing research, and discovering things, and developing new technologies. We are educating the next generation and ensuring that the kind of education we offer is high-end, that it is relevant, that it enables the students. So that is where I am.

KLINE: Is there anything else that you would like to add?

HUNTER: I think that touching on the National Medal of Science is something important. And I also think that touching on some of the other contributions, like the Smithsonian, it is very important.

JACKSON: Sure. Let me just mention that. I will talk about two things.

One, the Nuclear Regulatory Commission is important. It is important because nuclear energy and nuclear power is something that is a big deal around the world. It is a big deal because it is a source of energy and it provides a lot to our infrastructure—about 20% of our electricity production. But in other places, it is more than that.

It also exists within a frame having to do with nuclear nonproliferation and things like that. But the Nuclear Regulatory Commission also does more than just regulate license and regulate nuclear power plants. It looks at nuclear materials that get used in medicine and industry and research. It deals with nuclear waste, both high-level and low-level, and it does licensing of nuclear exports. But it also gets involved with other entities of the federal government in areas having to do with nuclear nonproliferation and so on.

So as chairman of the NRC, I actually transformed the whole regulatory process. It had been based on what was called engineering judgment, which it still is, but [my focus was on] bringing a more structured risk-assessment process to what we did based on probabilistic risk assessment—basically, to better evaluate relative risk and to have it be performance-based. And so that whole risk-informed, performance-based regulation is something I introduced, and it still exists.

I reorganized the NRC. I created a new planning, budgeting and performance management structure. We wrote and promulgated a convention on nuclear safety. And we, unfortunately, were the last country to ratify the convention, even though we, essentially, promulgated it—meaning the NRC. But we got that done. We created the license renewal process that allows us to extend operating licenses of nuclear reactors for 20 years.

But then we did a lot of work with the countries of the former Soviet Union after the breakup of the Soviet Union—and with other countries in Central and Eastern Europe, as well as in South Africa, with the post-apartheid government.

So those are the things that I am very proud of. I am proud of the research that I did in two-dimensional systems. I am proud of the work I did as chairman of the NRC, and certainly proud of the work that I have done, and still working at, at Rensselaer.

But along the way, I have also had a chance to be involved at a high level in other arenas. I was on the President's Council of Advisors on Science and Technology for President Obama and led a major study—co-led with Eric Schmidt of Google—a major study on advanced manufacturing that had a big impact. And then I was vice co-chair, rather, of the President's Intelligence Advisory Board. We focused a lot on the role of new technologies in intelligence, as well as looking at Russia. But we will not talk more about that, partly because these things are classified anyway.

Then I was vice-chair of the Board of Regents of the Smithsonian. I was on the Board of Regents for 12 years. And when you become a regent, you are appointed by legislation, did you know that? OK, so let me tell you that, it is an interesting story, and then I am going to have to quit. One, there are 17 members, and eight of them are public officials. Six members of the Congress—three from the house, three from the Senate, two from the majority party at any given time, plus the vice president of the United States, and the chief justice of the United States. And then there are nine citizen members, two from the

District of Columbia, and then seven others, no two of which can be from the same state.

So I was the regent from New York for 12 years. You can only serve a total of 12 years, two possible six-year terms, and I served two six-year terms. Legislation has to be introduced once the Board of Regents acts. It has to be introduced in the Congress, in the House and the Senate, to name a certain person as a regent. And then if that is passed into law and signed by the president, that is your appointment.

So I was appointed both under President [George W.] Bush for my first term, and President Obama for my second. And then I ended up being the on the executive committee of the board of regents, and then for my last three years as vice-chair. And I had a role in getting the National Museum of African American History and Culture sited where it was. Legislation was passed to create it, but the siting was a big decision, and so we got it on the mall. And then I ended up, as vice-chair, speaking at the grand opening of the museum. That was a big honor, because I was there with former President Bush and Laura Bush, with President Obama, with the Chief Justice. And so it was a big deal.

So I had this interesting career that has crossed multiple fields, and that is what is different and unique. I have been a researcher, an academic. I have been involved with business at a high level on boards and things like that. And then I have had a very high-level positions in the government. And so I was awarded the National Medal of Science because of the combination of those things—of the work I have done in my research, in both particle physics and condensed matter, but particularly condensed matter physics. And because I have always done work in public policy that has been rooted in science.

When I was awarded that in May of 2016—and it is the highest honor that the U.S. government gives in science—that was a big culmination for me. It is a big deal.

HUNTER: I think one other thing would be just to speak very briefly on World Economic Forum, because your influence is not only national, but also international.

JACKSON: Yes. I have been invited by the World Economic Forum to the annual meeting in Davos every year for the last decade. I go both as an expert in certain areas and as a university president. And so I end up moderating sessions and giving talks. Most recently-- Well, let me back up. The World Economic Forum just opened an office, an industry office, in Silicon Valley; it is actually in San Francisco.

They had a meeting on strategy and why companies need a foreign policy, how they need to look at the global scene. So I gave a talk on geopolitics of 2030, how the countries will relate, particularly with the advent of new technologies. The so-called, "Fourth Industrial Revolution."

But I was on the World Economic Forum before it recently reorganized to have a USA board. It was the World Economic Forum USA, which was the key part of the forum for a long time. And I was on the board of the World Economic Forum. I have gotten a number of our faculty members come to different meetings in Davos. They have a meeting in China every year, in Dubai. And the last couple of years, I have been co-chair of what is called a Global Future Council on international security, so I have been doing that.

HUNTER: There is one last thing I would like to add, just to connect with one thought that you had, and this is about President Jackson's tenure at Rensselaer. In the last several years, the student body has been progressively more diverse. We had our most diverse class last year, and we will have an even more diverse class this year, both related to gender and ethnic background.

JACKSON: And it is the most diverse in multiple ways: women, under-represented minorities, international, and geographic, in terms of outside the Northeast. Progressively, each class is the strongest class we have ever had, very academically accomplished. And large: we have had the most applications ever. Last year was the most applications ever. It keeps growing, so there is a high demand.

HUNTER: And the other question you asked, about how does President Jackson believe her background has influenced others-- We receive letters, hundreds each month, as well as messages from students, that indicate that the expanse of her entire career serves as a role model for so many. I think that is why it is important, also, that she went through all of those things.

KLINE: Thank you so much for taking time for the AMITA oral history project.

JACKSON: Thank you.