

# Next Year, in Beijing

## Planning Gears Up for ICM 2002

In August 2002 mathematicians from all over the world will gather in Beijing, China, for the International Congress of Mathematicians (ICM). Held every four years, the ICM is the premier international conference spanning all of mathematics. Of the twenty-two congresses held since the first one in Zürich in 1897, all but five were in Europe, and only one was in Asia (Kyoto, 1990). The choice of Beijing as the site for the first ICM in the new millennium is a sign of the increasing role of Asia in world mathematical development and testifies to China's efforts to build its academic and research prowess. But the choice has also been questioned on human rights grounds.

### **Beijing, an Educational Center**

Although China is still a developing country industrially, mathematically its development goes back at least 3,000 years. Mathematics has long been an important part of education in China, and today it still commands interest and respect among the general public. "Chinese people have great admiration for scientists and mathematicians," commented Roderick Wong, chair of the mathematics department and dean of the Faculty of Science and Engineering at the City University of Hong Kong. Wong spent thirty-two years in North America, where he found the public had far less appreciation of mathematics than in China. He said that an average Chinese person can probably name at least one modern-day mathematician, such as Hua Loo Keng (L. K. Hua). Hua, who died in 1985 at age seventy-five and was a member of the U.S. National Academy of Sciences, worked in the United States before returning to China. In

1952 he became the founding director of the Institute of Mathematics at Beijing's Chinese Academy of Sciences (CAS).

The value China has traditionally placed on education can be seen in the number of institutions of higher education in Beijing, which in 1998 was a staggering sixty-three; the number has dropped to perhaps fifty in the last few years as the government merged some institutions. Among the top universities in Beijing are Beijing Normal University, Peking University, and Tsinghua University. Another high-profile institution is Nankai University in the nearby city of Tianjin, which is about 150 miles from Beijing and which has more than a dozen universities.

In China demand for higher education is strong and increasing: Last year *Asia Week* reported that in 1999, out of 30 million college-age people in China, 7 million competed for just 1.4 million university slots. The Chinese government plans to greatly expand this capacity, with the aim of making higher education available to 15 percent of the college-age population by 2010. The improvement in recent years of China's economic condition has allowed increased investment in universities. For example, between 1999 and 2001 the Chinese government stepped up funding for Peking and Tsinghua Universities by US\$225 million each. The extra money permitted the construction of new buildings with additional office space, improvement of computing facilities, and increases in salaries. A mathematics professor at one of these universities receives, in addition to a housing subsidy and free medical insurance, a salary equivalent to about \$625 to



**The Great Hall of the People, Tiananmen Square in Beijing, China, site of the opening ceremonies for ICM 2002.**

\$875 per month. (As a comparison, the registration fee for ICM 2002 is expected to be around \$240.)

The Chinese government has also expanded support for mathematics research. President Jiang Zemin, in an editorial in *Science* magazine last year, highlighted scientific and technological development as high priorities for China. In particular, he said that because of its limited science budget, the nation would focus on areas like mathematics that do not require large capital expenditures. Over the past three years the National Science Foundation of China has nearly doubled its funding for mathematics. The Chinese Ministry of Science and Technology has identified five “national key research projects” that have a mathematical component: mathematics mechanization and applications, core mathematics, large-scale scientific computing, nonlinear science, and information technology and high-performance software. The ministry currently spends about \$12 million per year to support about one hundred fifty mathematicians working on these projects.

Not all of the universities in Beijing and Tianjin have mathematics departments, but most have departments of “basic science” that employ mathematicians. Counting the approximately four hundred mathematicians on staff in the Academy of Mathematics and System Sciences of the CAS, one might estimate that there are two thousand mathematicians in the Beijing-Tianjin area alone. There are also two high-level mathematics research institutes that employ a small number of mathematicians and hold international conferences. One is the Nankai Institute of Mathematics at Nankai University, founded in 1985 by Shiing-Shen Chern, who is retired from the University of California, Berkeley, and currently serves as the institute’s honorary director [see side bar]. The

other is the Morningside Center of Mathematics at the CAS, founded in 1996 under the directorship of Fields Medalist S.-T. Yau of Harvard University.

### **Planning for the Congress**

The ICM is sponsored by the International Mathematical Union (IMU), which chooses the congress site and appoints committees for local organization and for the scientific program. The Local Organizing Committee for ICM 2002 is chaired by Zhi-Ming Ma, a professor at the Chinese Academy of Sciences and president of the Chinese Mathematical Society (CMS). The CMS does not have precise membership figures, but Ma estimates there are about forty thousand members across China. He also estimates that the number of Chinese mathematicians attending the ICM will be several hundred to one thousand. The total expected attendance at the congress is three thousand to four thousand.

The ICM will begin on August 20, 2002, with opening ceremonies held in the main auditorium of the Great Hall of the People in Tiananmen Square. Often used for major public events, as well as for meetings of China’s National People’s Congress, the Great Hall has a seating capacity of just over ten thousand. If all goes according to plan, President Jiang Zemin will be the featured speaker at the opening ceremonies. His agreement to speak came about during an unusual meeting organized by Chern in October 2000. Chern, who has known Jiang since their days together as university students, arranged for Jiang to meet with a number of prominent mathematicians from outside China. Trained as an electrical engineer, Jiang clearly has an appreciation for mathematics: the fifteen minutes set aside for his meeting with the mathematicians stretched to an hour. IMU president Jacob Palis, a professor at the

## On the 2002 Congress

by Shiing-Shen Chern



*Shiing-Shen Chern is one of the outstanding geometers of the twentieth century. He was born in China in 1911 and received his Ph.D. in 1936 from the Universität Hamburg, under the direction of Wilhelm Blaschke. He was on the faculty of the University of Chicago and the University of California, Berkeley, before his retirement in 1979. In 1985 he founded the Nankai Institute at Nankai University in Tianjin. He now lives in that city and serves as honorary director of the institute. Chern played an important role in the efforts to bring the ICM to Beijing in 2002. What follows are some of his thoughts on mathematics in China and on the upcoming congress.*

The International Congress of Mathematicians will be held in Beijing, China, in August 2002. This event will provide perspective on the 3,000-year span of the history of Chinese mathematics. In China, mathematics has long been a part of the general education and was usually on the applied side. While there was some logical reasoning, no axiomatic foundation existed. However, throughout China's long history there were many important developments. I wish to mention a few significant facts:

1. The most important ancient book was called *Nine chapters of arithmetic*. It must have been published before the time of Christ, and it was in the form of problems and solutions. In 263 A.D. the great Chinese mathematician Liu Hui published a commentary on this book that contained many of Liu's own ideas. The exact dates of Liu's life are unknown.

2. It was known to Liu, or perhaps to others before him, that  $\pi$ , the ratio of the circumference of a circle to its diameter, is a constant. Its calculation naturally became a fundamental problem. Liu obtained the value  $\pi = 3.14 \approx 22/7$ . A further evaluation was made by Zu Chong Zhi (A.D. 420-500), who obtained  $\pi \approx 355/113$  and  $3.1415926 < \pi < 3.1415927$ .

3. The Chinese Remainder Theorem was widely studied. There were many books consisting mainly of methods of calculation.

4. During the thirteenth and fourteenth centuries there was development of algebra by the Chinese. The method was "detached coefficients". In spite of the inefficient method, their achievements in the theory of equations and other areas of algebra were quite remarkable.

Modern mathematics had to be transported to China by students who studied in the West. The first one to obtain a Ph.D. was M. F. Hu, who received the degree from Harvard University in 1917. I studied with T. Chiang, who received a Ph.D. from Harvard in 1919, his adviser being Julian Coolidge. Another teacher of mine was Dan Sun, who received a Ph.D. from E. P. Lane at the University of Chicago. It may be amusing to note that I became Lane's successor at Chicago in 1949.

The general mathematical level in China is comparable to that of other countries, and there is interest in mathematics among the general public. In recent years China has performed exceedingly well in the International Mathematical Olympiad. The Chinese people are very anxious to be connected to the rest of the world. International conferences in China will get a favorable reception.

If you are attending the congress, I believe it makes sense to combine the trip with some travel in China. The people are friendly, and the cost could be minimal. If you are worried about language problems, you might consider engaging a Chinese companion.

I am now comfortably settled at my alma mater, Nankai University in Tianjin. I received my B.Sc. from Nankai in 1930 and my M.Sc. from Tsinghua University in Beijing in 1934. The latter was founded on the return of the Boxer Indemnity Fund by Teddy Roosevelt. It is now the leading university in China and every year gets the best students through a nationwide examination. Beijing and Tianjin are only about 150 miles apart, and there is a good mathematical atmosphere in the Beijing-Tianjin area.

On behalf of the mathematical community of China, I would like to welcome our mathematical colleagues all over the world to attend the International Congress of Mathematicians in Beijing.

Instituto de Matemática Pura e Aplicada in Brazil, was at the meeting and seized the opportunity to invite Jiang to give the opening address at the congress. "He accepted on the spot," Palis recalled.

Barring an emergency that takes Jiang away from Beijing, ICM 2002 organizers are confident he will address the congress. His speech will be

broadcast on national television and covered in the newspapers, Ma noted. "That will make our opening ceremonies very visible to the public," he said. The support Jiang has shown for the ICM no doubt helped the organizers obtain government funding of around \$1 million, about half of what they need. Efforts to raise the remaining funds through

donations from universities, industries, and private individuals are under way. In addition, support in the form of travel grants is offered by the IMU and also by the AMS through a grant from the U.S. National Science Foundation.

Following ICM tradition, the opening ceremonies will include the awarding of the Fields Medals and the Nevanlinna Prize. The rest of the congress, from August 21 to 28, will be held at the Beijing International Convention Center. The center is next to the National Olympic Sports Center, where the 2008 Summer Olympics will be held. In addition to the section and plenary lectures, the congress will feature some cultural events; one possibility is a performance by the Peking Opera. There will also be some sessions aimed at the general public on topics such as the mathematics of genomics, mathematics and the Internet, and the role of mathematics in modern society. An especially large number of the traditional ICM "satellite conferences" will be held before and after the congress in all parts of Asia and one as far afield as Moscow.

### Scientific Program under Development

The scientific program for the congress will consist of about twenty plenary lectures and about one hundred fifty parallel lectures. The parallel lectures are organized into nineteen sections, each focusing on a specific mathematical area. The plenary and section speakers are chosen by the ICM Program Committee, which has around ten members and is chaired by Yuri Manin of the Max-Planck-Institut für Mathematik in Bonn. This is only the second congress for which the name of the chair of the program committee has been made public. After some deliberation the IMU decided to keep the composition of the rest of the committee secret. Were the names made public, the reasoning goes, the great prestige accorded to speaking at the ICM would lead individuals to lobby members of the committee for invitations. The present arrangement allows for the submission of suggestions to the chair but shields the full committee from undue pressures. Manin reported that he received a substantial number of suggestions sent by several national mathematical societies around the world and by one research institute, but few suggestions from individuals.

From congress to congress there are often small changes in the topics of the sections. The topics for 2002 are largely the same as for 1998, except that the section on "Control Theory and Optimization" has been dropped and a section on "Operator Algebras and Functional Analysis" has been added. To choose speakers for the sections, the program committee assembles nineteen panels, one for each section; each panel has a chair plus four to eight other members, whose names are also kept secret. The panels are asked to come

up with an ordered list of possible speakers, containing about 50 percent more names than the expected final number of speakers. The chairs of the panels also coordinate their lists of possible speakers in cases where section topics overlap. All the lists are sent to the program committee, which decides whom to invite, taking into account such considerations as geographical, topical, and gender balance. The section panels also submit to the program committee suggestions for plenary speakers.

Inherent in such a process is the possibility of conflict of interest: Those best suited to choose speakers are often the ones best suited to speak. Phillip Griffiths, director of the Institute for Advanced Study, also serves as IMU secretary. He noted that there have been cases where people serving on panels were asked to be plenary speakers. "But it's not so common," he explained, because the panels tend to consist of older, more established mathematicians, and they aim to invite younger, less established speakers. In other words, said Palis, "Members of the program committee are not choosing themselves." In fact, Manin noted, the current program committee explicitly observed this principle from the very beginning of their work.

The process of inviting speakers, receiving acceptances, and finding alternates for those who decline to speak will be largely complete by the end of August 2001. Decisions about the Fields Medals will be made later, closer to the time of the congress. According to Griffiths, the committee choosing the medalists is "small but representative," with nine members.

### Human Rights Concerns

The choice of Beijing as the site for the 2002 Congress has raised concerns within the mathematical community because of perceived human rights violations in China. Detentions and mistreatment of followers of the Falun Gong religious movement have been widely reported in the media. Other cases have involved academics. For example, in spring 2001 China detained three academics who are originally from China and who had worked outside the country; one is a U.S. citizen and another is a permanent resident of the U.S. (none of the three is a mathematician). They have been charged with espionage. In the wake of the detentions, the U.S. State Department issued a public announcement cautioning that Americans, especially those originally from China, could be at risk of being detained "if they have at any time engaged in activities or published writings critical of Chinese government policies."

On June 4, 2001 (the anniversary of the uprising in Tiananmen Square in 1989), the Committee of Concerned Scientists sent to Chinese governmental officials a petition with nine hundred signatures.

The petition protests the detention of thirteen scientists, including one mathematician, Zhang Zong'ai. The petition says that Zong'ai is "serving a five-year sentence under a harsh regime imposed in 1996, and [is] reportedly ailing." The AMS Committee on Human Rights of Mathematicians has endorsed the petition. Recently the committee has had several discussions about ICM 2002, especially because of the possibility that some ICM attendees might take the occasion to speak out about human rights in China.

Will ICM participants be at risk of detention? Those interviewed for this article did not think so. "All mathematicians who want to attend the ICM, I think they will get visas freely and there will be no dangers," said Ma. "I think the U.S. State Department is too sensitive. There will be no danger, no restrictions for mathematicians." Wong, who is also a member of the ICM Local Organizing Committee, agreed. "I think this is an exaggeration," he said of the State Department announcement. He travels regularly to the mainland from Hong Kong and has not experienced problems. "It's safe to go in and out, with no questions asked," he remarked. But, he added, "I would advise people not to cause trouble—this is an academic event." He speculated that talking about human rights or Chinese government policies would not elicit much response, but more extensive actions, such as setting up a booth to distribute printed materials on these topics, could cause problems.

Stephen Smale retired from the University of California, Berkeley, six years ago and has since been on the faculty of the City University of Hong Kong. In his regular travels to the mainland, he has observed a great expansion in individual and political freedom for the Chinese people and, at the same time, the "almost desperate" attempts of the Chinese government to keep a measure of control, as demonstrated in the repression of the Falun Gong followers. But, he remarked, "I think that in general there will be no problems for ICM attendees under normal circumstances." He said he has felt free to talk about the Tiananmen Square crisis, "and the responses of mainland people are very relaxed."

Tsit-Yuen Lam of the University of California, Berkeley, is a member of the AMS Committee on Human Rights of Mathematicians. He too agreed that ICM attendees are unlikely to run into problems. For one thing, he noted, the Chinese worked hard for years for the privilege of hosting the ICM, and it would be counterproductive if detentions marred the event. Especially if President Jiang Zemin addresses the congress, "the Chinese would try all the more not to do anything to compromise their good-host image," Lam said. But if some congress participants speak out on human rights issues and criticize the Chinese government, it is not clear what the reaction would be. "There are

really too many variables out there for us to take anything on faith," Lam said. Some expressions of protest have proceeded without incident, he noted. For example, at an international mathematics conference in China in the mid-1990s, participants encountered no hindrance to organizing an unofficial session on human rights and social responsibilities of scientists or to circulating a petition on behalf of imprisoned students and academics.

Griffiths said that the IMU discussed the human rights situation in China before deciding on Beijing as the site of the 2002 congress. The IMU received assurances that the Chinese government would grant a visa to any mathematician who wished to attend. The ICM organizers are hoping that the congress attendees will focus on mathematics. "It is our hope that people will view this as a scientific activity, and if they have expressions of concern in other areas, they can exercise them in the way they see fit," Griffiths said. "But we will try to keep the congress a scientific activity, not a political one."

"We are concerned about this," said IMU president Palis, "but at the same time we are quite optimistic that the congress will be a good one in scientific terms and that there will be no serious incidents." A native of Brazil, Palis seemed to understand the aspirations of a developing country like China. "There has been progress in science, particularly in mathematics," he said, "and this is clearly a factor in favor" of having the congress in China. The increasing use of mathematics in all areas of science and technology has created a great demand for mathematics the world over, he noted. "It's a special moment, and maybe the Beijing congress will be part of this new era for mathematics."

—Allyn Jackson

### International Congress of Mathematicians 2002

ICM 2002 will take place August 20–28, 2002, in Beijing, China. The official website for the Congress is <http://www.icm2002.org.cn/>. The *Notices* will publish the list of invited speakers and the full program when this information is available.

The International Mathematical Union (IMU) and the AMS are offering travel grants for mathematicians to attend the congress. For more information on the IMU grants, visit the website <http://elib.zib.de/IMU/>. For the AMS grants, see <http://www.ams.org/careers-edu/icmapp.html>.

—A.J.