

Jim Simons (1938–2024)



Figure 1. Jim Simons.

Background

Mark C. Wilson

James Harris (“Jim”) Simons was a truly exceptional person who had an enormous impact on the US mathematical scene. Receiving distinction for his research in geometry, working as a government codebreaker, heading and building up the Department of Mathematics at SUNY Stony Brook at age 30, and making a substantial influence on geometry and theoretical physics would be enough for most people. However, he had another career with an immensely successful hedge fund based on quantitative trading, becoming the richest mathematician in history. This allowed him to engage in philanthropy at a large scale. The Simons Foundation has supported research in mathemat-

ics and some other STEM fields to the tune of billions of dollars.

It is very difficult to do justice to his varied life in the space available. In this article we present some reminiscences by those who knew and worked with him. For other retrospectives on his life, see [Kan24, Sum24, Bou24]. The extended video interview of Simons by Jeff Cheeger [Che12] is very informative and highly recommended, as are the popular articles and books [Max17, Zuc19].

I have coordinated this article (and give special thanks to David Donoho for his help), and now turn it over to some of the people who really knew Jim.

A Note on Simons’s Research

Jeff Cheeger and H. Blaine Lawson

Jim Simons was one of the foremost geometers in the world. His work on minimal varieties was fundamental. In addition to its impact on mathematics, his work on Chern-Simons invariants became extremely important in physics with well over 100,000 citations on Google Scholar. This work also led to differential characters, the first instance of more general differential cohomology theories which were defined much later by M. Hopkins and I.M. Singer. The above works were cited when Simons was awarded the Veblen Prize in Geometry of the AMS in 1976. The Stony Brook seminar which Simons ran jointly with Nobel Prize-winning physicist Chen-Ning (“Frank”) Yang totally transformed the relations between mathematicians and physicists, leading to extraordinary results in both fields. All of this requires a detailed presentation by both mathematicians and physicists which will have to be done elsewhere; see the forthcoming collection in the *Bulletin of the AMS*.

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Early Life

Richard Lourie

From boyhood on, Jim was both a loner and a leader. The “lonerness” could sometimes take extreme form. One day when I was seven and he nine I came to visit him—we lived close to each other in Brookline, Massachusetts and grew up like brothers. I found him sitting in an armchair, staring off into space. “Jim?” I said but he didn’t reply. “Jim,” I repeated, “Jim.” His large brown eyes were vacant and glassy. I was starting to get worried. Finally, after a minute of me nearly shouting his name, he came back around, saying with a sheepish smile, “Sorry, I was just thinking about something.”

Yet that same strong comfort with solitude—perhaps in part the result of being an only child—was matched by a strong urge to surround himself with people, the more the merrier. He often ended up the leader of any such group, a role to which he displayed an early and natural affinity. Being a leader for Jim meant two things—coming up with the idea and seeing it through. One day he’d be saying to me, “I wonder if we threw CO₂ cartridges in the furnace of my building it’d make a terrific racket that would go ricocheting through the whole heating system,” and the next day we’d be throwing the cartridges into the coal-fired furnace in his apartment building. They did make a terrific racket and for weeks afterward when the grownups discussed why the heating system could have possibly gone so haywire Jim and I would exchange grins we could barely keep from becoming laughter.

Later, in the college years, the winter of 1958 or so, Jim said: “It might be fun to get a few guys together, find a driveway car to the South then ride the rails back to Boston.” That sounded great but proved trickier and more dangerous than expected, especially jumping onto a moving freight car after you’d thrown your knapsack on board. That was something we had to do and all did well. However, once inside the freight car it was only Jim who would sit in an open door, his feet dangling as he smoked and took in the red earth landscape of Virginia. That courage made him the leader and at the same time isolated him.

Jim’s mother Marcia, talented, domineering, ambitious but without outlet for her talents, placed all of her hopes on “my Jimmy” as she called him, causing him more exasperation than inspiration, or at least as much.

But it was probably her father, Peter Kantor, who was the strongest influence in the family. A shoemaker by profession, he had emigrated from Russia in the early 20th

century with only his cobbler’s tools in his pocket. Within a fairly short time, he owned the “Dainty Maid” shoe factory in Haverhill, MA, drove Cadillacs, smoked Cuban cigars, and, unheard-of for a Jew at the time, owned a boat.

Sometimes Jim and I would spend a day working at the shoe factory—Peter had no sons and may have been grooming us to take over. In those days the workers received pay envelopes containing cash. The safe in our grandfather’s office would be stuffed with cash on payday. One day he said to Jim and me, “Boys, put out your arms.” Then he began piling the cash onto our extended arms until it rose to eye level then even beyond. Jim and I stumbled around the office, blinded by cash, inhaling its odd musty smell, laughing in delight at being so rich for a moment. Our grandfather was laughing too, saying again and again, almost like a mantra or incantation, “The money, the money!”

Student

Barbara Bluestein Simons

I met Jim on a blind date in 1958 when I was a 17-year-old Wellesley freshman and at 20 he already was an MIT math graduate student. Our mothers, who were friends when our two families had lived in the same Brookline apartment building (Jim claimed to remember my second birthday party), had fixed us up. On our first date his car ran out of gas—not cool. However, after a few months we bumped into each other and this time very quickly decided to get married, much to the consternation of my parents who correctly thought that at 18 I was too young for marriage. Nonetheless, we became engaged and transferred to Berkeley my sophomore year so that Jim could study with Shiing-Shen Chern. Since Chern was on sabbatical, Jim did his PhD with Bertram Kostant.

We eloped October 1959, and the following September I gave birth to our daughter Liz. The semester after Liz was born, I returned to school while Jim babysat. At the end of our second year at Berkeley he finished his PhD and accepted a Moore instructorship at MIT. The combination of being a young mother and moving away from Berkeley led me to drop out of school, not returning until after our marriage broke up. In the intervening years we had two more wonderful children, Paul and Nat. Eventually, I got my PhD in computer science at Berkeley at age 40 without completing an undergraduate degree.

Barbara Bluestein Simons is retired from IBM Research and is a board chair of Verified Votin.

Richard Lourie is a writer who lives in San Miguel de Allende, Mexico.

I think that Jim, who always had a certain restlessness, felt that a conventional academic career as a mathematician would be boring. So, in 1963 we spent the summer in Bogotá, Colombia, where two MIT undergraduate classmates of his were planning to start a factory manufacturing vinyl asbestos floor tiles. After realizing that he could not help in operations, Jim instead borrowed money from our parents to invest in the company. It turned out to be a good investment and ultimately provided some of the seed money for his later projects. Soon afterward he took a job at IDA (see section below), in part because IDA paid more than university jobs and he wanted to pay off his debts.

Jim's phenomenal success was mingled with sorrow. In 1996 our dear son Paul was killed in an accident. One of the most painful things for me, and I think for Jim as well, was that we never had an opportunity to say goodbye. Tragically, there was more grief to come when Jim and his second wife Marilyn also lost their son Nick in an accident in 2003. As Marilyn describes below, Jim channeled his pain from both losses into something positive.

I learned a lot from Jim, including that rules made by people can be broken, an insight that has proven very helpful in my nonstandard career. He was a loving father, a good man, and a strong proponent of education who always retained a social conscience.

IDA

Lee Neuwirth

At the Institute for Defense Analyses (IDA), Communications Research Division (CRD), which is now the Center for Communications Research-Princeton (CCR-P), Jim Simons worked closely with Len Charlap on an important problem of classic difficulty. He and Len developed an innovative and ingenious technique for attacking the problem. Their method proved applicable to many more problems, and the importance of their work was widely recognized in the community. Jim gave a number of brilliant and exciting lectures on their work. Jim was a wonderful colleague to the CRD staff and was an enthusiastic member of a poker-playing subset of staff members. Games (table stakes) often went all night, and Jim was usually a winner—not always the big winner, but invariably a winner. I remember him being elated when he purchased a new small Buick to commute to his house some five miles

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from work. He did walk that distance one morning when I think his wife needed the car.

Nick Patterson

I first heard of Jim Simons in the early 1970s while working for the British Government as a cryptanalyst, when I became aware of some of his important and elegant classified work. But I first met him in person through a mutual friend, Leonard (Lenny) Baum [the prime force in the development of hidden Markov models]. Lenny and Jim had been colleagues at IDA. I think Jim was always hard driving and ambitious. Richard (Dick) Leibler was director there at the time, and told me the following. IDA had a pension scheme, fairly standard, in which the employees could put in up to 5% of their salary which would be matched by the company. Leibler discovered that Jim was not contributing and on asking why, Jim told him that he was going to be rich and wouldn't need the IDA pension.

Barbara Bluestein Simons

During Jim's time at IDA the Vietnam War became a national issue, generating widespread campus protests. The war also led indirectly to Jim's being fired from IDA. Since we were opposed to the war, we were upset when a supportive article by General Maxwell Taylor, the head of all IDA, was published in the *New York Times Magazine*. In response, Jim composed a letter in which he explained his disagreements with Taylor. He signed the letter "Jim Simons, Permanent Member, IDA." We subsequently learned that the publication of Jim's letter in the *NY Times* News of the Week in Review almost resulted in his being fired by Taylor. So much for being a permanent member.

The branch of IDA where Jim worked was located on the Princeton University campus. At some point after the publication of the letter, there was an anti-Vietnam War student sit-in on the IDA steps. Jim thought the students should have been left alone until they got bored and went home, but the decision was made (in Washington?) to arrest them.

Around the same time Jim informed his local management that as his form of protest he would not do any more classified research until the war was over. They tolerated his stance for a number of reasons. Jim's having produced some very useful research definitely was a factor. And, while fact-checking this article, I learned from former Deputy Director Lee Neuwirth that he and many of Jim's coworkers agreed with his stance on the war. Furthermore, not only would Jim's dismissal have created a

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negative work environment, but, given management's neutrality regarding a prospective hire's view of the war, his firing would have had a negative impact on hiring.

Later, when a *Newsweek* stringer went to the Princeton campus to interview mathematicians about their opposition to the war, someone told the reporter of Jim's *NYT* letter. During the subsequently interview with the reporter, Jim spoke of his personal protest of not doing classified research. On Friday he mentioned the interview to management. The following Monday he came home early, having just been fired. (*Newsweek* never published any of his comments). We were shocked (we were still quite naïve), but even though we had three young children and little in the way of savings, we were confident that something else would turn up. That "something else," which Jim viewed as an interesting challenge, was an offer to chair the Stony Brook math department. So, at the age of 30 Jim became department chair and I played the role of chairman's wife. A few years after we moved to Stony Brook, we separated and ultimately divorced. But we remained friends.

Professor/Stony Brook

Irwin Kra

Jim Simons and I arrived at Stony Brook around the same day in 1968—he as professor and chair, and I as an (untenured) assistant professor. We quickly became close colleagues and personal friends. He rapidly promoted me and asked me to serve as undergraduate director of mathematics. Thus Jim was directly responsible for the beginning of my path on the road to perdition (that is, becoming a part- or full-time administrator).

During our years at Stony Brook we switched roles several times, with each one reporting to the other at various moments. We started to build the department, and as part of this, Jim convinced James Ax, the most prominent mathematician at Cornell, to move and join us at Stony Brook. Jim was incredibly persuasive when he wanted to be, and managed to do this in spite of the Stony Brook department being new, while Cornell was well established. Bringing Ax to the department was just one of Jim's extraordinary successes. Jim didn't stop there and tried to recruit another Cornell colleague, whose work was closer to my field of interest, but his efforts in this direction were suddenly halted. The Cornell administration complained that the State University at Stony Brook was not established to

"steal colleagues" from a New York sister institution, and we were forced to aim elsewhere.

Our families got to know each other, but we were lucky to have time for just the two of us. We spent many hours working on Jim's first (small) boat, which I had labeled a "putt-putt." The engine needed constant repairs, and I was regularly recruited to help him. My job consisted of handing him tools as he lay under the engine trying to fix it, and usually misadventures on the boat followed. After one repair session, we bought lobsters from a neighboring boat. When I called my wife to invite her to a lobster feast at Jim's house, she exclaimed "Don't you know it's Yom Kippur eve and we do not feast, but fast, and on this day especially we do not eat non-kosher lobsters." The lobsters remained in the refrigerator.

One of our interactions was particularly revealing about his character and friendship. A close personal friend was an incompetent chairman of our department, and Jim asked me to talk to the chair to make the suggestion that he step aside. Even though I thought it was in the best interests of the department, I couldn't act against a friend. However, a few days later I learned that my friend had resigned as chair and Jim was acting chair. After a few more days, Jim came to me with a request: he wanted time to pursue other plans, and asked if would I take over as acting chair. As always, Jim was persuasive and so I agreed. In spite of my asking him multiple times if he had planned the sequence of moves in advance and had engineered the situation, Jim never answered.

After several years at Stony Brook, Jim left the university to pursue activities that led to his fortune and fame beyond the mathematics community. When he was well on his way to becoming a billionaire, I was a dean at Stony Brook and we negotiated his first million-dollar gift to my division in the college. After many attempts to draft a memorandum of understanding, we decided that we trusted and knew each other well enough that we did not need one. Soon enough, however, I needed to use the earnings on the endowment for an activity not included in our discussions. When I called him to inform him about my deviation from plans, he seemed annoyed and asked whether I just called him out of politeness to tell him that I misused the funds. After a few minutes he asked me how I did use them, and I explained that it was a temporary need for funds to bring Dennis Sullivan, a great mathematician, to our campus. His response was "well done."

After that our paths diverged, only to be rejoined years later in our work on behalf of Math for America.

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Figure 2. Jim at the wheel.

Tony Phillips

Jim and I both arrived in Stony Brook in September, 1968. Stony Brook had been very fortunate, as I learned, in choosing him to lead the mathematics department, but it was not an accident. Stony Brook's president John Toll had recently brought on the Nobel Laureate Chen-Ning Yang and set the Physics Department on the map, part of New York Governor Nelson Rockefeller's plan to make Stony Brook "the Berkeley of the East." Mathematics was another area ready for development. In my reconstruction, Toll asked Yang for guidance, and Yang turned to the best mathematician he knew, Shiing-Shen Chern. Jim had been a graduate student at Berkeley, in Chern's department. Chern in his later years reminisced about how impressed he had been by Jim's enterprise and mathematical talent; I am pretty sure that Chern's recommendation brought Jim to be Chair at Stony Brook.

It should be noted that Jim did not land in a mathematical vacuum. The outgoing Stony Brook Math Chair, William Barcus, a former Rhodes Scholar with a Princeton PhD, had high standards and had kept the permanent faculty small and of very good quality; there was a solid base on which to build on outstanding department.

Jim started with the area he knew the best, differential geometry. He had known Jeff Cheeger since Jeff took a course from him at Harvard, and then had served as his unofficial thesis advisor when Jeff was at Princeton and Jim was working down the street at IDA. Jeff was interested, but wanted Stony Brook to recruit his collaborator Detlef Gromoll as well; Gromoll would not come without his collaborator Wolfgang Meyer. So Stony Brook

became a world center in differential geometry almost overnight. Jim also built up operator theory—Joel Pincus, on the original faculty, was joined by Ron Douglas; representation theory—Howard Garland and Roger Howe; algebra—Han Sah and Michio Kuga; analysis—Bill Helton and Stan Osher; complex analysis—Irwin Kra and Bernard Maskit, with Denny Hill in several complex variables; and topology—Jim brought in Len Charlap and Lowell Jones. All these appointments in such a short time meant a crowded schedule of visits, seminars, after-seminar dinners and after-dinner parties. The parties often had "non-trivial dancing" (as one guest put it) and more—this was the tail end of the sixties, after all.

Let me recount a couple of episodes I was involved in that exemplify, for me, the kind of leader Jim was. The first involves the Math Library. In those days having a well-managed mathematics library close at hand was essential for a research-oriented department. In fact Jim had me engage Agnes Kenny, the math librarian at Princeton, to come up and evaluate our library's holdings (they passed inspection). But when construction of the new "Math Tower" began, and we were scheduled to move to South Campus, it looked like the Stony Brook Main Library was going to realize its nefarious dream (at least as we saw it) of moving all the math books and journals to a secure location deep in its central campus headquarters; so instead of being right down the hall, they would be a couple of blocks away. As I understood it, they were fairly adamant. But Jim went ahead and outfitted a South Campus space with the appropriate number of shelves and desks and, one evening, hired a truck, corralled a bunch of graduate students, and we physically moved the books ourselves.

The other one was a few years later. When I was on an inter-academy exchange visit to the Soviet Union, in Spring 1969, I had met Mikhail Gromov (then still a graduate student) and had realized that this was a uniquely powerful mathematician. We had common mathematical interests and stayed in touch, although communication in those days was quite difficult. Misha himself was keeping a low profile and was relatively unknown in the West. After a while (two or three years) the message was relayed to me that he was planning to leave the Soviet Union. I took the news to Jim, with the idea that we might bring him to our department. There was no investigation, no hiring committee meeting, no consultation with the Dean: Jim just told me, immediately, to go ahead. I was able to write Misha that if he made it out, there was a place for him at Stony Brook. A year later, there he was.

Tony Phillips is a professor emeritus of mathematics at Stony Brook University.

Shing-Tung Yau

A few weeks ago, I received the shocking news that Jim Simons had passed away. Although I knew that his health was not in the best shape, it was still a surprise because all my memories of him are of a dynamic man looking to the future and full of energy.

He was always fond of my teacher, Professor Shiing-Shen Chern. During 1970, he came to Berkeley to work with Chern on their groundbreaking paper on the Chern-Simons invariant. He gave a beautiful talk which clarified many of my questions on that topic. Although I saw him talking with Chern extensively, I did not have chance to meet him. On the other hand, I learned from Blaine Lawson later that he told Chern that I should come to Stony Brook after I graduated from Berkeley. In those years, under the leadership of Jim Simons, Stony Brook succeeded in recruiting a large number of outstanding geometers. This included Detlef Gromoll and Jeff Cheeger. They were also on the process of hiring Blaine Lawson. Lawson told me the story of how Jim Simons recruited Gromoll. Berkeley was making an offer to Gromoll, but Gromoll had difficulty in getting a green card. Jim Simons was very resourceful. He called a congressman to help. He said that Detlef Gromoll works in the subject of differential geometry. It is a key component of general relativity. Moreover, general relativity is important for making the atomic bomb. Therefore, it is important to retain Gromoll in America. While the reasoning stretched things a bit too far, it worked, as Gromoll stayed in Stony Brook.

Half a year later, Chern decided that the paper that I wrote on the fundamental group of compact manifolds with nonpositive curvature was good enough to be my thesis. He told me that I should graduate. I was taken by surprise. I thought that paper was not really my true research direction, although it solved a conjecture of Joe Wolf. After thinking about Chern's proposal for a day, I decided to take his offer. An immediate concern was that since I would not be a student, I would have to find a way to stay in America if I wanted to continue to do research. My visa was F-1 and needed to be changed after one year of practical training. Chern thought that I should go to the East Coast to experience some of the great universities there. So I visited Stony Brook in February 1971. It was quite an experience. I met most of the distinguished young mathematicians at Stony Brook. Apparently Jim did not know the purpose of Chern in sending me to Stony Brook before I graduated. But he treated me nicely. He asked me to give a colloquium and invited me for dinner. Then he men-

tioned that he could solve my visa problem. The enthusiasm of young faculty members in the math department of Stony Brook impressed me. I started to be fond of the department.

By the time I came back to Berkeley, I decided to go to the Institute for Advanced Study (IAS) in Princeton to be a postdoctoral fellow starting in the fall semester of 1971. It was a pleasant and rewarding year. But by the end of the fall semester of that year, I needed to decide what to do next. IAS offered me a chance to continue for one more year. But I was worrying about my visa problem. It could be serious, so I decided to go to Stony Brook as assistant professor. I rented a studio near a department store. I taught classes and went with a group of young faculty to Port Jefferson for lunch frequently. This group included Howard Garland, Roger Howe, Detlef Gromoll, David Ebin, Irwin Kra, Bernard Maskit, Stanley Osher, Bill Helton, Michio Kuga, Ron Douglas, and others. There were no serious offices at that time. All of us were close together in a wooden building where we discussed math all the time.

I developed geometric analysis during this period. It was great to see Jim often. He was hoping to prove the Poincaré conjecture via the Chern-Simons functional. Jeff Cheeger often worked with him on differential characters. Overall, it was a young and dynamic department. Under the leadership of Jim Simons, the young faculty members were ambitious and wanted to build a first-class department. I still remember the scene in the big wooden department building with only one floor, where Jim was strolling around, thinking about mathematics. I asked him what he was thinking about. He smiled and said that the problem is simple: "I am trying to prove that for a three-dimensional manifold where all closed loops can be shrunk to a point, then the manifold must be a sphere." Of course, I realized that he was working on the Poincaré conjecture.

When I was offered a position as a tenured associate professor in Stanford in 1974, Stony Brook refused to match the offer. It showed how highly people at Stony Brook thought of themselves. The department had come a long way under Jim's leadership.

After I left Stony Brook, I unfortunately did not see Jim much. I remained in contact with him for a while, especially during the time when I was chairman of the math department at Harvard University. I remembered an interesting discussion with him on the phone around 1995. I asked him how does a person spend his money after earning 50 million dollars. To my surprise, he could not give a simple answer. I was chairman of the Harvard math department from 2008 to 2011. There was very bad financial crisis in 2008. The Simons Foundation made a noble

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move to fund 67 postdoctoral fellows all over the country. The Harvard math department got one such postdoctoral fellow. It helped me, and the department, a great deal as I was able to appoint one PhD from Berkeley who we wanted to hire.

About three years ago, I was involved in a project on the mathematics of string theory. I gave a talk in a panel discussion in the Simons Center. To my surprise, Jim showed great interest in my talk and wrote to me about his thought on the math that I mentioned. He sent me by email his handwritten notes, which were about twenty pages long. The notes were full of wisdom despite the fact that he had not worked on mathematics for about 40 years. I really admired his intrinsic love of mathematics and the ways he supported our field so generously and for so long.

John Millson

In 1971 I had been a graduate student at the University of California, Berkeley for three years but I did not yet have a thesis adviser. I had been making computations without any guidance. Some of those computations involved a family of spaces called lens spaces. I showed them to a small number of UC Berkeley faculty members including Blaine Lawson. One day Blaine called me and told me “Jim Simons is visiting and he wants to meet with you.” I met Jim that day and he explained to me he wanted to compute Chern-Simons invariants for lens spaces and told me some ideas he had for the computation. Using what I had learned about lens spaces in the previous three years, I made the computation which became my PhD thesis (after some further generalization). This computation was the starting point of my career. I wrote over ninety research papers and gave an invited address at the International Congress of Mathematicians at Kyoto in 1990.

During the course of my career Jim helped me in many ways. I became an assistant professor at Yale and then I learned that the US Immigration Service was going to send me back to Canada (I was a Canadian citizen) even though I had two more years left on my Yale job. The US Immigration Service ignored all letters on my behalf from my colleagues and former professors. But Jim got the foreign secretary of the National Academy of Sciences to write them a letter saying that “it is not in the national interest to deport John Millson” and they let me stay. Of course this was an exaggeration but nothing less than that would have convinced the US Immigration Service to let me stay. It was critical that this letter had come from a member of the US government and not from an academic.

John Millson is a professor emeritus of mathematics at the University of Maryland.

Scott Sutherland

In 1968, SUNY Stony Brook President John Toll hired James Simons as chairman of the Mathematics Department with a charge to “build a strong math department,” complementing the already well-respected Physics department. During the years he spent in the department, Jim recruited several stellar mathematicians and Stony Brook became especially well-known in the areas of geometry, topology, complex analysis, and their interrelations with theoretical physics. Jim’s own mathematical results (Chern-Simons theory, differential characters, etc.) contributed substantially to this growth.

Jim had been investing in financial markets since shortly after arriving at Stony Brook. In 1978, he left the department to devote his full attention to investments and in 1982 founded Renaissance Technologies, which quickly became wildly successful. Simons hired a large number of mathematicians and physicists to work on investment strategies.

But even after leaving, Jim didn’t forget about mathematics, physics, and Stony Brook. In the early 1990s, he began with creating the Simons Lecture Series in Mathematics, which brings notable mathematicians to Stony Brook to give a multiday sequence of lectures. As an example of its impact, Grigory Perelman’s first public lectures on his proof of Thurston’s geometrization conjecture (and hence the Poincaré conjecture) were part of this series. A few years later, Jim funded the Simons Postdoctoral Instructors in Mathematics, infusing a regular stream of young mathematicians into the department and complementing the postdocs in the recently established Institute for Mathematical Sciences. In the mid-2000s SUNY was struggling financially and Stony Brook faced serious budget cuts—Jim responded by creating an operating fund to ensure the continued stability and excellence of the departments of Mathematics and Physics, as well as the the Yang Institute for Theoretical Physics and the Institute for Mathematical Sciences. He shrewdly structured this gift to ensure that it would continue to augment rather than replace existing university support. Jim’s generosity only grew from there, with further donations funding graduate students, visitors, and other activities. Throughout his lifetime, Jim remained a valued advisor and friend of the department.

Jim played no small role in founding the annual Simons Summer Workshops in Physics and Mathematics in 2003, which laid the groundwork for the Simons Center for Geometry and Physics (SCGP), inaugurated in 2007 with a gift from Jim and Marilyn Simons. The SCGP is now a major

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host for workshops in mathematics and physics. After his retirement from Renaissance Jim returned to doing mathematics, coauthoring five papers with Dennis Sullivan between 2007 and 2018.

The Simons family and Foundation have been extremely generous to Stony Brook University over the years, with generous donations to the School of Medicine, Brookhaven National Labs, the Simons STEM Scholars Program, and many other efforts, culminating in a \$500 million gift to Stony Brook's endowment in 2023.

Certainly Jim Simons more than fulfilled his original charge to strengthen mathematics at Stony Brook: the department currently boasts mathematicians who have received every major prize in mathematics and is now widely respected as a leader in several areas. His impact on mathematics and science, not only at Stony Brook but also worldwide, cannot be overestimated.

Renaissance Technologies

Peter Brown, Henry Laufer, and Bob Mercer

To Jim Simons, life was one long great adventure. He was equipped with a tremendously curious mind and a desire to understand everything. He was a brilliant mathematician, but often said he preferred doing math to studying math. Similarly, he wanted to understand the financial markets by investing in them. So, in graduate school at Berkeley, he began trading stocks. Soon he found that stock prices did not move enough to provide him with the "action" (as he put it) that he craved. So, following the advice of a colleague, he turned to soybean futures, which at the time were extremely volatile and provided him with all the action he could tolerate. Between the profits that he made trading soybean futures and his winnings from late-night poker games, he managed to finance his education in mathematics.

After receiving his PhD from Berkeley, he taught mathematics at MIT and at Harvard for a few years, and then went off to IDA, where he met fellow mathematician Lenny Baum. Jim greatly admired Lenny's ability to wring mathematical structure out of raw data. Jim soon asked himself, "What better data to sic Lenny's prodigious mind on than financial data?" So, using the nest egg he had cobbled together from his trading and from the investments he had

made with his college roommates in South America, Jim hired Lenny to dope out the markets. After months in seclusion studying market behavior, Lenny emerged and said to Jim, "Screw the math, let's buy pounds." This was not exactly what Jim had in mind when he hired Lenny, but Jim could not resist the prospect of adventure, and so he and Lenny began a successful macro-economic trading career.

As all traders do, Jim had a love-hate relationship with volatility: on the one hand, he loved the action that volatility courted; on the other hand, he hated the sleepless nights spent worrying about the enormous risks that he and Lenny were taking. So, Jim decided to migrate from human-based trading to computer-based trading. As he put it, "When you have a large intuitively based position in the Japanese yen against the United States dollar, you wake up each morning and agonize about whether or not to reduce your position. But when you trade quantitatively, you have an easy morning question: 'Should we turn the computer off?'"

For every moment that the financial markets are open, they determine for each of the many thousands of instruments that are traded on them the price at which a small position in that instrument can be acquired and also the (somewhat lower) price at which the same size position in that instrument can be liquidated. According to the widely revered efficient market hypothesis, the prices available in the financial markets reflect all currently knowable information about the price of each instrument and therefore it is not possible to trade with reliable profitability. Jim, however, did not buy it. He was convinced that it was possible to formulate a mathematical model of market behavior with sufficient accuracy to allow for profitable trading by computers. And thus, Renaissance was born and grew into a home for us and so many others who Jim hired to build mathematically based trading systems. With AI and quantitative trading so much in the news these days, hiring mathematicians, physicists, and computer scientists to construct trading systems may seem quite natural. But recall that this was nearly forty years ago, a time when very few people imagined that trading could be understood as a problem in data science.

Everything about working at Renaissance was an adventure. Socially, the company was designed to be one big happy family in which everyone worked together and played together. There were company ski trips, beach weekends, bike races (who could ride most slowly without falling off), boat trips, and dinners. We all worked on the same problems, we were all paid from the same pot, and we were all invested in the same funds.

Jim pushed us forward incessantly because he craved the intensity, the competition, the action, and the adventure.

Peter Brown is CEO of Renaissance Technologies.

Henry Laufer is a retired chief scientist at Renaissance Technologies.

Bob Mercer is a former co-CEO at Renaissance Technologies.

One might normally expect the workers at a company to push to get their work into production, and the management to enforce prudence in making sure all the i's are dotted, and all the t's are crossed. But not at Renaissance. As Jim once put it "Patience is not one of my virtues." Jim had tremendous faith in science and in his employees. He felt we were onto something and just could not wait to put it into production. When we developed a trading system and showed Jim our simulations, his immediate response was always, "OK, so when are you going to turn it on?"

When we were coding up the equities system, two of us got our first glimpse at how hard Jim pushes people. We were nearly finished writing the thing when Jim called one Monday to say that he wanted us to go live the next day. We told him that we needed two more weeks to shake out all the bugs. He said, "OK, you can have two more days." So we worked day and night and, on no sleep, began trading live on Wednesday, November 16, 1994. It was clear to us at that point that working for Jim was going to be very different from working for our previous managers at IBM.

Then there was the Caxton Threat that loomed over us. For a time, a while back, whenever Bruce Kovner's Caxton Fund had a better month than Medallion, we would get a call from a very agitated Jim. "Did you see Kovner's latest returns? You've got to work harder. I simply will not allow that man to beat me at this game. You just have to get the employees to work harder. Do whatever it takes. Bye." After one of these calls, we said to him, "Jim, are you nuts? Who cares about Bruce Kovner?" "What?" he replied, "Am I not allowed to have a rival?"

It was always clear that Jim's incredible drive stemmed from his boundless faith in people and in what they can accomplish when they work together. He treated us all as if we were a part of his extended family. He took great pride in hiring the best scientists he could find and invested heavily in infrastructure to provide his employees with the best tools that money could buy.

We watched Jim make many decisions over the years, and he was always guided by the principle that if we treat people well, they will treat us well. For example, at one point, some firms were trying to steal some of our employees. We went to Jim and asked for advice on how to handle this. His answer was, "If you want them to stay, just pay them more." One night, we took his advice to heart. A couple of us were working late, and we needed an answer to a question to which some other employee knew the answer. But it was around 1:00 a.m., and that employee was surely asleep. We asked ourselves, "What would Jim do?" And immediately we realized exactly what Jim would advise. So we phoned the employee, waking him up, told him we're giving him a raise, and then we asked him our question.

Jim was also enthusiastically optimistic. For example, the first day we traded more than a million shares, Jim came in to say, "OK, now that you've got the thing running, we need to crank it up. I don't see why we shouldn't be 20% of the market. So, get working on that." At the time, we thought he was completely insane, but today more than half of all trading is carried out by computers. Then a few years later Jim called to say, "I've been plotting future projections for Renaissance profits. Volumes keep growing, we keep finding new markets, and our systems keep getting better. The way I see it, we should be able to grow at 15% per year, and there's just nothing that's going to stop us." After we reminded him that the planet is finite, he accused us of being pessimists.

We could never match Jim's optimistic faith in his colleagues and in the systems they constructed. Nonetheless, Jim always treated us well and always helped each of his employees become a better person. For example, we lost a tremendous amount of money when the dot-com bubble burst in March 2000. After we got through that, we realized we had screwed up in not appreciating the risks we were taking. One of us even offered to resign. But Jim's reaction was, "Oh no, now that you have been through such a stressful losing period, you are far more valuable to me and to the company than you were before."

The first time we saw Jim really scared was during another difficult period: the August 2007 "quant quake." He was holed up in one of our offices with a 16-oz cup full of cigarette butts, and he wanted to cut back hard. But after looking at the forecasts, we argued strongly against any cutback. It was very tense, but we eventually got through it. A couple of years later when Jim was about to retire, we reminded him of this period, and asked if he wasn't concerned that we were going to be too aggressive and blow the place up. Jim said that the only reason we took such an aggressive posture was that we knew he was going to cut back no matter what we advised. He was, of course, right about that. It was yet another example of Jim's keen insight into human nature.

During the past thirty years, we went through a lot together. Right after a plane crashed into the north World Trade Center tower on 9/11, Jim was the first person we called. He had not yet heard the news, but the first thing he asked was, "Are they evacuating the south tower?" How could he have known? Later that night, a couple of us couldn't get home to our families, so we ate dinner at Jim's home and watched the news coverage, and then we talked late into the night. It was a pretty somber occasion, and at one point, we discussed why we were doing what we do. Jim's response was that "building this company and building a charitable foundation that will result from all the money we're making is like planting a sapling." He

continued, “I take enormous pleasure thinking about the tree that sapling will grow into even long after I’m gone.” If you look around Renaissance, the Simons Foundation, the community of mathematicians, and his vast array of friends and family members, you cannot help but be overcome by how many trees Jim has planted and by how the light from his candle will continue to illuminate the lives of so many of us for decades to come.

Jim was an optimist who saw no bounds on what mankind can accomplish. In retrospect, with such unlimited faith in people and in science, it’s no wonder that Jim named our firm Renaissance. Today, as we walk through the halls of our building and see all the artwork that Jim had selected and that still adorns those halls, we realize that the art is still there, and the company’s still going strong, but with Jim no longer a phone call away, it just feels so overwhelmingly lonely. He was our leader, our mentor, our friend, and a Renaissance man whom we will miss every day for the rest of our lives.

Nick Patterson

Soon after I met him for the first time, Jim called me up and offered me a job. I worked for him for a month in 1992 and then joined his outfit, Renaissance Technologies (Rentec) full-time a year later. Rentec was very small at first. In 1992 they occupied the top floor of a large house in Stony Brook, Long Island. We had, I think, eight employees there and so little space that they moved a desk for me into Jim’s office.

We were (as is now well known) extremely successful. It was obvious that we were likely to be very profitable in the short term, and I always wanted to push hard, not knowing whether the good times would last. But Jim wanted to build a long-term business and not take risks which if they went wrong might put us out of the game. Given Rentec’s success over decades, Jim was of course right about this.

An amusing anecdote, at least in hindsight, is that I was tasked with developing a strategy to trade options. I put up a system that was profitable, but the profits were small. Jim came into my office one day and told me I needed to do better. “There’s a fellow up the road making a fortune trading options—why can’t you?” A few years ago I reminded Jim about this—the fellow up the road was the now notorious fraudster Bernie Madoff—and indeed I couldn’t compete with Bernie’s fake numbers.

Jim always treated his staff exceptionally well. As an example I got seriously ill in 1998, and couldn’t work for six months. I offered to take leave without pay, but Jim insisted on paying me in full.

Why was Jim so successful? He was both a world-class mathematician and a brilliant manager of people, not a



Figure 3. Jim and Marilyn Simons.

common combination. He also tried very hard and successfully to hire the best people he could, give them a really good environment, and then expect good things to happen. First-class people hire first-class people. Second-class people hire third-class people [sometimes called *André Weil’s “logarithmic law of hiring”*—Ed.] No question Jim was first-class, I am privileged to have worked for him, and he changed my life for the better.

Simons Foundation

Marilyn Hawrys Simons

When I met Jim in 1973, he was 35 years old and a mathematician at Stony Brook. Over the course of the next four years, Jim gradually transitioned from pure math to trading in the financial markets. As an economics student, I enjoyed listening to the trials and tribulations of his speculations in currencies and commodities and celebrated his insightful successes. By the time we were married in 1977, Jim was trading full-time, though he still harbored a hankering for the gratification that came from proving a beautiful theorem.

Early in our marriage, well before great wealth came, I was impressed that Jim would not only make charitable contributions to share his successes, but that he also took sincere pleasure in being able to do so. By the early 1980s, charitable giving was part of our annual budget, and we were getting educated by family, friends and various

Marilyn Hawrys Simons is chair of the Board of Trustees at the Simons Foundation.

institutional advancement officers as to the benefits of supporting their favorite causes. Coming from middle-class backgrounds, we actually found this absorbing, inspiring, and helpful. I give a lot of credit to Chuck Vest and Bob Birgeneau, both at MIT then, for opening our minds to the beauty of supporting mathematics and the basic sciences.

As partners in philanthropy, Jim and I shared our epiphanies and evolved our vision over the years. In 1994, I suggested that we start a foundation, envisioning a small family foundation. Jim took me up on that and presented me with documents making me president! By the year 2000, Jim said—out of the blue—as we were discussing a gift request, “We should give to things that we want to give to!” He mentioned being proactive rather than reactive and I thought to myself “He really is very smart.” Soon after, I proposed to Jim that we could give a lot of money to one thing and try to have an impact—and in 2003 we agreed to focus on understanding autism. Later that year, Jim added that, in fact, he wanted the Simons Foundation to only give to mathematics and basic science research. I embraced the idea since I too loved math, and I relished the chance to learn cutting-edge science. We narrowed the focus of the Simons Foundation and drafted our mission statement: to advance the frontiers of research in mathematics and the basic sciences.

When Jim presented our mission to the family, it didn’t quite resonate, so Jim and I focused on developing a professionally run organization. Jim’s brilliance and good taste in finding the best people shone through with his recruitment of Gerry Fischbach to direct our autism research program. As an outstanding neuroscientist, Gerry came with excellent ideas for our research program, set a high bar, built an outstanding team, and directed our grants funding through a peer review process. Seeing what could be done to support research, we turned our sights to expanding our research support in mathematics, and Jim recruited David Eisenbud to direct that program’s funding. From there, the foundation just continued to grow and grow.

Jim’s deep love of scientific research, determination to take on hard problems, probing questions, creative insights, joyful conversations, and quick wit made the work fun. On the business and operations side, Jim amusingly and intelligently, introduced many formulas for our giving. Ranges, step-functions, ratios, tranches gave guidance to our budgetary processes, while exponential growth seemed to dictate our staffing! Add to all that, Jim’s love of cutting-edge lectures, parties, and adventurous trips—and I’m sure you can get a sense of the ingenuity and energy emanating from Jim at the Simons Foundation.

While the Simons Foundation is the largest of our philanthropic endeavors, we started others as well. When Jim’s

oldest son Paul died in a bicycle accident in 1996, Jim felt strongly that we had to make some good come from this tragedy. The Paul Simons Foundation’s Avalon Nature Preserve, a tribute to Paul’s love of nature and his deep affection for his hometown, attracts thousands of visitors each year to explore the indigenous flora of Stony Brook, Long Island. In 2003 our family again confronted profound loss; our son Nick drowned while traveling. Once again, we turned to philanthropy to produce something beneficial through our immense sadness. To honor Nick’s interest in medicine and in developing countries, the Nick Simons Foundation supports health care in remote areas. And while we were building this foundation, Jim also founded Math for America (see below), an organization whose mission is to keep outstanding math teachers in the classroom.

Jim and I have been thanked for our philanthropy many times over the years, but philanthropy has helped us as well—especially during these most difficult periods. Philanthropy has also given us the opportunity to keep up with cutting-edge science and inspired us to keep pushing the limits of human knowledge.

David Eisenbud

The Mathematical Sciences Research Institute (MSRI—now SLMath) was established in 1980 by an NSF competition. I conjecture that Shiing-Shen Chern, the first director, soon went with Elwyn Berlekamp (formerly Jim’s business partner) to their friend and collaborator Jim Simons, already wealthier than most mathematicians, to ask for his support. In any case, Simons became the first private supporter of MSRI, to the tune, I believe, of \$10,000/year, which seemed at the time a great deal. Somewhere between then and 1997, when I became Director, the gifts lapsed, for reasons unknown. By that time Simons was much wealthier, and as he was also famous as a mathematician, I asked him to join the MSRI Board of Trustees, and in 2003 he accepted.

I was aware at the time that this could be important for MSRI’s future—and it was! I didn’t suspect that Jim’s joining would be of such significance in my own life! Jim proved to be a great trustee, and through many conversations I came to appreciate his generosity and charm. Jim and Marilyn established the Simons Foundation in 1994, initially as a family foundation, later focused on the support fundamental research, and what became Math for America. When I retired from MSRI for the first time, in 2007, they asked me to become the Foundation’s director.

David Eisenbud is a professor of mathematics at UC Berkeley.

I was looking forward to teaching again as a Berkeley faculty member so I refused the offer. But in 2009, I was asked to join as director of a new division of mathematical and physical sciences (MPS). The mandate: to rapidly grow the program to a level of \$40,000,000/year. I found this far too interesting to pass up!

From 2010 to 2013 I worked closely with Jim on plans for funding basic research, and worked with Marilyn to begin a program for popularization of science. This was just one of Marilyn's roles at the Foundation! Her care for all matters affecting the well-being of the staff made the work easier for everyone.

The working relationship with Jim still seems to me remarkable. My task was to bring him good ideas, either my own or from consultation with the communities that we served (math, theoretical physics, and theoretical computer science). We discussed each idea extensively, and he cared a great deal about the details of how a given program might affect individual researchers. The programs we finally agreed on owed a great deal to his experience as a working mathematician and his remarkable intuition about human relationships.

Jim listened carefully to the ideas I presented and was sometimes willing to be convinced even about programs that he initially found silly, like the now popular program of small grants to mathematicians (what difference could \$5K/year possibly make??—a relatively big one, it turned out). Jim often brought real improvements to the ideas we discussed, filtering them through his own experience dealing with university administrators and business leaders. Though it was clear that he made all the final decisions, he used his absolute power with a very light touch.

This was Jim's characteristic approach: he tried to appoint excellent people and then give them great latitude to act and create. I've heard the same assessment from others across the Foundation, and I think that this approach was a major contributor to the immense success of the Simons Foundation, and to the immense success of Jim's financial empire around Renaissance Technologies.

When I left the Simons Foundation to return to MSRI in 2013, Jim invited me to join the Board of Directors of the Foundation, and I happily accepted, feeling that it can play a significant and steady role in science over the long term, even as governments may change their priorities.

Like the great redwoods, which, in their demise, are surrounded by a circle of redwoods springing from their roots, Jim's benevolent love of mathematics and science and the people studying them will continue to influence culture and learning for a very long time. I marvel at the impact Jim and Marilyn have already made.

Funding Research in Mathematical Sciences

Yuri Tschinkel

This year marks the 30th anniversary of the Simons Foundation, founded by Jim and Marilyn Simons. Initially, it was a structure for processing gifts to institutions with close ties to the Simons family: Stony Brook University, MSRI, IAS, Cold Spring Harbor Lab, Rockefeller University, MIT. About 15 years ago, after Jim retired from Rentech, Jim and Marilyn decided to build up a professionally managed organization that would advance frontiers of research in mathematics and the basic sciences, be generously endowed, and operate in perpetuity. There were many panels and informal meetings with leading scientists; it took time to sharpen the focus, to identify promising directions, to find the right people. Some decisions were triggered by unforeseen events, such as the 2008 financial crisis, or COVID. However, the charge from Jim and Marilyn was to move toward a more systematic process, toward open calls for most grant programs, with thorough and transparent evaluations by outside panels and detailed discussions among Foundation leadership. Among their goals was to establish a balanced portfolio of grants, balanced in terms of fields as well as in terms of scales. A substantial part of the portfolio would fund collaborative efforts, with a timeframe of 7–10 years. The Foundation would create an international network of institutes. There would be stable support for critically important infrastructure, such as arXiv or the Simons Observatory.

One of Jim's most cherished projects was the creation of the Flatiron Institute, the in-house research division of the Foundation. Jim's experience in academia and business convinced him of the potential of bringing together scientists from different fields, united by a common goal, and equipped with best computational tools, to find "signals" in data. In this case, data coming out of biology, astrophysics, quantum physics, and neuroscience.

In all funding deliberations, Jim focused on excellence and leadership. He was open to risky, ambitious proposals. He encouraged collaborations with federal agencies, other foundations, and professional organizations. He sought and valued advice, arranging face-to-face meetings with experts whenever possible. He had a remarkable ability to instantaneously grasp the essence of complicated discussions and formulate conclusions. Jim had boundless

Yuri Tschinkel is the executive vice president in the mathematics and the physical sciences division at the Simons Foundation.

curiosity, and a passionate interest in people. He viewed the grants programs of the Foundation as a way of identifying talent; he followed the professional growth of grantees, took pride in their accomplishments, and thought about next steps: trusting them with bigger projects, connecting to other colleagues or institutes. Both Jim and Marilyn attended regularly presentations of proposals, decision meetings, conferences, and panels. They created a unique culture at the Foundation—all divisions are aware of what is happening in other divisions, all are united by a common goal to support transformative science. Jim's amazing energy, and his personal commitment—day trips from NY to the European Council for Nuclear Research (CERN) in Geneva, or to the Simons Institute for the Theory of Computing (SITOC) in Berkeley, or to the Institut des Hautes Études Scientifiques (IHES) in Paris were not uncommon—inspired all around him. His wisdom, great taste, decisiveness, and gentle wit made every moment in his presence unforgettable.

Jennifer Chayes

I've seen so many postings in tribute to Jim for all he has given to the scientific community. I too have been the beneficiary of his and Marilyn's gifts to MSRI (now the Simons Laufer Mathematical Institute or SLMath) and the Simons Institute for Theoretical Computer Science at Berkeley. But my sadness at the loss of Jim goes much further. I first met Jim almost 30 years ago, and, as with many, we initially bonded over our love of mathematics, of beautiful proofs, and of the thrill of discovery/creation of those proofs.

But Jim and I soon discovered that we had something else in common. We were both institution-builders. Jim had done it three times—first, as the transformational Chair of the Department of Mathematics at SUNY at Stony Brook at the age of 30 (!!!), next with his investment firm which became Renaissance Technologies, and finally with the Simons Foundation. I did it a couple of times—building and leading interdisciplinary research groups and labs at Microsoft Research, and more recently founding the College of Computing, Data Science, and Society at UC Berkeley—the first new college at Berkeley in over 50 years. Indeed, flatteringly, Jim asked me for some advice as he was building data science at what eventually transformed into the Flatiron Institute. And I asked Jim for advice on whether I should come to Berkeley and what I should try to help create here. Jim and I talked about all he would do in my place, and indeed, with his encouragement, I came to Berkeley.

Jennifer Chayes is dean of the College of Computing, Data Science, and Society at UC Berkeley.

Over the years, Jim and I talked about audacious aspirations, seeking out people who were smarter than ourselves, finding leaders who were both brilliant and selfless, constructing institutional structures and culture that encouraged deep collaboration, and creating fertile ground for people to go after the biggest problems. Both of us spoke our minds, for better or for worse (indeed, if Jim had not spoken his mind, he might have remained at the IDA and never ventured to Stony Brook). And both of us had an unshakable belief in the power of human ingenuity to solve the world's most urgent problems.

I will miss Jim's sage advice, warm support, wry sense of humor, and boundless optimism.

Shafi Goldwasser and Tatiana Toro

Jim's generosity, and unparalleled belief in the importance of basic scientific research have changed not only the face of our fields but also the face of the University of California, Berkeley campus where he received his PhD in 1961. This is evidenced by the two Berkeley research institutes which bear the Simons family name: the Simons Institute for the Theory of Computing at UC Berkeley, and the independent nonprofit Simons Laufer Mathematical Sciences Institute (SLMath), formerly MSRI.

Jim's belief and support of MSRI, now SLMath, goes back to the very beginning, as David Eisenbud discusses elsewhere in this article, including his service as a trustee for 25 years. When visiting the institute, he would often reminisce at the statue of cofounder Shiing-Shen Chern, Jim's research partner and friend in whose honor the SLMath building, Chern Hall, is named. In May 2022, in conjunction with the Institute's 40th anniversary, an endowment campaign was announced—beginning with news of a landmark unrestricted \$70M joint endowment gift from the Simons and Laufer families. In honor of their generosity in investing in the future of our vibrant collaborative research community, MSRI has now become the Simons Laufer Mathematical Sciences Institute (SLMath).

Around 2009, theoretical computer scientists Avi Wigderson, Dick Karp, and Margaret Wright attended a meeting with Jim that was focused on exploring new avenues for philanthropic investment. The three of them made the case to Jim that while mathematics as a field benefited from the presence of a number of NSF-funded math institutes, theoretical computer science had no equivalent. Jim responded enthusiastically to the idea of funding an

Shafi Goldwasser is a director at the Simons Institute for the Theory of Computing.

Tatiana Toro is the director of the Simons Laufer Mathematical Sciences Institute and a professor at the University of Washington.

international institute to serve as the center of excellence for the field and announced a competition to host a new institute dedicated to theoretical computer science funded by the Simons Foundation. In 2012, the Simons Institute for the Theory of Computing (SITOC) was established in UC Berkeley. In founding the Institute, Jim and his wife Marilyn made an indelible impact on research in theoretical computer science, enabling and seeding collaborative research programs in which researchers from around the world in theoretical computer science and adjoining fields come together to study core computing problems with (not always imagined in advance) potential impact on diverse subareas of applied computer science, engineering, mathematics and the sciences: exact, natural and social, through the so-called computational lens. Concerning the unimagined impact of basic mathematics, Jim always chuckled about the impact his own legendary geometry work made in physics, although he claimed “I don’t know any physics.”

SLMath and SITOC have hosted thousands of researchers over the years. Scientists come together through our programs to share ideas and collaborate, which not only facilitates breakthroughs, but has also propelled the career trajectories of generations of visiting postdoctoral fellows.

In our shared experience, Jim’s first instinct when meeting someone new was to find a uniquely personal connection to that person. Upon learning that Tatiana hailed from Colombia, Jim reminisced with her that after graduating from MIT in 1958, he had driven a motor scooter with a couple of friends from Boston to Bogotá, remembering the journey and friendships fondly. He also acknowledged that his first successful investment was in a Colombian manufacturing company, as Barbara Bluestein Simons mentions elsewhere in this tribute, started with his friends and fellow MIT alumni who had been part of the trip.

Shafi, who has been at SITOC since 2018 moving from MIT to Berkeley to direct the institute, recalls “In my first meeting with Jim, we immediately dove into a discussion on modern advances in cryptography, which is my field of research, in the age of cloud computing which enable computation to be done on encrypted data stored remotely without ever decrypting. Jim recalled his early days working for the Institute for Defense Analysis (IDA) in Princeton, where he spent part of his time doing applied cryptography and what were his first thoughts on the possibility of basing cryptography on hard number theory problems following a meeting with Ralph Merkle. I knew that Jim eventually left the IDA due partially to his opposition to the Vietnam War, but he seemed to continue to carry an active interest in cryptography in its current incarnation

as a subfield of theoretical computer science. It made me wonder whether his fascination with cryptography fueled his belief in theoretical computer science as a whole. Later in our conversation, when Jim learned that my son was attending Wesleyan University, he told me that as a young high school student in Brookline, MA, he was recruited as a mathematics protégé to come to Wesleyan and spend what turned out to be a weekend of great fun. But, he especially loved telling me the end of the story—“Alas, Wesleyan went on to reject my formal college application, so I went to MIT instead and I guess it all worked out.” His humor and humanity made me feel immediately at ease, and in the span of 30 minutes I went from being terrified to thinking that this SITOC directorship could turn out OK. It did, to a very great extent due to the continued connection with Jim and Marilyn.”

We, Shafi and Tatiana, wish to express our profound respect and admiration for the incredible life of an incredible human being, whose generosity of spirit has impacted many lives around the world and has transformed the landscape of science forever. His work will live on through his own mathematical research and the many, many lives and organizations touched by his and Marilyn’s determination and passion for advancing basic research through science philanthropy, at Berkeley and worldwide.

Funding Research in Biology and Medicine

Nick Patterson

In 2001 I left Rentec, but my involvement with Jim did not end. I was working in genetics and the Simons Foundation funded the Simons Genome Diversity Project (SGDP) which generated high-quality genetic sequences from multiple human groups such as Mbuti Central Africans or highlanders from New Guinea. These groups are important for the understanding of deep human history, but largely neglected in most genetic research. The SGDP has proved an invaluable resource for the study of human genetics.

Bruce Stillman

In the early 2000s, Jim Simons was introduced to Cold Spring Harbor Laboratory (CSHL), an institute carrying out biomedical research on the north shore of Long Island and about 25 miles from Renaissance Technologies. The Simons Foundation made its first grant to CSHL in 2003

Bruce Stillman is the president of Cold Spring Harbor Laboratory.

to support Mike Wigler's research disentangling the genetics of autism spectrum disorder. Wigler was using sophisticated molecular techniques and mathematical analysis and Jim took a great interest in mathematical approaches that Mike was using. Indeed, Wigler acknowledged Jim's assistance in a 2007 paper [ZLK+07]. With the support of Jim and Marilyn, CSHL established the Simons Center for Quantitative Biology in 2009. Initially a home for mathematicians, computer scientists, and physicists at CSHL working on problems in biology, the Simons Center has now broadened to support the application of quantitative approaches across diverse areas of biology, including genomics, neuroscience, cancer, and plant biology, with applications to human diseases such as cancer, autism, bipolar disorder, and depression. The Simons Center has also developed major strengths in artificial intelligence as applied to neuroscience and genomics. As the importance of quantitative approaches in biology has grown, so too has the reach of the Center, and nearly a third of the faculty at CSHL now have substantial quantitative components in their research programs. Jim and Marilyn have continued to support many initiatives at CSHL, and Marilyn is currently Chair of the Board of Trustees. Jim was an Honorary Trustee of CSHL. The growth and success of the Simons Center for Quantitative Biology and, indeed all of CSHL are a tribute to Jim and Marilyn's vision for supporting research at CSHL and around the world.

Funding Math for America

Irwin Kra and Maria Klawe

Among those of us who appreciate great school teachers of mathematics and science, we are especially grateful for Jim's founding of Math for America.

For a number of years in the early 2000s Jim had been pondering how to improve math education in our public schools. In 2003 he met with finance colleagues Jeff Rosenbluth and Neil Chriss to brainstorm about possibilities. Shortly thereafter mathematician and educator Irwin Kra joined the group and Math for America (MfA) was launched in 2004 with Irwin as Executive Director, followed by John Ewing in early 2009 and Maria Klawe in late 2023. Funded largely by the Simons Foundation, Math for America recruits outstanding K–12 teachers in NYC into four-year fellowships in which they receive an annual stipend in exchange for engaging in professional development. Initially the teachers were high school math teach-

Maria Klawe is the president of Math for America.

ers but over time expanded to science as well as middle school and elementary school teachers. The program has been highly successful in increasing retention, building a strong teacher community, and raising student test scores. The total number of MfA teachers in NYC is about 1000 and nearly half of NYC high schools have at least one MfA STEM teacher. Approximately 12000 NYC public school teachers have been MfA fellows over the past two decades.

Jim's dream was always that the success of MfA in NYC would lead to other similar programs being established in other locations and eventually to a national program funded by the federal government. He believed that great STEM teachers are essential for the inspiration of young people to become mathematicians, scientists and engineers and that a federal program was critically important in maintaining America's leadership in science and technology. A number of other successful programs modelled on MfA NYC have been created, including MfALA in Los Angeles in 2008 and the NY State Master Teacher program in 2013 which currently supports about 1400 teachers. Everyone involved with MfA and the Simons Foundation was thrilled when the National Science Foundation announced the National STEM Teacher Corps Pilot Program on May 28, 2024. Jim's dream had come true.

A Final Word

Marilyn Hawryst Simons

In December of 2010, Jim was a guest speaker at an MIT colloquium series which highlighted its successful graduates. The title of Jim's talk was "Mathematics, Common Sense, and Good Luck: My Life and Careers." During his talk, Jim alluded to a conversation he and I had in the car, but I'd like to tweak his version slightly.

As we headed to Boston from New York City, Jim turned to me and said, "I have my talking points, but I don't know how to end my speech." I said that he should end by talking about his values. As Jim recounted in his speech, he replied, "I don't have any values" and of course, we both laughed. I assured Jim that people wanted to know how he got to where he did and what they could learn from him. We sat quietly in the car for the rest of the ride while Jim pondered—a behavior of his I knew well.

Jim gave his speech in his inimitable style: clear, to the point, and full of humor and wit. When he gave his summary remarks, the audience was captivated. True to his mathematical training, Jim abstracted the essential values that helped him envision goals and navigate challenges over the years. Despite youthful self-doubts about his slowness, setbacks, and disappointments, Jim was able

to see through his numerous experiences to distill lessons learned and the sources of his fortitude and inspiration.

Jim Simons's guiding principles.

- Do something new—don't run with the pack.
I am not such a fast runner. If I am one of N people all working on the same problem, there is very little chance I will win. If I can think of a new problem in a new area, that will give me a chance.
- Surround yourself with the smartest people you can find.
When you see such a person, do all you can to get them on board.
- Be guided by beauty.
This is obviously true in doing mathematics or writing poetry, but it is also true in fashioning an organization that is running extremely well and accomplishing its mission with excellence.
- Don't give up easily.
Some things take much longer than one initially expects. If the goal is worth achieving just stick with it.
- Hope for Good Luck!

References

- [Bou24] Jean-Pierre Bourginon, *Tribute to Jim Simons*, May 15, 2024, <https://www.ihes.fr/en/tribute-jim-simons-jpb/>.
- [Che12] Jeff Cheeger, *Jim Simons interview by Jeff Cheeger*, 2012, <https://www.simonsfoundation.org/2012/09/28/simons-foundation-chair-jim-simons-on-his-career-in-mathematics/>.
- [Kan24] Jonathan Kandell, *Jim Simons, Math Genius Who Conquered Wall Street, Dies at 86*, New York Times (May 10, 2024), <https://www.nytimes.com/2024/05/10/business/dealbook/jim-simons-dead.html>.
- [Max17] D.T. Max, *Jim Simons, the numbers king*, The New Yorker (2017), <https://www.newyorker.com/magazine/2017/12/18/jim-simons-the-numbers-king>.
- [Sum24] Thomas Sumner, *Simons Foundation Co-founder, Mathematician and Investor Jim Simons Dies at 86*, May 10, 2024, <https://www.simonsfoundation.org/2024/05/10/simons-foundation-co-founder-mathematician-and-investor-jim-simons-dies-at-86/>.
- [ZLK+07] Xiaoyue Zhao, Anthony Leotta, Vlad Kustanovich, Clara Lajonchere, Daniel H. Geschwind, Kiely Law, Paul Law, Shanping Qiu, Catherine Lord, Jonathan Sebat, Kenny Ye, and Michael Wigler, *A unified genetic theory for sporadic and inherited autism*, Proceedings of the National Academy of Sciences **104** (2007), no. 31, 12831–12836.
- [Zuc19] Gregory Zuckerman, *The man who solved the market: How Jim Simons launched the quant revolution*, Penguin, 2019.

Credits

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