A Different Kind of Institute: The American Institute of Mathematics

Allyn Jackson

You would never think there is a math institute *here*.

Driving south along the wide, six-lane thoroughfare called El Camino Real, you pass into Palo Alto, California, from the north. The stately campus of Stanford University stretches along for a mile or two, offering a bit of elegance and greenery before the monotony of low-slung, nondescript architecture resumes. You pass the inevitable Starbucks, a few bicycle stores, and some Asian restaurants. There are few pedestrians and plenty of parking lots. After a couple of major intersections, you reach Portage Avenue, a street so small it would not merit even a stoplight were it not for the need to regulate traffic into the parking lot of the massive Fry's Electronics store that sits at the end of Portage. As you enter the Fry's parking lot, there is still no indication that a mathematics institute of international renown is located here. You mount the steps to the walkway that runs across the front of the Fry's building and wander along to the battered metal door modestly bearing the words "American Institute of Mathematics". You might then notice that the colorful mural painted on the wall next to the door has some distinctly mathematical themes.

Since its founding in 1994 the American Institute of Mathematics, known by the shorthand AIM, has become an active center for mathematical research. Its improbable location is the result of its start as a small, elite institute privately funded by the president of Fry's Electronics. The private money has been supplemented by funding from the National Science Foundation (NSF) since 2002, when AIM became one of the national mathematics institutes funded by the NSF. Among the many mathematics institutes that now dot the globe, AIM is a different kind of institute, with an unusual structure and an unusual history. And, if its plans come to fruition, AIM will become yet more distinctive when it moves into its new home, an opulent building to be constructed in the center of a golf course in a farming community about forty-five minutes south of Palo Alto.

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Adapting to Commercial Quarters

Walking into AIM, you might wonder, "*This* is a math institute?" The single-story, flat-roofed, windowless warehouse was clearly constructed with commercial purposes in mind. There is no foyer, no check-in desk, no lecture halls or administrative offices in view. After proceeding down a narrow corridor, you enter a large rectangular room with sofas and coffee tables set here and there. Soon you notice bookcases filled with mathematics monographs: AIM has purchased the entire publication list of the AMS and all mathematics books published by Cambridge University Press, Elsevier, Oxford University Press, and Springer-Verlag. Its library is 12,000 volumes strong and growing.

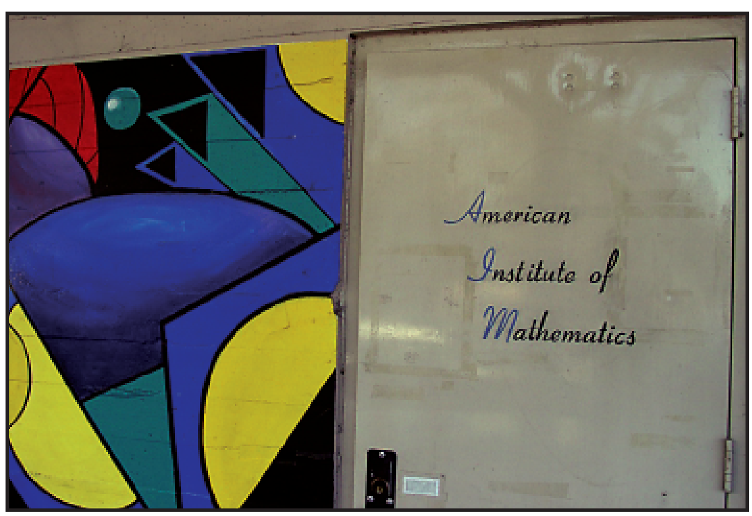
At this point one might notice that along the back wall of the room a mathematician stands lecturing in front of a whiteboard. Audience members move forward and listen or hang back and observe; they might get up to get a coffee or a snack, peruse the journals, leaf through handouts about current AIM activities, and then return to the lecture—all without ever leaving the room. Take one of the chairs near the whiteboard to follow the lecture closely or perch on a stool a little distance away or sit on a sofa at the back of the room and chat with colleagues. It turns out that this odd, boxy room, which probably looked at first glance to be totally unsuited to housing a mathematics institute, has been set up in such a way that it actually works very well.

So how did a mathematics institute come to occupy this space next to Fry's Electronics? AIM is the brainchild of John Fry, president of the privately held company that runs a chain of about thirty electronics stores that now stretches across the southwestern United States. Stores recently opened in Atlanta and Chicago, and international expansion is in the works. In the 1970s Fry was a mathematics major at Santa Clara University and took courses there with Gerald Alexanderson, who remembers Fry as an outstanding student who clearly had the talent to become a mathematician if he desired. "He was terribly interested in mathematics, but he was also interested in making money," Alexanderson recalled. Fry's family owned a chain of supermarkets, and after the chain was sold Fry and his brothers decided to open supermarket-like stores selling electronics and computer equipment. Fry's Electronics stores do resemble supermarkets or perhaps Wal-Marts: they are huge and cavernous, with long shelves stuffed with goods. The stores are decorated in various whimsical themes. One sports an Egyptian motif, with wall murals depicting pharaohs doing calculations on laptops; the theme of the store next to AIM is the Wild West.

Some years after he finished college and after the electronics stores were established, Fry got back in touch with Alexanderson. In the early 1990s he asked Alexanderson to help organize a series of lectures about mathematics at the Fry's Electronics store in Sunnyvale. Among the speakers were Donald Knuth of Stanford University, Thomas Banchoff of Brown University, and Nicholas von Neumann, the brother of John von Neumann. Because they were held in the heart of Silicon Valley, the lectures sparked much interest and drew large crowds. Alexanderson recalled that at this time Fry often spoke of his desire to establish a mathematics library that would house everything ever published in the field—a contemporary version of the great library at Alexandria that was built in the third century BC and is thought to have been destroyed in a fire. A rare book collector himself, Alexanderson fully understood that it would be a herculean task to create such a library, but nothing could shake Fry's attachment to this dream. And Fry has made a start: for the past decade he has employed a part-time librarian to build his collection

One might ask, "There's a mathematics institute in *here*?"

Or say, "Wait a minute—this is an electronics store, not a math institute!"



But lo and behold, here is the door to AIM, which occupies one of the storage spaces in the building.

of rare mathematical books and has invested a couple of million dollars in it.

AIM was born in Alexanderson's living room one Sunday afternoon when Fry proposed starting a mathematics institute and persuaded Alexanderson to chair the board of trustees. Having just been named secretary of the Mathematical Association of America, Alexanderson was reluctant to take on additional responsibilities. But when it became clear that Fry was unlikely to start the institute without him, Alexanderson relented, and he has chaired the AIM board of trustees ever since. Another early key figure in the establishment of AIM is Fry's business associate, Stephen Sorenson, who is a director at Fry's Electronics. One of the people initially recruited for the AIM advisory board was Brian Conrey, then mathematics department head at Oklahoma State University. Conrey had also been a mathematics major at Santa Clara and knew Alexanderson and Fry from his student days. After serving for two years on the advisory board, Conrey was appointed as the director of AIM in 1997 and has remained in that position ever since.

Gerald Alexanderson

Although Fry continues to be deeply interested and involved in the running of AIM, particularly in its financial aspects, he stays out of the limelight. He declined to be interviewed for this article, following his policy of never granting interviews to the media. Conrey says that Fry has a deep, abiding interest in mathematics and physics and calls him a "visionary" who looks decades ahead, trying to find ways to have a positive impact on the future. As a businessman and a former college football quarterback, Fry is convinced that the team approach is the way to make progress on solving difficult problems, including in mathematics. When this approach was floated in early meetings of the AIM advisory board, the members expressed skepticism, saying that mathematicians do not operate that way. "They were still in this old paradigm that mathematicians lock themselves in a room and work on a problem until they solve it," Alexanderson recalled. "I was certainly skeptical, because that was the way I was told to do mathematics—you just sit there and plug away at it, and maybe you are lucky and maybe you aren't, but that's the way it's done." Fry envisioned a more strategic approach: pick a problem, bring together the world's experts, give them the means they need, and tell them to go at it. "And, by golly, it seems to work," said Alexanderson.

A Strategic Approach

Jonathan Mattingly of Duke University is standing in front of the whiteboard at AIM, pen in hand. The occasion is a workshop on deterministic and stochastic Navier-Stokes equations. Proving global existence of solutions to the Navier-Stokes equation in R^3 or controlling the inviscid limit of the forced equation in R^2 would be major feats, Mattingly notes. "Okay, these are the home runs—these are *Annals* papers," he says. But are there any smaller problems along the way? he asks. Are there less daunting steps that could be taken that would bring the "home runs" a little bit closer? People in the audience start suggesting problems, and Mattingly starts scribbling. This is an AIM problem session. As the moderator, Mattingly has the job of eliciting suggested problems from the audience and writing them on the board. To have your problem written on the board, you must at a minimum get Mattingly to understand it. The idea of having a moderator write the problems on the board, as opposed to having each person come up to the board to write his or her own problem, is that the moderator can distill the problem statements to make them clearer and more accessible. And the choice of a dynamic and enthusiastic moderator like Mattingly helps to get ideas flowing. This particular structure for the problem sessions is one of the hallmarks of AIM workshops.

AIM has developed various strategies for promoting interactions among researchers, with a focus on ultimate goals: solving important problems in mathematics. This approach has its roots in Fry's initial vision for AIM as a place where teams of experts would come together to focus on major problems in the field. Indeed, the very first AIM event centered on the Riemann Hypothesis, which today remains one of the major outstanding challenges in mathematics. Conrey recalls that at one of the very early advisory board meetings, when AIM existed in name only and the board was still grappling with the question of what the institute ought to do, he threw out the suggestion of having a project to attack the Riemann Hypothesis. "Everybody on the board said, 'No, no, no, that's crazy; nobody knows how to solve the Riemann Hypothesis,'" he recalled. Later that day when Conrey related this to fellow number theorist Hugh Montgomery of the University of Michigan, Montgomery noted that that particular year, 1996, was the one hundredth anniversary of the proof of the Prime Number Theorem by Jacques Hadamard and Charles Jean de la Vallée Poussin. Might it make sense to have a symposium celebrating this milestone and assessing current progress toward the Riemann Hypothesis?

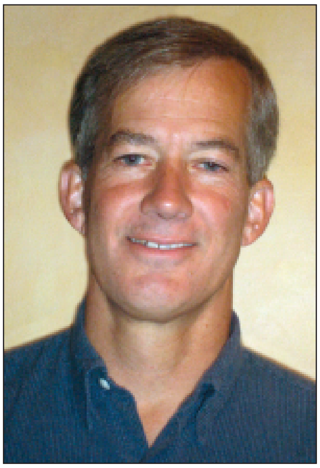
Seizing on this idea, Conrey secured AIM support and organized the symposium together with Douglas Lind from the University of Washington in Seattle. The symposium was held on the Seattle campus in August 1996 in conjunction with the MathFest. A highlight of the symposium was a rare public lecture by 1950 Fields Medalist Atle Selberg, then seventy-nine years old. In 1949 Selberg gave an elementary proof of the Prime Number Theorem and has worked on aspects of the Riemann Hypothesis throughout his long career. The symposium also included a roundtable discussion by the participants, among whom were many top experts on the problem. "Everybody sat around and talked about whether it was feasible to bring a group of people together to solve the Riemann Hypothesis," Conrey recalled. "Of course, everybody said no, but that discussion was something that I suspect nobody there had ever witnessed." It is indeed highly unusual to have a group of top mathematicians entertain the subject of how they might develop a strategy to solve such a problem. No strategy emerged for the Riemann Hypothesis, but this seems to have been a defining moment for AIM, when it cemented its identity as an institute whose goal is to identify and solve important mathematics problems.

Soon thereafter, Conrey was appointed as the director of AIM, and the institute set up shop in its Palo Alto location. Initially AIM stuck close to Fry's original vision of bringing in teams of researchers to work on specific problems. As a privately funded institute, AIM could pay full salaries and expenses for these researchers, something that cannot be done with NSF dollars. The very first mathematician funded by AIM, Frank Pacard of the Université de Paris XII, came to Palo Alto before AIM actually had a home itself; he worked in an office at Stanford University, collaborating with Stanford's Rafe Mazzeo. After AIM moved into the space next to Fry's in January 1998, it hosted three more researchers, each of whom was working with a colleague at Stanford: Ralph Greenberg of the University of Washington at Seattle, who worked with Karl Rubin on the Birch and Swinnerton-Dyer conjecture; Ib Madsen of the University of Aarhus, who worked with Gunnar Carlsson in algebraic K-theory; and Jon Wolfson of Michigan State University, who worked with Richard Schoen on the Lagrangian Plateau problem. AIM has capitalized on the strength of the Stanford mathematics department, and ties between the two have been strong from AIM's early days. Out of the nearly forty people serving on the governing boards for AIM (the board of trustees, the advisory board, and the scientific board), four are Stanford mathematicians.

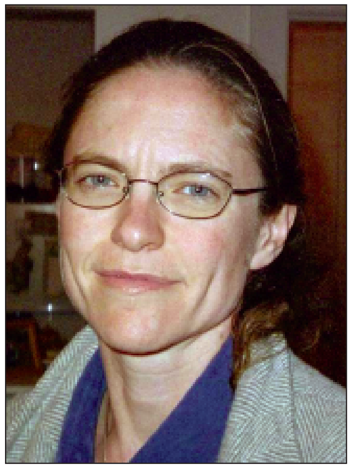
One project that AIM counts as one of its big success stories focused on the strong perfect graph conjecture, a forty-year-old problem considered to be one of the most important in graph theory. (The conjecture states that a graph is perfect if and only if it contains no odd graph hole and no odd graph antihole.) On the advice of Peter Sarnak of Princeton University, AIM's scientific advisory board invited Princeton's Paul Seymour, together with Neil Robertson of the Ohio State University and Robin Thomas of the Georgia Institute of Technology, to propose a problem from graph theory that they could work on together at AIM. They ultimately chose the strong perfect graph conjecture, which none of them had worked on previously. Seymour received release time from Princeton, and AIM paid the full salaries of Robertson and Thomas for six months and then paid part-time salaries for another six months. "So they spent a year, eight hours a day or whatever, just talking to each other and working on this problem," Conrey said. "Well, four years later, with the addition of Maria Chudnovsky, Paul Seymour's graduate student, they solved the problem." The solution drew heavily on the ideas and methods developed during the time AIM supported Robertson and Thomas.

It was in 1997 that the NSF announced a new competition for grants for national mathematics institutes. At the time, the two existing institutes were the Institute for Mathematics and its Applications at the University of Minnesota and the Mathematical Sciences Research Institute in Berkeley, and they were forced to compete anew for continued funding. AIM submitted a massive, US$30-million proposal that outlined a plan for pooling funds from Fry, the NSF, and a network of eight mathematics departments across the nation that would form the nodes of a "distributed institute". The proposal was turned down for various reasons, including its size and some skepticism on the part of the NSF about Fry's financial commitment.

After that, AIM took a more incremental tack with the NSF and began submitting a series of smaller proposals for individual projects, including some conferences and workshops. AIM also became the sponsor for a Focused Research Group (FRG) grant from the NSF, for which Conrey was one of the principal investigators (AIM has since served as a sponsor for three other FRGs). By the time the NSF announced yet another institute competition in 2000, AIM had gained experience not only in dealing with the NSF but also in organizing activities other than the small groups with which it had started, and it used this experience as the basis for a new institute proposal. When that proposal was approved in 2002, AIM became one of the seven NSF-funded mathematics institutes that exist today. Formally, the NSF-funded portion of AIM is called the AIM Research Conference Center (ARCC). The main activity of ARCC is weeklong workshops with thirty-two participants apiece. Since it was established in the fall of 2002, ARCC has held over forty workshops across a wide spectrum of mathematical areas, pure and applied.



AIM Director Brian Conrey.



Codirector Helen Moore.

Codirector David Farmer.

The AIM Workshop Style

It is 9:00 p.m., and a group of mathematicians is sitting in front of the whiteboard at AIM. One of the participants is Dennis Sullivan of the City University of New York, whose energy and enthusiasm is the driving force behind this late-night meeting. He has asked some of the other participants to explain certain ideas to him, and most of the rest of the workshop group is all too happy to listen in. As a succession of speakers give short explanations, Sullivan cuts in, asking questions and requesting clarifications that others were no doubt also wondering about, albeit silently. At some point the AIM cleaning crew shows up and quickly withdraws, not wanting to disturb the mathematicians. After someone tells the crew it is okay to come in, the mathematicians continue their discussion into the night as the trash cans are emptied and the vacuum cleaners whirr. Because AIM is close to many restaurants and because the hotel it uses to house visitors is within walking distance, spontaneous after-dinner sessions like this one are not uncommon.

The evening session initiated by Sullivan took place during a workshop on the topology and geometry of the moduli space of algebraic curves organized by Ulrike Tillmann of the University of Oxford and Ravi Vakil of Stanford University. The purpose was a common one for AIM workshops: to foster communication between two groups that have common interests but that do not usually talk to each other. Topologists and algebraic geometers are both interested in the moduli space of curves but for different reasons and from different perspectives, and the goal of the workshop was to get them to exchange ideas. At one point the participants broke up into three "camps": a topology camp, an algebraic geometry camp, and a "miscellaneous" camp. Each one came up with a list of questions it would like to ask of one of the other camps, and the three lists were compiled, printed out, and distributed to the workshop participants. There was also a problem session, led by Jordan Ellenberg, who at the time was an assistant professor at Princeton University and is now at the University of Wisconsin at Madison.

Activities like breaking into small groups and holding interactive problem sessions are characteristic aspects of the AIM style of workshop. Another is the small number of formal lectures, no more than three per day. For many AIM workshops, only the first day's lectures are scheduled in advance, and others are set up during the course of the workshop as the organizers find out what participants are interested in hearing about. As a result there is a good deal of unstructured time for informal discussions and impromptu talks. This fluidity is reflected in the physical setup of AIM, which allows many simultaneous activities to be going on at once: as one person lectures, some will sit near the whiteboard and listen, small groups will move to the back to engage in discussion, and individuals might park themselves on a sofa to read a journal for a while before going back to the lecture. A constant supply of drinks, snacks, and coffee keeps participants together in the room for the entire day, and when wine is uncorked at five o'clock, they often remain in discussion before ambling off to dinner at a restaurant.

Despite the seeming looseness of the structure, a good deal of planning and management goes into the AIM workshops. Mathematicians submit workshop proposals to AIM, and once a proposal is selected by the AIM Scientific Board, Conrey gets on the phone with the organizers. "I explain to them in great detail that [the AIM workshops] really are different, that the ARCC staff is very hands-on and very involved with what goes on," Conrey explained. "I give them the opportunity at that point, if they are not comfortable with this, to say so right then so we don't go any further, because in order to be able to do this, they absolutely have to buy into what [AIM does] and be willing to try this different style. It's true that it flies in the face of conventional thought about mathematics, but we think it's an interesting alternative."

In addition to director Conrey, AIM has two codirectors, Helen Moore and David Farmer. Well before a workshop takes place, the directors hold a series of three, hour-long conference calls with the workshop organizers to discuss the structure of the workshop. Each call begins with a question to the organizers: What are the goals of the workshop? The AIM directors help the organizers to articulate, refine, and shape the goals to ensure that they are clear and realistic. They also describe typical AIM activities and discuss how they can be structured in pursuit of the workshop's goals.

Of the thirty-two workshop participants, the organizers invite twenty-four, and the other eight slots are filled by open applications. The AIM directors help the organizers cull through the applications and choose appropriate participants. One of Moore's main responsibilities is to increase diversity among participants, and for this purpose AIM has assembled a database of mathematicians from underrepresented groups, together with information about their research specialties. When a workshop fits with the mathematical interests of a person in the database, Moore encourages him or her to apply. The organizers are also told that the initial list of invited participants should include members of underrepresented groups, and sometimes the organizers request AIM's help in finding appropriate people to invite. As a result of these careful and sustained efforts, the AIM workshops have had about 20 percent women participants, and 6 percent have been from underrepresented minorities. AIM has been so effective in this regard that other mathematics institutes have begun asking for Moore's help in finding appropriate participants from underrepresented groups for their own activities.

After the participants are invited but well before the workshop is held, they are asked to submit statements about the workshop topic: they might suggest problems, describe what they are working on, pose questions they are curious about, supply ideas for references, and so forth. As the director of AIM Web programming, Farmer creates for each workshop its own Web page, accessible only to that workshop's participants. The participants' statements are made available on this Web page and are also handed out when the workshop actually starts. The organizers recruit some of the junior participants to act as scribes during the workshop and in particular to record the suggestions made during the problem sessions. The material so generated is also posted on the workshop's Web page. In addition, AIM asks all participants to send a full collection of reprints of their papers and adds them to its sizeable reprint library, which has been built primarily through donations of collections of papers. During the workshop the AIM directors check in regularly with the organizers to monitor how things are going and to offer advice on what activities could be scheduled for the rest of the meeting. They also try to circulate among the participants to gauge their responses to the workshop; based on this feedback, they might work with the organizers to adjust the workshop plans accordingly. At the end of each workshop the AIM directors conduct a final "debriefing" meeting with the organizers, and they also collect written evaluations from participants.

Reactions to the AIM style of workshop vary. One participant in a recent workshop raved about the more open, interactive format and relished the emphasis on tackling difficult problems and trying to move the field forward. Another participant in the same workshop was perplexed at the request before the workshop for suggestions of topics and problems to be covered and at the lack of a set schedule for lectures: to this individual, it all looked a bit disorganized. To some, the windowless quarters are drab and uninviting, while others find that interactions are enhanced by having the workshop participants basically spend a week together in one room. (AIM's few individual offices are reserved for staff and long-term visitors; as the AIM directors say, workshop participants have no offices and therefore have "nowhere to hide"). Some people find the targeting of goals and problems to be stimulating and motivating, while others express skepticism that such a strategic approach can work in mathematics, a field where it is often the unexpected side trips that lead to the most fruitful results.

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AIM has gained a reputation for having adopted a "business-model" approach to mathematics. Indeed, during a recent AIM workshop a joke floated among the participants that if they didn't prove any theorems, they would have to give AIM its money back. But this reputation might not be entirely deserved. Vakil said he has heard people rail against the notion that AIM's goal is to have immediate results during its weeklong workshops, a goal that he called "idiotic." However, he said, "I didn't get the sense during our workshop, or the previous workshop that I attended, that AIM actually had this intent." He was initially skeptical about the AIM problem sessions, which he assumed were intended to isolate key problems to be solved during the workshop, which is unrealistic. Instead, he found that the problem sessions opened a window for him on what other people found interesting in the field and why. "It gave me a sense of the flavor of the field: what's known, what we really should want to know, and what sorts of methods are out there," he remarked. "This 'big picture' is something you tend not to get from a series of narrow research

Morgan Hills, CA, golf course, location of future AIM.

talks." Jeroen Demeyer, a graduate student at the University of Ghent in Belgium who attended a recent AIM workshop, also noted that the problem sessions are especially helpful for graduate students who are looking for ideas about what to work on.

Another aspect of AIM that might give the impression of a "business-model" approach is the hands-on style of the AIM directors. Moore noted that this style has sometimes elicited reactions from workshop organizers along the lines of "I have been organizing math meetings for thirty years, and who are you to tell me how to run my workshop?" However, this reaction is uncommon, she says, and most organizers, especially junior ones, are willing to experiment with activities and approaches suggested by the AIM directors. Many organizers have become converts to the AIM way of doing things. As Farmer says, "It is extremely common—certainly over 80 percent of the time—that someone starts out very unhappy and skeptical, [but later] says, 'You know, you really have something here, and we are happy we did it this way.' The more we hear that, the more we just keep pressing."

One aspect of AIM that resembles a business is the flexibility it has in spending money—a flexibility that derives from its private funding. For example, not long ago a prominent mathematician explained to AIM that she could not attend a workshop because she has two small twins and cannot travel without her nanny. AIM dipped into its private funds and paid for the nanny's travel too, and the mathematician was able to attend the workshop. Typically AIM provides full travel and housing support for all workshop participants. It is able also to offer modest financial incentives for the work associated with organizing and carrying out the workshops. For example, the students and postdocs enlisted to take notes and to maintain the workshops' Web pages are paid US$1,000 for this work. Workshop organizers split an honorarium of US$2,000.

Conrey says that to his mind the main difference between AIM workshops and typical mathematics meetings is that AIM workshops look to the future. "Imagine a typical conference or workshop: everybody presents what they've done, the theorems they've proved," he said. "Whereas the whole concept of the AIM workshops is to look to the future. What are the problems that we don't know? Is there a possibility for how we might solve these? What are the priorities? What kind of agenda do we have? How can we bring people together and get them excited about working on these problems? How can we bring new people into the field?" The AIM style of workshop may not work for every mathematical topic and may not suit every organizer, but it seems to have been successful in many cases. As Vakil noted, "It has its place in the mathematical universe."

Alhambra Look-alike

Morgan Hill, California, population 36,000, lies about twelve miles south of San Jose and about fifteen miles inland from the Pacific coast, nestled in a valley between the Santa Cruz and Diablo mountain ranges. It is a world away from the bookstores and theaters, the stylish shops and restaurants, and the world-class universities of the Bay Area proper. Driving through the outskirts of Morgan Hill to reach the golf course owned by John Fry, you pass fields of crops, perhaps a clutch of chickens scratching the dry dirt. With its ponds and flowers and meandering streams, the golf course is an inviting green oasis amid the gently rolling hills that, as everywhere in this part of California, remain golden brown for most of the year. On entering the golf course, you are likely to wonder, "*This* will be a mathematics institute?" In fact, assuming that all goes according to plan, it will be something yet more unusual: a mathematics institute *and* a golf course.

In 2005 AIM cleared the final legal and zoning hurdles to begin construction of a new building that will be its headquarters and will also, as something of a sideline, serve as a clubhouse for golfers. Right now the course is not open to the public and is used by just a few people, most of them friends and business associates of Fry's. Once the new clubhouse is in place, golfers' use of the building will be limited to six months out of the year, but it is possible that tournaments would be held there. AIM will use the building year-round for workshops as well as for small groups of mathematicians working together over longer periods and perhaps for new activities that are not possible in its current, very limited Palo Alto facilities. AIM will most

Artist's rendering of the proposed new AIM headquarters in Morgan Hill, CA.

likely keep the Palo Alto quarters after its move to Morgan Hill, which is tentatively scheduled for August 2007.

There are a couple of existing buildings on the golf course, some of which will be torn down to make way for the AIM building. One that will remain is the "Octagon Building", so named because of its octagonal shape. The building has been renovated in opulent style—the extraordinary stone sinks in the bathrooms testify to the expense lavished on the decor—and AIM has held several dinners and other events there. Conrey hints that the new AIM building will have a level of luxury similar to that of the Octagon Building. What is more, the design of the new building is modeled on the legendary Alhambra in southern Spain, which is renowned for its splendid fountains and courtyards and intricate mosaics. The cost of the 177,000-square-foot building is currently estimated at US$50 million. Fry will donate a large chunk of the funds, and a fundraising campaign is being planned.

AIM will try to recreate in its Morgan Hill location some of the successful features of its current home in Palo Alto, including a large open area for the workshops. There will be only a few private offices, to be used by staff and long-term visitors. Like the mathematics institute in Oberwolfach, Germany, the AIM building will have on-site accommodations for workshop participants and visitors, as well as a dining hall with a professional kitchen. There will also be a 150-seat lecture hall. Conrey notes that because the Morgan Hill location, like Oberwolfach, is somewhat isolated, a top-notch library is essential, and plans are under way to establish one. There will also be a rare documents room to house Fry's collection of rare mathematics works. The golf course is adjacent to the 87,000-acre Henry Coe State Park, which is the largest state park in northern California and offers hiking possibilities.

According to Conrey, Fry's ambitions for supporting research extend beyond AIM and the new building. Conrey predicts that Fry's business will eventually become a multibillion-dollar enterprise with hundreds of stores worldwide. "If only a small percentage of that goes to mathematics, that would be great," he says. "I want to be there when it happens." He speculates that AIM may one day have a permanent research faculty, in the style of the Institut des Hautes Études Scientifiques in Paris, and noted that Fry has dreamed of starting a physics research institute.

Aside from grants held by the AIM directors for their own research (all of them remain active in research), the budget for AIM is around US$2 million per year, about half of which comes from Fry. The NSF institute funding, which supports the AIM workshops, comes to a little more than US$1 million per year and is supplemented by cost-sharing from Fry. (Right now, AIM is running only workshops and not the small-group research activities of its early days, though it will likely return to funding small groups again in the future, especially after it moves to Morgan Hill.) Most of the rest of the AIM budget goes toward staff salaries and library and administrative costs, as well as the elite AIM Five-Year Fellowship, which is given each year and pays a generous salary to a new doctorate, who can take the fellowship anywhere. In addition, AIM sponsors a few outreach activities, such as local mathematics competitions and a yearly meeting of women mathematicians in the area.

Fry has not set up an endowment for AIM, preferring instead to fund the institute on an ongoing basis. Still, his consistent support for AIM over the past eight years, together with his plans for the building, seem to indicate he is in it for the long haul. As long as his business does well, the future looks bright for AIM. The more immediate challenge for AIM will likely not be a financial one, but rather the task of transplanting the traditions it has built up in Palo Alto to its new, and very different, location in Morgan Hill. But AIM has shown itself to be an adaptable and innovative institute despite having only a small staff and less-than-ideal facilities. When it moves into its new home, perhaps AIM will find that it finally has a building to match its ambitions.