KENNESAW STATE UNIVERSITY ORAL HISTORY PROJECT

INTERVIEW WITH NIKOLAOS KIDONAKIS

CONDUCTED, EDITED, AND INDEXED BY THOMAS A. SCOTT

for the

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TS: Today the interview is with Nikolaos Kidonakis who won the Distinguished Scholarship Award for 2008. Nikolaos, why don't we begin as we do with everybody, just asking you about your background, where you grew up and where you went to school and things like that.

NK: I was born and raised in Greece. My home city is called Thessaloniki.

TS: That's an historical, Biblical city.

NK: It is. It's the second largest city in Greece after Athens, the capital. It goes back to 315 B.C., so the time of Alexander the Great, basically.

TS: Right, it's right on that major highway that used to run through east-west. I guess it still is a major highway through the east-west. Paul wrote two letters that are part of the Bible to the Thessalonians.

NK: That's right.

TS: Okay, so you were in a very historic location.

NK: That's right. It's full of history, full of monuments. Well, the whole country is very historic everywhere and, yes, I was born there in 1969. I was raised there, so I went to school there. I left when I was seventeen and a half, and I left to study in the U.S. I went to the California Institute of Technology, Caltech.

TS: How did you make that decision to go there?

NK: Well, I did a lot of research about schools. I was always interested in America, the U.S., so I wanted to see new things. I always liked travel, and then, specifically, why Caltech? I did a lot of research about schools, and I thought it was the best science school in the U.S.

TS: Oh, yes, it's hard to beat Caltech.

NK: Yes. So I applied, and I got a scholarship, and that's how I went. I wouldn't have been able to go without a scholarship because it's very expensive.

TS: Your English is as good as a native speaker. Did you have a strong background in English growing up?

NK: Well, English is taught in public schools, but, traditionally, many Greek children also go to a private school a few hours per week for English, to learn it even better, because in public school it's not taught so well. People go to this kind of school to learn English better, but also many children, though not me, also go to other private schools to basically go over again the material they are taught in public school to enhance their chances of going to a university because university admissions are very competitive. I didn't actually go to that kind for just general education, but only for English. I was quite good with languages in general.

TS: Before we get you to Caltech why don't we talk a little bit about did your parents encourage you strongly toward getting an education?

NK: Yes, for one thing, my mother was an elementary schoolteacher. She is retired now.

TS: What is her name?

NK: Dimitra. In fact she was my teacher for three years in elementary school.

TS: Oh my goodness.

NK: So first, second, and fourth grade.

TS: Poor kid! You could never cut up in school!

NK: No. But, yes, I was quite fine about it; it wasn't a problem. So, of course, we focused on education a lot. My father also—my father was an officer in the military when I was in elementary school. Then he retired quite young at around forty-one or forty-two. Then he became a businessman, he opened a business, a store, and then he . . .

TS: What kind of store?

NK: Well, drinks, both alcoholic and non-alcoholic, retail and wholesale. Actually when he started, he started selling olive oil, which is big in Greece.

TS: What's his name?

NK: Ioannis. That's the Greek of John, basically. It's the original version, I guess. I also have a sister, Marianna.

TS: I guess you know you're not the first person born in Greece to win one of our Distinguished Faculty Awards here; Vassilis C. Economopoulos won the Distinguished Teaching Award back in '95.

NK: Yes, I guess I came too late; he had already passed away, but I met his wife [Marjorie], actually.

TS: She's just retired. So you have a strong background—how did you get interested in physics?

NK: As soon as I can remember, myself, since I was a little child, about five or six, I was always interested in the universe, in physics, in the planets, the stars, and so on. I was watching all these science programs like *Cosmos*, Carl Sagan, so I was always interested in science. Then even in the specific topic of theoretical particle physics, when I was in high school, I was already interested in that. So when I was sixteen or seventeen I already knew.

TS: I didn't even know there was such a thing when I was in high school. [Laughter]

NK: Also, there was an American cultural center in Thessaloniki where I did research about the American universities. There was an American consulate, but there was also a separate cultural center with a library. I remember going there and reading *Physics Today*, which is the professional journal of the American Physical Society [and American Institute of Physics], so I was already . . . .

TS: You know, that's not what a normal high school kid usually does in America at any rate?

NK: Yes, but in Greece it's not so unusual that you may be interested early on because you have to decide from high school already what you want to do in the university. It's not like here, where you go, and the first three years of college are, basically, high school where you discover yourself and decide what major. There you have to know from high school what your major will be. When you go to the university, if you go to physics, you just do physics, physics and maybe some math and chemistry. You don't do history, English, whatever.

TS: Oh, so no liberal arts core courses.

NK: No, because that's what you did in high school. High school is very broad, and everybody takes everything. So, actually in high school you don't have any choice in what you take; you take everything. High school is very broad, and then you go to the university, and you specialize.

TS: Do you think we take too long getting people to their majors here?

NK: I think so, yes. It looks to me almost backwards that in high school you have a choice not to take physics, for example, like many of my students say they have never taken physics. I say, "How come? In Greece, you take three or four years of physics; everybody takes physics, and everybody takes English, everybody takes psychology, Greek, and many other subjects."

TS: When I went through high school close to fifty years ago, everybody who was going to college, I think, took biology in the tenth grade, chemistry in the eleventh, and physics in

the twelfth, and I guess we had a general science in the ninth grade. So we had a little bit, but three years of physics in high school is tremendous.

NK: Yes, but I think, because I've talked with some Americans, I guess here when you take biology or you take physics you take it every day, five hours a week. But in Greece you don't do it like that; you maybe take two or three hours per week, but then you take more subjects, and you take them every year. So maybe that's why you can do so many years because it's not so intensive. But I think it is better like that because you're not yet specializing. It's supposed to be high school education where you learn a little bit of everything.

TS: And if you do a little bit each year you don't forget it.

NK: Exactly. It reinforces it, so I think all in all it's a better way.

TS: Sounds good to me. So you applied to Caltech and got accepted.

NK: Yes, I applied to other schools as well and got accepted, like Stanford and MIT, but Caltech was my choice.

TS: They gave you a scholarship?

NK: I got a scholarship, yes, because it was financially difficult of course, going from Greece to California. The climate was very similar, so that's one thing that I liked.

TS: Really?

NK: Yes. California's climate is like that of Greece.

TS: What city is Caltech in?

NK: It's in Pasadena, which is Los Angeles, basically.

TS: So that's a pretty warm climate.

NK: Pretty warm and relatively dry and desert also. Greece is not a desert, but it's very dry compared to northern Europe.

TS: In Thessaloniki, you're not far from the mountains though are you?

NK: No. And actually Thessaloniki is not as dry as southern Greece, so Athens is much drier. Actually Thessaloniki is a little bit more like northern Europe in that it's more green.

TS: You're a few miles from the sea one way and a few miles from the mountains the other way?

NK: Actually we're right between the sea and the mountains. It's right on the sea, but then it goes uphill. The city is actually built uphill, so you get both simultaneously within a couple of miles.

TS: It sounds like a great place to grow up.

NK: Yes, and I enjoy going back all the time. I love the sea. I love cities that are built by the sea, so you can just walk by the sea.

TS: Right. So you get to Caltech, let's see, what year was it that you got there?

NK: Nineteen eighty-six.

TS: You spent four years there and graduated in 1990.

NK: Yes, a Bachelor of Science with Honor in Physics.

TS: One of the things we ask people along the way is about mentors; do you have any mentors this early on that kind of shaped you?

NK: Actually, yes. I had an advisor, although I didn't have that much interaction with him. He won the Nobel Prize a few years ago, [H.] David Politzer. He won the Nobel Prize in Physics in 2004. Although I didn't know it at the time, his specialty is actually what I'm doing now. What he won the Nobel Prize for was the theory of QCD, Quantum Chromodynamics, which is a theory that I'm working on now, although at the time I wasn't really specialized enough to . . .

TS: So he was doing that, but you weren't aware of it at the time.

NK: I was aware that he was doing theoretical particle physics, which is what I was interested in, but I didn't know this very specific….

TS: Did you take any courses from him?

NK: No, I didn't actually.

TS: But he was your advisor?

NK: He was my advisor, so, basically, it was signing papers, and I talked to him a few times, but I didn't really have much interaction. At the time it was more amazing that Richard [P.] Feynman was still alive; I don't know if you've heard of him. He was probably the greatest American physicist. He actually died when I was at Caltech in '88.

TS: He was at Caltech?

NK: Yes. He is probably the most famous American physicist, Richard Feynman, and he was a Nobel laureate, of course [1965], and then another famous one was Murray Gell-Mann, another Nobel laureate [1969]. He's also very famous, and he was actually responsible for QCD. He started the theory of quarks. Then David Politzer worked more on that. So especially at that time Caltech was really, really the best place for physics. All the famous people were there. Kip [S.] Thorne was there. I also took classes by him, he was famous. He was working with Stephen Hawking on black holes and cosmology, and actually he taught me a class. Richard Feynman actually gave a guest lecture when we were freshmen. That was the year before he died, and he just liked to interact, and even though he didn't have to, he liked to teach freshmen a little bit and expose us to physics. In the 1960s he taught freshman physics, and his lectures were made into books, the famous Feynman lectures on physics. This is a standard back from the 1960s for freshman physics.

TS: That's really remarkable to get somebody that prominent to be teaching freshman courses.

NK: Yes, but it's not that unusual. I know other people as well who, I mean, they don't do it every year, but they want to do it. I think there is a tradition in America that they pay a lot of attention to the first year physics. It's kind of a traditional course, more I think than in Europe, and they pay a lot of attention and even luminaries will think it's important to teach it. So, yes, it was a very impressive place, and I was really happy to be there at the time. It was a lot of hard work though—very hard work. The thing is that you go there, and you think you're the smartest kid in the world because you were in high school, and you really were very smart, but then you go there, and everybody is just like you. So it's really impressive in the beginning how everybody is smart. But, on the other hand, it's not cut-throat competitive; it's competitive, but people help each other. It's not like there's cut-throat competition. The climate was nice, and you would help each other with homework and so on—one reason being that you wanted to survive. So it was nice that people helped each other.

TS: You spent four years there and probably went to the beach a time or two as well.

NK: Only a time or two, probably because I didn't have a car, so I depended on friends and didn't have time.

TS: You spent a lot of time in the lab?

NK: Yes, and homework and many nights staying up doing homework.

TS: In 1990 you graduate from there. Then before you go to State University of New York at Stony Brook you went several other places.

NK: I went to the University of Cambridge in England.

TS: That was straight from Caltech?

NK: That was straight from Caltech. That was a one-year course I did at Cambridge. That's called Part III of the Mathematical Tripos, which is a very old, distinguished and traditional course. What you get when you finish it, the degree you get is called the Certificate of Advanced Study in Mathematics. So that's what I received a year later. In the UK sometimes theoretical physics is grouped under mathematics, not under natural science. So there's experimental physics, which is under the natural sciences, and then you have theoretical physics, which in some places goes under math. So, in fact, [Sir Isaac] Newton also was the Lucasian Professor of mathematics. This department was called the Department of Applied Mathematics and Theoretical Physics.

TS: Applied mathematics?

NK: Yes, there's also pure mathematics, but Applied Mathematics and Theoretical Physics.

TS: Meghan [A.] Burke [professor of Mathematics at KSU] studied applied mathematics.

NK: Yes, it was in Oxford [Center for Mathematical Biology]. I've talked to Meghan, and she was at Oxford. So this is the department [at Cambridge] where Stephen Hawking is, so I saw him many times. And the other thing with Cambridge is you don't just belong to a department, you also have to belong to a college. You know the college system . . .

TS: Which college were you in?

NK: I was in Gonville and Caius.

TS: I'm not even familiar with that one.

NK: It's a very distinguished college; I think it's the second or third most distinguished in terms of awards and reputation. Those are the names of the founders. [Edmund] Gonville was the founder [in 1348], and then [John] Caius [Latinized version of John Keys], I think a couple of centuries later [in 1557], basically refounded it and extended it. It's a very old college; it dates back to 1348, if I'm not mistaken, so it's a very old college, very distinguished. The building is very beautiful, and it has a very high reputation in math, physics, and also in medicine. Apart from Stephen Hawking who is the most famous fellow there now, there was Sir Nevill [F.] Mott who got a Nobel Prize in Physics [1977]. Even before, in the 1920s and 1930s [Sir James] Chadwick was there, the discoverer of the neutron. There were also medical people—the person who discovered the circulation of blood, William Harvey if I'm not mistaken, was a member centuries ago. [John] Venn, the mathematician, Venn of Venn diagrams. So, in Cambridge colleges you have a hall where all the college eats, and there's a high table where all the professors eat. For example, Stephen Hawking would be there many times, and then the students eat in other tables. Then the graduate students had a gallery, actually, overlooking everybody in the hall; so we would sit there. There were stained glass windows that would show, for example, the discovery of the neutron or Venn diagrams or other things, so it showed the history of the college.

TS: In the stained glass windows?

NK: Yes. So these figures would be in the windows.

TS: How about that? Neat place.

NK: Yes, it was quite nice. Yes, so, for one thing I had the college life, and on the other hand I had the department and courses and so on. Then at the end of the year you have to take the exam on all the courses. I took six courses. It's not like here where you have mid-terms and finals. There, you do a whole year, and then at the end of the year you get examined on everything.

TS: One exam.

NK: Yes. One exam per course; there were six exams over a few days.

TS: Right. But no weekly quizzes along the way.

NK: No, no, nothing like that.

TS: American law school is probably the closest thing to that where you get all these exams at the end of the semester and just hope you've been studying along the way.

NK: Yes. I was very happy in Cambridge; it was quite an experience, a very beautiful place and very historic.

TS: But that's scary to take those exams at one time.

NK: Yes, but if you're interested in that subject then that's . . . yes.

TS: Well, great experience in Cambridge. Then how did you get to State University of New York?

NK: Well, I was thinking of staying in Cambridge or moving, and one reason I decided to go back to the States was financial. They don't have as much money to support students in the UK, and I didn't really want to keep depending on my parents. So I decided that I wanted a fellowship, so I applied to various schools.

TS: I'm surprised the UK doesn't have fellowships like that.

NK: They have some limited, but they don't cover everything. For example, even that year in Cambridge I did get some money actually from the local council because I'm a European Union citizen. So I was treated partly like a Brit. It would pay for my tuition expenses, but not for living expenses. So I think if I had gone for the Ph.D. again it would be the same deal that I would get paid for tuition, but not necessarily for living expenses.

TS: So you had some bills to pay.

NK: Yes, plus I wanted to go back to the U.S. anyway. So I applied to various schools. The State University of New York at Stony Brook has a great Physics department, especially theoretical physics. The department is one of the top ten or twenty in the country, but specifically they have an Institute for Theoretical Physics. The director at the time was C.N. [Chen-Ning] Yang. He is a Nobel laureate [1957]. He was the director of the institute [now named the C. N. Yang Institute for Theoretical Physics]. Then there were many other very good people. My Ph.D. advisor there was Jack Smith, and then I also worked with George Sterman. I worked mostly with these two, and officially Jack was my advisor. The first two years it was mostly classes, you know, classes and comprehensive exams. Then the last three was basically research. I did a lot of research mostly on the top quark production, heavy quarks in general, and I wrote three papers, and I got my Ph.D. in May of 1996.

TS: What was your dissertation?

NK: It was called "QCD Resummation and Heavy Quark Cross Sections."

TS: QCD, for Quantum Chromodynamics, Resummation. In laymen's terms what does that mean?

NK: Okay, well, it would take a while to explain. What I'm doing is I'm studying how when protons and anti-protons collide together they can produce new particles. There are some very big labs. There's one in the U.S. called the Fermilab Tevatron [Batavia, Illinois] where they have a very big tunnel underground, and they circulate beams of protons and anti-protons, and they collide in certain regions. When they collide, they smash together very violently, and they can produce new particles. Some of these particles are heavy quarks.

TS: Okay, so quarks are the particles that come from the splitting of protons?

NK: Yes, actually the proton itself is made out of quarks and gluons. There are three quarks that the proton is made of, two up quarks and one down quark. And also neutrons are made out of these light quarks. But there are also heavier kinds of quarks. These can only be produced with high energies because they're very massive. When you smash together protons and anti-protons, they can create new kinds of quarks, heavier quarks. The top quark is the heaviest one. It's very, very heavy. It's like two hundred times heavier than a proton even. Although it's a fundamental particle, it's extremely heavy. So when you smash these protons and anti-protons at very high speeds you give them enough energy to produce very heavy quarks. That's what I'm studying. I'm doing theoretical calculations of the cross-section—that is a measure of the probability of producing these heavier particles. QCD Resummation is a way to calculate what are called radiative corrections. So when you have this theory of calculating you have what's called perturbation theory; so that means you calculate, let's take an easy term, like the

dominant term first, and then you calculate some corrections on top of that. This gets increasingly difficult to calculate, to refine your answer. Resummation is one way of dealing with this, of calculating more refined, higher corrections to do a more refined calculation. So that's what I was working with.

TS: What is the history of all this? The last physics course I took was probably 1963 or '64, and we knew all about protons and neutrons and electrons and all that, but I don't remember anybody talking about quarks back then.

NK: The quarks were proposed back in the 1960s actually by Murray Gell-Mann, so I think '63 was probably a little too early. Even then it didn't get fully accepted as a theory until the 1970s because there was a lot of work to be done and many consistency checks. So the Standard Model of particle physics which includes QCD and also includes electroweak theory—electromagnetic interactions and weak nuclear interactions, these things didn't solidify into the Standard Model until the 1970s and then experimentally continued being tested. And by the way, QCD, Quantum Chromodynamics, is the theory of the strong nuclear forces, the forces that are responsible for binding quarks into a proton or for having the protons be bound inside a nucleus. So that's what QCD is, the theory of the strong nuclear forces. Then you also have weak nuclear forces, you have electromagnetic forces and you have gravity, and these are the four fundamental forces in the universe, as far as we know. There are only these four. Everything else is really a result of this.

TS: You're doing some very basic theoretical research; let me just ask you, what are the practical implications of all of this?

NK: The practical implications, well, we don't really know. That's the thing with basic science that you may not know the practical applications until fifty years later.

TS: Sure, sure.

NK: There are practical side applications, let's say, in the sense that to build these accelerators, so I'm talking about the Fermilab Tevatron and right now the CERN [European Organization for Nuclear Research] Large Hadron Collider in Switzerland is getting ready for actual events, for collisions. So to build these machines you're pushing the technology because you need superconducting magnets. So you are really pushing technology—it drives technology forward. Also, the need to transfer large data sets between scientists actually pushed the envelope. In fact, the World Wide Web, the "www" was invented, was created by a physicist at CERN.

TS: Somebody in England, wasn't it?

NK: Well, actually he was working at CERN; he's English.

TS: What's his name?

NK: It's Tim Berners-Lee.

TS: This is in the 1990s, isn't it?

NK: Exactly [1991]. The lab had existed for a while. There was a different collider at the time, called the Large Electron-Positron Collider, and now in the same tunnel they're building a new machine, the Large Hadron Collider [LHC].

TS: But your point is that the guy who invented the worldwide web was really doing it for purposes of discussion in physics.

NK: Exactly. So there are all these side applications that can revolutionize the world although they're not direct applications of what happens inside the nucleus. Also, now they're even extending these to what's called the grid, the data grid, because they need to be able to transfer really quickly very large data sets now with the LHC coming online, so they're actually pushing the envelope there.

TS: I guess where my thinking was going when I first was reading through this and trying to figure out what exactly it was that you did, I was thinking in terms of splitting the atom and producing immense energy and the military significance of it.

NK: No, so far, there is no military application or anything like that. That's nuclear physics and what we're doing is really sub-nuclear. It's much smaller scales than the nuclear. I'm looking inside the protons and fundamental particles. Another historic application, and I told you that these things can take awhile, for example, the first accelerators were built in the 1930s, and now these are actually used in medicine. They can be used in medical facilities.

TS: I was wondering if there were medical applications of this.

NK: There are. They can be used for cancer treatments. I'm not an expert on these things, but I know there are medical applications of this.

TS: It's the theory that really grabs you, I guess.

NK: Yes. Exactly. I was always more theoretical; I wasn't so much into experiments although I had to take experimental classes at Caltech.

TS: Right. This is not exactly the kind of stuff—well, I guess you do some lab work but . . .

NK: Well, my theory is related to labs. I do computations that are useful for experimentalists, but I don't actually work on the actual machines. But I do calculations that are relevant. It's not theory in the sky. It's actually calculating things that experimenters use all the time. They take the data, and then they compare it to my calculations, and that's how we know if theory and experiment agree or prove our theory. So it is very experimentally relevant; it's just that I don't actually get my hands in it.

TS: Right. Okay, so you went through their Ph.D. program, and by May 1996 you graduated and went back to Cambridge, wasn't it?

NK: No, actually I went to Edinburgh in Scotland. So I was at the University of Edinburgh.

TS: And this is a post-doc?

NK: That was a post-doc research fellow for two years, '96 to '98.

TS: Why Edinburgh?

NK: Well, that's where I got a position. I knew some people there who were doing work very similar to mine.

TS: Is that a hot spot for theoretical groups?

NK: It is a big group, yes, especially now, it's quite a big group. Actually, there is a very famous physicist who retired the year I went there, and that's Peter [Ware] Higgs who is famous for the Higgs boson which is named after him.

TS: That was mentioned in your curriculum vitae as one of your research interests—Higgs physics.

NK: Yes, I was lucky enough to have met all these giants. Peter Higgs actually retired as I moved in, and actually I shared his office. So, basically, I moved into his office and I was sharing with him although he would show up only sometimes late at night to pick up his mail because he had retired.

TS: Did you get to talk to him very much?

NK: I talked to him a little bit. What is amazing about this is not only that I work in that field, but Higgs actually turns out to be my academic grandfather. He is the Ph.D. advisor of my Ph.D. advisor. He's the Ph.D. advisor of Jack Smith. So that was quite amazing to meet my academic grandpa, so to speak. In fact, at the time the American Physical Society had some kind of contest to trace your academic lineage, to trace your roots. So another student of Jack Smith, Brian [W.] Harris, and I got involved in this. We wanted to trace our roots. So actually talking to Peter Higgs was very helpful because he told me who his Ph.D. advisor was. Then we used the English *Who's Who* to trace, and then I talked to his advisor. I called up his advisor on the phone, quite an old man, and he talked to me. We managed to trace our lineage back all the way to James Clerk Maxwell, who was one of the giants of physics. It was quite amazing going through that history. So we did our little history project there. And it even got published in the *APS News*.

TS: Is that right? Different types of genealogy.

NK: Exactly.

TS: That's an important type.

NK: That was quite nice. And Edinburgh is a very beautiful city, so we had a good time there.

TS: It's cold though, isn't it?

NK: Cold, yes, but not too bad.

TS: Of course, you had been in Stony Brook.

NK: Exactly. Stony Brook, actually, is more brutal in the winters—the snow, and the wind chill would go down to minus forty some days.

TS: What part of New York is Stony Brook?

NK: Stony Brook is on Long Island. It's about sixty miles east of New York City. The first year I visited the city often with a friend, Peter Pfeifenschneider, who was a physicist also. We were in the same year at Stony Brook. He was an experimental particle physicist, and we became best friends. We would go to the city every weekend the first year. Then after the first year he moved back to Germany. Then I stopped going that often to the city also. It got to be very expensive. New York City is very expensive even to visit for a day.

TS: You probably didn't have that much time anyway.

NK: No, exactly. So I left Edinburgh in '98 and I moved back again to the U.S. I did a lot of going back and forth between the U.S. and UK. I must have some sort of record for someone who is neither an American citizen nor a UK citizen. So I went back to the U.S. in '98. I had a post-doc at Florida State University.

TS: How did that come about?

NK: My post-doc advisor, Jeff Owens [Joseph Francis Owens, III], was in the same collaboration as my Ph.D. advisor, so he knew about me. So we had things in common. I applied there, and I got the position. I must say that particle physics is extremely competitive. What traditionally happens is you apply to like a hundred places and hope you'll get one or two offers. When you get an offer, you don't really argue.

TS: It's competitive because so many people want to study it and it's overcrowded in the field?

NK: I wouldn't say that it's so many people because we're a very small number of physicists in the world, but the positions are even fewer. So, yes, the number of positions relative to the pool of applicants is very small. So it gets very competitive. Although the pool of

applicants in absolute terms is also very small. Physics overall is a very small pool. As you can see, not many people major in physics here. Especially at the Ph.D. level in a specific field it is very few.

TS: A lot of people are concerned about that in America—so few Americans go into the hard sciences.

NK: Exactly. And I'm one of these people who are very concerned. It's really a big concern. I don't know why physics in the U.S. has this reputation of being so insurmountable. It's not so in other countries. Physics, overall, universally is considered a hard subject. And it's true that physics is not easy. But the attitude here is not the same as elsewhere. Elsewhere people will go into physics because it is hard. You want the challenge or it's very interesting. You don't shy away from it. It's stimulating and it's rewarding. For example, in Greece, as many people go into physics as go into chemistry or biology, for example. Here, their numbers are like one to 100.

TS: Well, everybody goes into biology supposedly because the math isn't as demanding.

NK: Exactly. And that's the problem that people are afraid of math. You hear this common saying that people would never admit, for example, that they cannot read, but they do not have a problem saying "I cannot balance my checkbook." Like, it's okay not to be able to do simple arithmetic. Nobody would say that in Greece. They would be ashamed to say something like this. There's a tradition in the U.S. that it's okay not to be good at math, but you wouldn't admit that you cannot read or write. Right? It's okay for some reason. I think that's part of the problem, the attitude. That's sad, I think.

TS: It is sad. I actually always did better on the aptitude tests in math than I did on the verbal part. But I guess I got attracted into history.

NK: There's nothing wrong with that. There's nothing wrong with being attracted to anything as long as you have the basic knowledge at the high school level of everything you are taught.

TS: Unfortunately my math ended after two calculus classes. I did very well….

NK: That's probably more than most people.

TS: But that was it in college was two calculus classes, and then I was on to other things. I can see how you can get excited about something like this. It is a concern in America; something about the culture, I think, that needs to be changed to get people interested in math and science.

NK: And the other reason is that America is so advanced technologically. It's at the forefront. It's almost counterintuitive that people are not more into it. How can a country keep being at the forefront if its citizens . . .

TS: Exactly. With the computer revolution and Silicon Valley and all of that, that's a good part of the wealth of the country today.

NK: Exactly. And it has been common to actually try to attract foreigners. But that eventually will also stop. As other countries increase their economic status probably attracting people will be harder and harder.

TS: Sure. Absolutely. I used Thomas L. Friedman's *The World is Flat* in my survey class last spring. They actually ate it up. I don't know whether any of them will become science or math majors, but they really liked that book, and I do too. He basically warns the same thing that the rest of the world is catching up, and what's going on in India and China and places like that.

NK: Exactly. As they develop they will be able to keep more of their scientists.

TS: Okay. So you go to Florida State.

NK: Yes. I stayed there three years, and then in 2001 I got a temporary position for one year as a visiting assistant professor of physics at Southern Methodist University in Dallas, Texas.

TS: At Florida State, this is a post-doc?

NK: Yes, research associate.

TS: So you weren't teaching?

NK: No, I wasn't teaching.

TS: So you are working on research. But Southern Methodist . . . ?

NK: I was still doing research, but I was hired to also teach. That was my first real teaching job beyond being just a teaching assistant and so on.

TS: You didn't teach any courses at Stony Brook?

NK: No, just teaching assistant, but not to lecture classes. But then at Southern Methodist University, I taught two courses the first semester and then one course the second semester. That was an experience in teaching. That was basically eight or nine months. Then we moved for three months to University of Rochester for the summer of 2002.

TS: You say "we" moved.

NK: My family. I was married in 1995 a few months before I got my Ph.D. to my wife Natalya Myasnikova; she's Russian.

TS: Was she majoring in physics also?

NK: No, but I met her actually in Russia when I was at a physics school there.

TS: Well, we left that out of the story.

NK: Yes, we can go back. In late February of 1995 I went to a physics school, basically a two-week conference for graduate students. In fact, I wasn't planning to go. Brian Harris was planning to go, but then he wasn't able in the end. Something happened, so he asked me to take his place. I said, sure. It was totally unexpected. So I went there. Gatchina is a town about twenty-five kilometers south-southwest of St. Petersburg. It was really impressive for me. St. Petersburg has all these museums, the Hermitage Museum. It's really amazing and a totally different world. It's still recovering from the end of the Cold War. Russia has changed a lot during the last thirteen years that I've been going back. It was a very new experience for me.

TS: Ninety-five is four years after the fall of the Soviet Union, so not long at all.

NK: Exactly. We met there—she's from Gatchina—in March '95. We kept corresponding. Then in the summer of that year I went back to visit her, and she visited me in Greece because I was visiting Greece almost every summer. She met my family there, and then we agreed to get married. In December of '95 we got married, so we married within the year.

TS: How did you meet her?

NK: I went out with people from the school. She was out with friends in a café, and we just started talking, and we clicked. That's how we met. We got married in December '95, and I brought her to Stony Brook in January 1996 for my last few months as a student. She was in New York State for a few months, and then we moved to Edinburgh in the fall of '96. Then we became more of us in 2000 when we had twin boys. My wife gave birth to twin boys in October of 2000 while we were at Florida State University. They were born in Tallahassee, Florida, so they are U.S. citizens by birth. But they also have Greek citizenship and Russian, so they can actually have three passports. They have an American passport, a Greek passport and they are written in their mother's passport.

TS: What are their names?

NK: Dorian.

TS: That's an English name.

NK: It's an English name, but it has Greek roots. The Dorians. You know, the ancient Greek groups the Dorians and the Ionians and Aeolians.

TS: Oh, of course.

NK: So it's really an anglicized Greek name, although it's not actually used in Greece as a first name, but it's a Greek name in the sense that it's [an ancient Greek tribe]. The other son is Dimitrios. They were born in 2000, so by the time we moved to Southern Methodist there were four of us. We moved in 2001. Then we left SMU in May of 2002. Then we spent the summer of 2002 at the University of Rochester. I had also been offered a post-doctoral position there, but we were unable to accept because I had to renew my Greek passport, and there were some complications because of having to serve in the Greek military. Eventually, I didn't serve. The law changed, and I actually got a deferment as an outstanding scientist. The Greek Ministry of Defense said that I didn't have to serve for at least two years. Then eventually the law changed, and I don't have to serve at all because if you live abroad for a certain number of years you don't have to serve.

TS: You're getting pretty old for the military by that time anyway.

NK: I'm thirty-nine now. Officially, you still have to serve until you're forty-five. But the law changed recently. Because I live abroad I don't have to serve unless I go back to live there. Anyway I wasn't able to accept the Rochester post-doctoral offer, but I still went there for just the summer. Then after that I went to Cambridge again. I was there as a student back in '90 to '91. In 2002 I went to Cambridge, but now I went to the Cavendish Laboratory. Remember, I told you before that there is the Department of Applied Mathematics and Theoretical Physics, but there is also the Cavendish Laboratory, which is mostly experimentalist, but there is also a theoretical group, it turns out, as well. I didn't know it really before. This group is actually more interested in the exact kind of physics that I do rather than the other group. So I had a post-doctoral position there. This was actually quite prestigious because I was actually funded for that by the European Union. Before going there I applied for the Europe-wide competitive grant called the Marie Curie Fellowship, so I was a Marie Curie Fellow at the University of Cambridge. I actually brought money; basically it was a grant. I was there as a Marie Curie Fellow at the Cavendish Laboratory, which is the Department of Physics, basically, at the University of Cambridge. The supervisor there was Bryan [R.] Webber. The group was small but distinguished. I did all the work there, research; I was very productive. At the time there were many other good post-docs, so it was nice.

TS: Post-docs are not something you can do forever though, are they?

NK: No, unfortunately not. Unfortunately, it's something that's a bit stressful, especially when you have a family, that you have to worry every two or three years about extending it or finding a new position or being totally shut out of the market. It is exciting in the way that you can focus on your research, and you don't have any service requirements or teaching and so on, but it is stressful in the sense that you have to eventually find a job.

TS: You don't get tenure in a post-doc.

NK: Exactly. You don't get tenure as a post-doc. I know there are some research positions, permanent ones, but these are usually soft money. They depend on grants, so if you lose the money, you lose the position. It was a wonderful two years there. My wife loved Cambridge. My kids loved it, again, for the reasons I loved it while I was a student—very historic, beautiful buildings. She likes also the lifestyle.

TS: So your kids by the time they were three or four years old had been in Florida, New York, Cambridge….

NK … Texas and England. And a good many other places because we visited Greece, we visited Russia.

TS: Citizens of the world.

NK: They've been to other countries as well; ten countries they've visited already. They will be eight next month, October, and already they've been to many U.S. states and many countries around the world.

TS: Are they going to grow up speaking more than one language?

NK: Yes, they are multi-lingual already. In fact, when they were very little, because mostly they were talking to their mother, actually I would say Russian was their first language. And now I'll say it's equally between English and Russian, and then Greek also they speak some although they're not as fluent as in the other two. But whenever we go to Greece they pick it up because they have to talk to their cousins and their grandparents. With me they can get away speaking in English. Even when I talk to them in Greek sometimes they may reply in English. But when they go to Greece they pick it much more. They are actually tri-lingual.

TS: Can you speak Russian?

NK: I can speak some, yes. My wife can actually speak Greek quite well. She learned it visiting; she's been to Greece so many times because almost every year we try to go to both Greece and Russia. Not quite every year, but we try, and we've been many times. I've been to Russia ten times overall, and my wife has been to Greece seventeen times. That helps. Another reason we visit is for the kids because we want them to have a more global perspective. We don't just want them to be Floridians or Georgians or even just Americans; we want them to have a global perspective, especially now. That's also a theme at Kennesaw State—you know, the campaign for the Global Perspective here. So we spent those two wonderful years at Cambridge. After that I had to apply again for tenured positions. I applied to Kennesaw, and got a position here. We moved here in 2004.

TS: Why don't you talk about that a little bit? Kennesaw is not defined primarily as a research institution. What attracted you to Kennesaw?

NK: Well, for one thing it's changing, so although it's not primarily, it is becoming more and more research oriented. Second, when I visited here I liked the people. Before I even applied, why did I decide to apply? For example, I saw that there were strong people in physics here. Ted [Theodore N.] LaRosa is doing astrophysics. He's quite published; there was a string theorist when I came here, although he has left now; he was publishing.

TS: Who was that?

NK: Rolf Schimmrigk. He left a year after I arrived. People were enthusiastic. I saw that you can do research here and you can prosper, especially as a theorist. As an experimentalist it would be more difficult. You need equipment. But as a theorist you can work anywhere. You know, I can work on the beach [laughter]. So for me it doesn't really matter if there are big facilities or not because all basically I need is a computer and my head.

TS: Was Patti [Patricia H.] Reggio still here when you got here?

NK: No, I think she had recently left.

TS: She was in that same boat that she was in an area where we didn't have lab facilities when she started here, but she was doing pretty much everything on the computer that she needed.

NK: Yes. So I applied. And, again, it's so competitive you don't get much choice; if you get an offer . . . . And also since we had lived in Tallahassee we had been to Atlanta before. So when I saw that this place was in Atlanta, I thought that's a place where we can live. It's a big city. It's more cosmopolitan than a small town somewhere. So we can live there.

TS: So you get here in 2004. What was your teaching load?

NK: It was very heavy actually. The first semester it was extremely heavy; I think I probably had the highest load. It was eighteen contact hours. I was teaching two courses that included four lab sessions. The only thing that saved me was that the courses were the same, so I was teaching two courses, but it was the same course.

TS: Is that the basic Introduction to Physics?

NK: Yes, the Physics 1111. But it was a lot of contact hours. It was eighteen contact hours. I had four labs per week, and these labs are supposed to be three hours each.

TS: How many were in the lecture sections?

NK: Forty-eight students.

TS: So you had twenty-four in each of the labs.

NK: Exactly. So a total of ninety-six—forty-eight in one class, forty-eight in the other class, and each class broke up into two lab sections. I started with that, but still I managed to publish in the very beginning. I went to conferences in the very beginning. I didn't use the teaching load as an excuse. It was very hard, but I thought that I cannot let that stop me. The next semester I went down to fifteen contact hours. It stayed that until I got my grant.

TS: When you go down to fifteen was that one less . . . ?

NK: Lab. I had now two separate courses.

TS: That's still heavy though.

NK: It's still heavy and especially now because it was two totally different courses, so that was different preparations. Then one course had two lab sections and the other had one.

TS: How are our lab facilities for student use?

NK: Well, they're adequate in physics. They're nothing spectacular, but it's an introductory course. You don't need anything spectacular for that. We don't have advanced laboratory courses; for that we would need something more difficult to get, more expensive.

TS: So we're adequate for students and really inadequate for faculty, would you say, as far as lab facilities?

NK: Well, we don't have experimental physicists here. The reason is we don't have labs for them. I know there are labs for biology and chemistry, but there are no labs for physicists.

TS: Aren't there plans on the books to build a new science building or addition to the science building?

NK: Exactly. And one thing we will be discussing is that we would like to have an experimentalist since there will be a possibility of having some lab space in the new science lab building.

TS: Yes. But that's a pretty critical need, isn't it?

NK: It is. Especially, if we want to move on and build a program in physics. We will need to get some experimentalists if we want to progress.

TS: How many people do we have teaching physics?

NK: Well, permanent faculty we have six professors and a couple of part-timers or temporary full-time. But right now we have six permanent faculty. It's a substantial number of physicists; in many universities there are departments with three or four physicists. So already we have a lot of people.

TS: Right. How many would you say there were at Stony Brook?

NK: Stony Brook is a very big, big department; it's probably fifty or sixty. But Stony Brook is one of the biggest physics departments.

TS: So fifty or sixty and we're six in comparison.

NK: Yes, but you're comparing two very different institutions. Most institutions that are not the top twenty, they have small physics departments; they have five or six people. Even Southern Methodist University, which is a doctoral granting research university, I don't think it had more than six or seven, maybe eight, so it wasn't that different.

TS: We're not far behind them.

NK: Exactly, in terms of faculty we're not that far, a little. But I've seen physics departments, especially in undergraduate institutions, with two people or three people.

TS: So we're not the smallest in the world, but if we want to grow we really need that lab space.

NK: Yes. And we need to get a program in physics because right now we don't actually have a program.

TS: We don't have a major in physics?

NK: No, which is really, I think, very sad.

TS: Yes, it is.

NK: We've started this year an MAT, a Master of Arts in Teaching. This is, of course, quote, graduate level.

TS: This is for high school teachers though.

NK: Exactly. The courses are not really what you would call traditional graduate courses. They're probably more like upper undergraduate, but they're at the level necessary for the high school teachers because as a high school teacher you don't need to know research level physics. So it's not traditional graduate courses. But they are now offered, and, hopefully, we'll get students. I think we have one student so far signed up, and we expect five more next year, so then we can start offering something.

TS: Okay, so you're attracted to Kennesaw. Kennesaw was obviously attracted to you. They wanted to give you a job. So you came here knowing that maybe we had a future in research, but you were really coming in on the ground level more or less, would you say?

NK: What do you mean, the ground level?

TS: Well, I mean, in terms of developing a program. I mean, we've been teaching physics for forty years, but in terms of not having a major in physics and that kind of stuff.

NK: That's right. Basically the thing is that there's a promise that this place will change. It's been changing even since I've come here four years now, and it's been changing dramatically.

TS: You've seen changes in four years?

NK: Yes. Just in terms of buildings—even the Convocation Center. I think it was created while I was interviewing.

TS: That was '04, correct?

NK: Yes. Then the . . .

TS: The Social Sciences building.

NK: The Social Sciences, and the building for the sciences will have a lab addition, and so so many new buildings. The place physically has changed.

TS: The Health Sciences building is under construction.

NK: That will be a major one. So there is change. We have a new president; we've got new faculty in physics and new faculty throughout the college, a lot of new faculty, biology and then also chemistry and math.

TS: And you all are together, aren't you, biology and physics?

NK: Right, biology and physics is one department, and it's a very large department.

TS: If you have six you're not too far to where you could break away if you wanted to.

NK: That's right, that's right. It's not really the matter of size. It's the matter of if the administration will support it, the matter of cost. We've always pushed for a program, but some people say that we won't have the requisite number of students because we have Georgia Tech down the road. But we think that as the university grows in terms of enrollment of students and as the university grows in reputation, we should be able to attract students in physics.

TS: I would think. What about Georgia State; what do they have?

NK: They have a program as well. I don't know the number of students they have.

TS: Do they have a graduate program in physics at Georgia State?

NK: I think so. [Ph.D. programs in physics and astronomy]. Also Southern Polytechnic State University has an undergraduate degree. I don't know what the politics of this is at all the levels. I've heard that people don't like competition, but on the other hand, if we're such a big university in terms of enrollment, we're bigger than Georgia Tech and we're certainly bigger than Southern Poly. Our reputation is growing. Certainly in physics, the level of the faculty in terms of research is spectacular. We can go against many top universities. I've published so much since I've been here, and I and other faculty have gotten awards.

TS: Let's talk about your four years at Kennesaw. What courses have you been teaching? You've been doing the basics, 1111 and 1112.

NK: And 2211 and 2212 which is a calculus-based version. They're both Introductory Physics, but there are two versions: one is trigonometry and algebra-based and that's the 1111, 1112 sequence; and then there is the calculus-based sequence, 2211, 2212. I've also taught 3305 which is Modern Physics which talks about special relativity, quantum mechanics, and atomic, nuclear, and particle physics. Then I'm also doing a directed study with students. That's Physics 4400. So I do as a directed study theoretical particle physics. I've managed to get three students so far. I've got my third right now. That involves studying, reading a book, and I talk to them. Then eventually this leads to research. One of them actually did serious research and heavy calculations.

TS: I know you all have done a lot over in the sciences with student research projects, faculty and students working together on a research project.

NK: Yes, I think it's important that a university should offer opportunities for undergraduates. Myself, as an undergraduate of Caltech, I did what was called the SURF Fellowship (Summer Undergraduate Research Fellowship).

TS: Another kind of surf.

NK: Another kind of surf, yes. So there's one kind of surfing and a different kind of surfing. I firmly believe that a university should provide research opportunities, not just for graduate students, but for undergraduates as well. I go out of my way to ask students, to attract them because we don't have a major, so it's actually very difficult. So I actually advertise in my classes. I ask students, "Would you be willing?" So actually I'm very practical, and I go to students and tell them, "Do you want to work with me? Do you want to do this?"

TS: Right. Well, you don't get the run of the mill students anyway because they don't have to take physics.

NK: Well, the science ones do have to take it.

TS: If you major in chemistry you take . . . ?

NK: You have to take physics, yes. And the biology students.

TS: So the biology students are taking the 1111 and the chemistry are taking the 2211.

NK: Not all of them because I think Chemistry has two tracks and some of them take the calculus-based and some of them take the trig-based. Many of the students who actually take the calculus-based want to transfer out to Georgia Tech. Hopefully, as the reputation of Kennesaw increases and as it becomes more and more of a residential school this will change, and we'll be able to give more of these . . .

TS: And once we have a Physics major.

NK: Exactly. I've tried to involve students. Also in 2006 I got my NSF grant—the National Science Foundation.

TS: I was going to ask you when that grant came through.

NK: Yes. I applied for that in the fall of '05 and actually received it in the summer of '06. That was a $100,923 grant from the National Science Foundation and basically covers summer salary, course releases, travel, because I do travel quite heavily. I go to many conferences. I'm invited to many conferences, and still I cannot go to as many as I'm invited. I'm invited to many more than I've been. Still, I go this year probably to five conferences total. I went to three already and I have two more coming up. Not every year is there that many, but I do try to go to keep in touch with people, especially since I'm kind of isolated here. The other good thing is we hired another faculty who is doing particle physics, Phil [Philip J.] Stephens, so I have somebody to talk to which is exciting. We're working together, and we plan to apply for grants together to continue this.

TS: So it sounds like your scholarship hasn't slowed down much since you got to Kennesaw, if at all.

NK: Well, a little bit. I cannot spend as much time, say, as when I was in Cambridge just doing research and no teaching. It slows you down, but I haven't let it slide away. I've kept up with publications. I've published some important papers, peer reviewed, and also conference proceedings and things like that. So I've published quite a few in the last four years.

TS: How would you say you divide your typical week in terms of hours; half teaching, half scholarship?

NK: Something like that.

TS: Or two-thirds, one-third?

NK: Well, it depends on the semester. At the beginning, actually, I probably spent more time teaching, but now I can spend more time on scholarship. The toughest thing when you start is to develop your lectures. And then if it is the same thing over and over, the work goes down, so it's less stressful later on after you get that experience. In fact, my most stressful time was probably not even at Kennesaw with teaching; it was at Southern Methodist University. When I came to Kennesaw actually I could use some of the material because it was the same kind of class. So that's how I survived this eighteen contact hours which was an incredible load. At least I wasn't totally a rookie.

TS: Are you still doing fifteen hours a semester?

NK: No, right now I'm doing nine.

TS: Is the grant paying for some of that?

NK: Yes, the grant is paying for course release, so I'm doing nine. Basically, I have one lecture course that splits into two lab sections. Even one time I had six hours one semester. I managed to get only six. It was one lecture course but it only had one section. I think it was 2212, but the enrollment wasn't high enough. But, yes, nine is the usual now as long as I have the grant. I also know that our department, our college, are trying to make it so that research active faculty will only have nine hours of teaching.

TS: Oh, the track system.

NK: Yes, even if you don't get a grant, that's the plan. We're not there yet.

TS: As long as you take the scholarship track and then you're held to it to produce in scholarship.

NK: Yes, so as long as you produce, yes. We went through this T&P guidelines at the college and department level, and there were various tracks, and it has changed so much. But, yes, basically we're trying to get that. I don't know, it depends on the finances.

TS: Right. The Coles College of Business was the first to do that at Kennesaw, to go to the track system and reduce the teaching load for those that were doing scholarship. I think Health and Human Services has gone that direction too maybe, and so Science & Mathematics has gone that way too, I guess, or thinking about going that way.

NK: Yes. I think there's a purely teaching track, and then there's a teaching and scholarship track. Most faculty, especially the new ones, are supposed to be on the teaching and scholarship track because they are supposed to produce scholarship. The purely teaching one is usually for older faculty who have been out of research for awhile. They're not expected to [produce scholarship]. So they can choose that, but all incoming faculty, I know, since I've been here, are expected to have scholarship.

TS: That seems to be pretty much the case across campus that new faculty are told that scholarship is going to be your second area beyond teaching.

NK: Exactly. And I agree with that. We're a university now. Every university to be called a university should have the faculty do some scholarship. Now the degree of scholarship varies among universities, but I think if you call yourself a university, it's implied that the faculty are involved in scholarship, not just teaching.

TS: But you've been amazingly productive in scholarship.

NK: Yes, I think I'm a little unusual in that compared to other faculty, yes. I'm very research driven. It's true.

TS: It only took you two years here to get one of the Foundation Prizes for scholarship.

NK: Yes, I got the Foundation Prize in 2006.

TS: For your college.

NK: Yes. And then I also got my college's Distinguished Scholarship Award in February '06. It was the 2005 award actually, but I received it in '06. This year [2008] I received both the Foundation Prize and the KSU Foundation Distinguished Scholarship Award.

TS: That ought to give you a little money to spend.

NK: Yes, which I need, given our salaries and given my travel needs and so on. . . I just had a meeting with Bill Hill [CETL Director G. William Hill, IV], and he told me, "Do you think you can spend $10,000 for travel and so on?" And I said, "I'm confident I can manage to spend it on travel and supplies and equipment and so on" [laughter].

TS: Well, with all these conferences you're going to.

NK: Exactly.

TS: I guess in the physics that you're in borders don't mean anything.

NK: No, particle physics is very international to begin with. You collaborate with people across the world. In fact some collaborators I haven't even met.

TS: Well, when you were talking about the worldwide web earlier and it's role with physics, it's a whole lot easier to be in contact with the rest of the world today that it was, say, twenty years ago.

NK: That's right. It's much easier and you can do physics basically anywhere. In our field what's amazing is that all the papers get posted on what's called an archive. It's an electronic repository. You don't have to wait for something to get published to see it, and it's free.

TS: That's the e-print archive.

NK: That's right.

TS: I noticed on your website [http://science.kennesaw.edu/~nkidonak/] that you could click on it.

NK: Exactly, and you don't even need a subscription to a journal because everything goes online before it gets published. I mean, if you want a published version, yes, you have to go to the journal, but you don't really need it, and most people don't even bother with journals. You publish in a journal to get the seal of approval, but you don't wait for the journal to publish the article to read it. You read it before.

TS: Journals will still publish an article after it has appeared online?

NK: Yes.

TS: We had a faculty member in the history department that lost the chance to have a journal article published because somebody had posted a draft on his website before the journal published it.

NK: I think there are some journals in other fields which are strict like that, but in physics we lead the way in that sense. We've really led the way in making things available.

TS: That's great.

NK: It is great.

TS: Why don't you talk about the research that you've been doing to win these awards including the KSU Foundation Distinguished Scholarship Award this year?

NK: Well, I mentioned before that my kind of physics is I study what happens in colliders. In particle accelerators we collide particles: protons with anti-protons at the Fermilab Tevatron; protons with protons at the Large Hadron Collider at CERN, the European laboratory for particle physics in Geneva, Switzerland, at even higher speeds, at even higher energies. So I study, basically, all kinds of particles that get created. So I talked about the top quark, also bottom quarks and charm quarks; then there's direct photon

production—photons that are particles of light; jet production, jets of particles, you know, the quarks give you jets of particles; then W-bosons, these are carriers of the electroweak forces; then Higgs bosons, you name it, everything that is of relevance to the particle colliders, I produced calculations. My calculations actually are very widely used. My calculations for top quark production are the standard used by the CDF and D0 collaborations at the Tevatron. Whenever they get data they plot their data against my theoretical predictions. Also the Tevatron people have used my calculations for jet production and direct photon production. The HERA electron-proton collider at DESY, which is the German electron-synchrotron facility in Hamburg—they've used my calculations for top and bottom quark production. So I've got a lot of citations. I have something like seventy-six papers so far.

TS: Since coming to Kennesaw?

NK: No, over my career. Since coming to Kennesaw it's twenty two.

TS: That's still like getting about five out a year since you've been here.

NK: Yes, an average of five a year.

TS: And with a teaching load that's pretty impressive.

NK: Exactly, it's a large output. But it's not just the number, as I said, it's the impact, because you can write a lot of things that nobody pays attention to. The impact is shown by citations and people using your data. When I applied for these awards, both for the Foundation Prize and for the Distinguished Scholarship Award, it's not just number but it's quality. It's how many citations. I've got more than two thousand citations on my papers, and they're used widely. Other theorists also use my formalism. They write papers and use my formalism. So it's really the impact in science that matters, not just the number.

TS: So you're getting the name of Kennesaw State out there worldwide.

NK: Well, at least in particle physics, Kennesaw was totally unknown. Yes, I could say I put Kennesaw on the map in particle physics. People now know it. Many times they ask me, "What is this? Where is Kennesaw?" I say, "It's in the Atlanta area." They didn't know, but now they know.

TS: That's great. Talk a little bit more about the intellectual life at Kennesaw State. You've got somebody in your department now that you can talk to about some of these things, but in general, what was your impression when you got here, and what's your impression today of the overall intellectual climate at Kennesaw?

NK: Well, most of my interactions are actually with physicists. I have some interaction with biologists, but not really talking about research or anything like that; it's usually more mundane matters. My interactions are mostly Ted LaRosa, Phil Stephens, and we can

have interesting discussions. In general, I noticed a bit of growing pains in the university especially with respect to teaching versus research. I know some of the older faculty don't necessarily like the idea that the university is becoming more research driven. I think I see some resentment from some faculty about people like me publishing so much.

TS: They resent that you publish so much?

NK: That and getting awards, yes, I think there is some resentment. Unfortunately, there is for some people. It's human nature; I understand that. They don't necessarily like that. The new faculty that are coming are more [involved in research], although not as much as they could have been because the selection committees also, you know . . . .

TS: But you picked up on tension between older faculty and newer faculty.

NK: Yes, and not necessarily older and newer because there are some older faculty that are also distinguished in research, so I wouldn't necessarily put it as old versus new. I would say people who are not into research as much and people who are. I know some older faculty who do appreciate very much what I'm doing, but I know some faculty who have never done real scholarship, and I don't think they appreciate it as much.

TS: Ted has been here a fairly lengthy time [since 1994].

NK: Yes, Ted is one of the people in the forefront of research. We have many talks about the [intellectual] climate.

TS: I think that's been part of our history as an institution; we've been evolving ever since we started as a junior college. So new faculty that come in always are, as we've evolved, let's just say they're different from those that were here already, brought different talents to the table than those that were here already.

NK: Although there are some new faculty that are not so much into scholarship either. So, again, I don't really want to totally separate it into old and new—although, of course, there is some preponderance of people just doing teaching among the old faculty, but it's not so clear.

TS: So the difference is how enthused you are about scholarship.

NK: Exactly. And what direction you think the university [should go]. There are some people I know who have actually spoken out that they don't want the university to become more research driven. They think it's actually [a mistake]. I don't agree with them; as I said, a university for me by definition is a place where scholarship is done. It's not a community college anymore. We're not even a four-year college. And actually even some four-year colleges do amazing scholarship. Some of the highest level four-year colleges, you know, the top ten or twenty, they have some pretty nice labs, and they're doing some pretty serious work.

TS: I think part of the issue from those that want to emphasize the teaching aspect is that teaching is going to be sacrificed for scholarship.

NK: Well, I don't really accept that; I don't think it's an either-or situation. For example, I told you about Richard Feynman, the famous Nobel laureate. He liked to teach, and his lectures have become standard [text]books. So I don't believe that if you are into research you cannot be a good teacher. In fact, I think often it goes hand in hand. In fact, I would say the opposite; you can't really be a good teacher if you're not at the top of your game in your science, if you don't know what's going on. And how can you be enthusiastic if you're not enthusiastic about your own science, about research. So I think actually in my letters from the students, the evaluations, many times they say that when I talk especially about modern physics my enthusiasm shows through because I'm really enthusiastic because that's what I work on. I do know there are some people who are doing research and are not good in teaching. I guess that's the kind of people that maybe Kennesaw couldn't have. A very research driven institution could afford to have [such] people because not everybody maybe teaches as much. I guess the difference that we are also into teaching as well is that we cannot afford a person who would only do research and not be good at teaching. But I don't accept that you cannot be good at both. In fact, if you just teach and don't do research, I don't think you can be the best.

TS: Well, I think maybe the key is hold their feet to the fire in both teaching and scholarship, but give them a teaching load that's reasonable so that they've got time to do scholarship.

NK: Exactly, because you cannot have expectations [in scholarship] when you overload people with teaching.

TS: And I think you've pointed the way—go out and get a grant that pays to reduce your teaching load because there's only so much money from the state. So everybody can't have a small teaching load.

NK: Exactly. So it certainly helps to apply and people should. That's another thing, that people don't apply as much as I would like them to. Some people just can't be bothered. I've noticed that, even for awards. I remember in department meetings actually urging my fellow faculty to apply for incentive grants, for example. The university itself pays for those, they are not even external grants. You can apply for incentive grants. I always encourage people to apply for incentive grants, apply for external grants, apply for awards; awards also pay. If you get a Foundation prize, you know, you get money. Now the university is also better at start-up grants for new faculty. I think some time ago there were no start-up grants. When I came in there was a very modest one. I think it was about $6,000. Now, I know our new faculty get substantially more, I think on the order of $20,000 or something like that. So that helps people start up, especially experimentalists.

TS: Start-up a research grant?

NK: Exactly. But even for theorists, computing equipment. I use my money for computers. I know the new theory faculty use their money for very fancy, many computers, and so on. Another thing I think that's important to help people is that I don't think it's good to hire people who've just finished with a Ph.D. I think having a post-doc experience is useful to get you started. One thing that helped me also was that I had a lot of post-doc experience. I had eight years. So I had a program going. I didn't need to start from scratch here. So that's one reason I was able to keep publishing a lot because I was a very experienced researcher already.

TS: You had done a lot of the research before you ever got here.

NK: Exactly. Although I started as an assistant professor here, and I just became an associate this August . . . .

TS: You put in the minimum time to get promoted.

NK: Exactly. I became tenured, so I actually started as a tenured associate professor last month in August. But although I came as an assistant professor four years [ago], my experience was probably higher than some associate professors in terms of research because of this eight years of, basically, being a scientist. And I think we actually say that in our job advertisements in our department that post-doctoral experience is preferred. It's not an absolute requirement, but it's better that you have started something because it's hard enough to start teaching and . . . .

TS: Well, it's the same as asking for experience in teaching to ask for some experience in scholarship.

NK: Exactly. We also seek the person who has taught before. We want somebody who has both done some teaching and done some research—some experience so they don't get totally overwhelmed here because then it's really hard I think for someone.

TS: Yes. I remember years and years ago wondering when I was at the very beginning of my career—everybody wants experience, but how do you get experience unless somebody gives you a job? But post-docs are a way to move from one level to another.

NK: Especially in the sciences. I don't know about history; I don't know how things work in the humanities.

TS: Well, we do have post-docs. One of our faculty members in fact is doing a post-doc this year on a leave of absence, but not like in the sciences I don't think.

NK: Yes. The sciences now, especially in particle physics, I know, two or three post-docs is normal. You are expected to do five or six years or more. Some people do much more even. I know people who did fifteen years and then eventually they became faculty.

TS: Do the post-docs pay a decent salary?

NK: It's decent, but it's not much. Things have changed; I think the pay has improved. When I was in the UK I was paid in pounds, so it's hard to compare, but I remember at Florida State it was around $35,000 to $37,000. That was ten years ago. I think now it's probably better. I've seen numbers like $40,000 to $50,000.

TS: So similar to an assistant professor.

NK: Sort of; a little below. Although I know there are some places that pay spectacularly well and some places that pay spectacularly badly. So it ranges from twenty something thousand to eighty thousand. But I would say the average is probably in the $40,000s now.

TS: What do you see as the future for Kennesaw State?

NK: Kennesaw is growing. It's changing. In terms of numbers, we'll get larger and larger. In terms of reputation we'll get better and better. I think teaching will be the main focus still, but research will be more and more required. In fact, I think now with the new tenure and promotion guidelines, all faculty are supposed to do scholarship.

TS: Some scholarship.

NK: Yes, even if it's scholarship of teaching or service. It doesn't necessarily have to be [basic] research. But I do think that as the university grows and gets more and more reputable that the expectations will keep increasing, and I think that's a good thing because you cannot build a reputation without doing . . .

TS: We're going to do stuff off-campus to build the reputation.

NK: Yes, and I think you need more national recognition to make it as a full professor now. It also depends on the finances of the state and how much they let us grow. For example, it's very indicative what Dr. [Daniel S.] Papp, our president, said. We had actually a reception at Jolley Lodge last year for people who had applied for grants and who had received grants. I went to that reception and Dr. Papp, I think, said it very well that, "We're not a research university, but we want people to do research and to apply for grants." Even the term of research university is not very well defined. I think every university in a way is a research university—that people do research. But, maybe, what he meant by research is the extent of the research, the extent of the funding, the extent of the expectations. What he meant was very extensive, really driven as opposed to Kennesaw, which is sort of half and half.

TS: Well, the Carnegie Foundation used to have these categories of Research I, and everybody wanted to be Research I. So they've gone away from those terms to a wide variety of descriptive categories that have more to do with your size and what types of graduate and undergraduate degrees you offer.

NK: Dr. Papp said, "We're a robust sector of comprehensive universities." So again, these are names, but we're getting graduate programs; we're getting doctorates and Ph.D. programs now. So we are a doctoral institution now.

TS: Yes, that's got to change our culture.

NK: Yes, but as new faculty come in and as scholarship is expected and people do research, things will change somewhat.

TS: So you see Kennesaw as a place that you'd like to stay for a long time?

NK: Yes, if it goes along that track of improvement, yes. It's definitely a place where I can prosper, obviously. I can do my research, and I can do my teaching. It would be better if we had increased presence of physics programs. It depends on how these things will progress.

TS: I guess what they're saying now is that they don't want to duplicate traditional majors that everybody else has got, but if you can do something that's a new wrinkle, so maybe if you have a program in theoretical particle physics at Kennesaw.

NK: Yes, I don't know if that would fly. [laughter] I don't think the market is big enough for that. Of course, I would love that. But, yes, if we can meet some needs. The campus is so much focused on teachers. That's one thing that [we can do.] We even have some physics education faculty who are into that. But we want a more traditional physics major. And eventually maybe even graduate programs. Who knows? We definitely have the expertise and the quality for that. It's just a matter of numbers and politics and things like that and support from administration, Board of Regents, and so on.

TS: Well, what should we have talked about that we haven't?

NK: I don't know. I think I've covered pretty much my whole academic history. We talked about family, so I don't know.

TS: Well, I think I've just about run out of questions.

NK: Okay, I think we pretty much covered everything.

TS: Our tape is just about to run out anyway.

NK: Well, that's a good time to stop then.

TS: I've certainly enjoyed talking to you.

NK: I enjoyed that too. Thank you.

TS: I hope you stay at Kennesaw for a long, long time.

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