An Interview with Professor Friedrich Hirzebruch, Max-Planck-Institut für Mathematik, Bonn.

by Bodil Branner, Department of Mathematics, Technical University of Denmark.

BB: *Professor Hirzebruch, you were the first president of the European Mathematical Society. What do you consider to be the main goals of EMS?*

FH: When Sir Michael Atiyah started the European Council of Mathematics in 1978 the most important goal was to establish co-operation between East and West and with this in mind to form an organisation which had not only societies as members, perhaps several of one country, but also individual members, in order to give it a more flexible and less political structure than the International Mathematical Union (IMU). When I became president in 1990 the iron curtain had fallen, symbolically by the fall of the wall in Berlin, so the separation between East and West became an economic one. People in the East are now allowed to travel, but they do not have the money to do so. For example, it is difficult for them to attend the ICM in Berlin. The EMS has tried to help and should continue to give support. Although EMS does not have many financial resources itself, it can give moral support and back up applications to the European Union and the European Science Foundation (ESF), for instance. The EMS can encourage exchange programmes and stipends, to for example Russian mathematicians, so they can better survive in their home institutions.

Another important role of the EMS is to make modern communication means available to the mathematical community. With the new age of electronic communication, electronic journals and the need for large databases it is important to have an established and independent organization as EMS to be responsible. The EMS has already done a lot through EMIS and is also playing an important role in reshaping the database Zentralblatt MATH.

The negotiations with Springer-Verlag about JEMS, the new Journal of the European Mathematical Society, started under my presidency. The journal, which will be both on paper and in electronic form, is now about to come out with Jürgen Jost from the Max Planck Institute in Leipzig as its chief editor.

A third important task of EMS is to make mathematics better known and understood by the general public. Very few people are aware of the important role mathematics plays in everyday life. This we must emphasise together with the increasing need for highly educated mathematicians in society.

Every national mathematical society should of course also be aware of this role. Many attempts have already been made in this direction. For example in Germany, recently two books were published. One, *"Verständliche Forschung: Moderne Mathematik"*, is for the educated public and edited by Gerd Faltings. It consists of a collection of papers which have previously been printed in *"Spektrum der Wissenschaft"* (the German version of Scientific American).

Another one, *"Überblicke Mathematik"*, consists of survey papers for a broader audience. This is a volume in a series which is published every year by Vieweg. Let me mention also the beautiful book *"The Parsimonious Universe: Shape and Form in the Natural World"* by Stefan Hildebrandt (Bonn) and Anthony Tromba (UC Santa Cruz), published by Springer-Verlag, 1996.

The Round Tables at the European Congresses of Mathematics and the Diderot Mathematical Fora are other initiatives by the EMS in the same direction.

BB: *I would like to hear your comments on the changes in the mathematical community in the former East Germany that happened after the unification.*

FH: While the situation is now rather stable, I would not say that there was a fortunate solution for everyone. Some are jobless, but as a whole I think universities came out quite well in mathematics. The new states (*"Länder"*) entered the Federal Republic, therefore federal laws became the laws to be reinforced, and the university system had to be adapted to the one in West Germany. It was certainly not easy; for instance, most positions were previously permanent in the East, including assistant positions, and that had to be changed.

In most universities committees were formed, at the top level and for the various fields. Usually half of their members were from the East, half from the West. The committees had to prepare the transition to the new system.

This was done differently in different places. For example in the Humbolt University in Berlin everybody was fired, they were actually still being paid, but all positions had to be renewed, so people had to compete with others for the position they occupied before. This looks so very hard and strange, but in reality most senior people could retain their professorships.

The federal government introduced *"Wissenschaftler-Integrations-Programm"*. Scientists who were unable to get a position at the university or their research institute were paid five years to do research and to give them time to find a position elsewhere. In addition to this, the Max Planck Society reacted especially fast to the unification. They set up 28 working groups in different fields. These were financed for five years and attached to a university with the hope that the groups could be integrated and financed by the university when the five year period was over. The groups had excellent working conditions. They often came out of institutes of the Academy of Sciences of the DDR. There were two working groups in mathematics, one attached to the Humbolt University (*"Algebraische Geometrie und Zahlentheorie"*) and the other to Potsdam University (*"Partielle Differentialgleichungen und komplexe Analysis"*). The groups were well funded.

The two groups had money for post- and pre-doctorial stipends and for visitors. Also office space, computer and library facilities were excellent. The integration into the universities was successful to a great extent. The two mathematical groups came from the *"Karl-Weierstraß-Institut"* of the Academy where some 160 mathematicians held permanent positions. All institutes of the Academy were closed. Most institutes were then founded again, very few as a Max Planck Institute or a Fraunhofer Institute. Many became so-called "blue" institutes. These are individually funded by agreement between the Federal Government and the government of the state where they are located. Both governments pay half of the money. In West Germany institutes of the "blue list" are rare. But the "blue list" was used as an instrument for former Academy institutes. Also the Karl Weierstraß Institute lives again as a blue institute under the name *"Weierstraß-Institut für Angewandte Analysis und Stochastik"*. After the two Max Planck working groups left, and some people went to industry or early retirement, the institute has now around fifty positions which are mainly permanent, though this will be changed gradually. The number of permanent positions is very large in comparison with the *"Max-Planck-Institut für Mathematik"* where only three directors and three other mathematicians are on permanent Max Planck Society positions.
So many Academy institutes survived by becoming blue. The blue institutes (east and west) are loosely joined in a "blue society" which accepted the name Gottfried Wilhelm Leibniz Society. The DDR Academy itself was closed and reopened as *"Berlin-Brandenburgische Akademie der Wissenschaften"* carrying on, as the DDR Academy did, the traditions of the academy founded by Leibniz in 1700. The 300th anniversary of this academy is in preparation. Altogether sixteen new Max Planck Institutes have opened in the new states after the unification. Among them, the *"Max-Planck-Institut für Mathematik in den Naturwissenschaften"* was founded in Leipzig with Jürgen Jost (formerly Bochum University), Stefan Müller (formerly ETH Zürich), and Eberhard Zeidler (formerly Leipzig University) as directors. This is a young and very energetic team. The institute is in a beautiful building and has ideal working conditions in every respect.

BB: *You started to study mathematics at a very difficult time.*

FH: I started in Münster in December 1945 under Heinrich Behnke. He had come back to Münster in the Summer of 1945 to build up the university again. He did not take part in the war, at the end he had lived in Oberwolfach. He became the Dean of the Faculty of Philosophy and Sciences. He died in 1979. By the end of June 1998 we celebrated Behnke's 100 years birthday in Münster.
I was just 18 when I started. Many students were much older. They had spent seven years in the war. We were all happy to be able to study, and to be alive. The city had been destroyed, and very little of the university had remained. So in the beginning we only had lectures one day every third week. In between we had lots of homework. We had to share one of the very few usable lecture halls with other fields. We soon became about 300 students in mathematics. There was no library and no books, only notes. I had however a few books from my father, who was a teacher in mathematics and the head of a secondary school. The situation improved rather fast, already in the second semester another building had been repaired and there were lectures every second week. From the third semester we moved to temporary buildings and were able to have a full programme and to live in an active mathematical atmosphere. Until then I had lived at home, in Hamm about thirty kilometres away, and commuted by train; it often took hours to travel this rather short distance. But from then on I had a room in Münster.
I learned a lot about complex analysis from Behnke. From the Summer of 1949 I studied three semesters at the ETH in Zürich where I learned topology and many other things from Heinz Hopf and Beno Eckmann and wrote my dissertation under Hopf on singularity theory in two complex dimensions. I received my Ph.D. degree from Münster University under Behnke in the summer of 1950. In 1954/55 I obtained my Habilitation in Münster with my book *"Neue topologische Methoden in algebraischen Geometrie"*. The results were achieved during the two year visit I paid in 1952 1954 to the Institute for Advanced Study in Princeton. There I was together with Borel, Kodaira, and Spencer. Using Thom's cobordism theory I was able to complete my proof of the Riemann-Roch theorem in December 1953. For the academic year 1955/56 I came back to Princeton as an assistant professor at the university. I had thought I would stay longer. But I returned to Germany in June 1956 to accept a chair at Bonn University which had been offered to me already in 1955 before I left to Princeton.

BB: *Immediately after you came back from the US you started the famous workshops called "Arbeitstagung".*

FH: Yes, I wanted to develop international contacts. The first Arbeitstagung was in 1957. Present were Atiyah, Grauert, Grothendieck, Kuiper, and Tits. They were together with me the founding members. Over the years the meetings grew to a size of about 200 participants. My idea was to have such a meeting each year. Often people start to prepare a meeting two years in advance, with correspondence about speakers and topics. I wanted to minimize the work, but more important to have the latest information. So out of laziness and search for efficiency grew a structure where very few lectures were decided ahead of time, and most were decided during open programme discussions. As a result many achievements were first reported during some Arbeitstagung. Very often Michael Atiyah was the first speaker.
We usually did not have proceedings, but at the 25th meeting in 1984 we had one, published as Springer Lecture Notes in Mathematics Vol. 1111, and for that special event half of the talks were decided ahead of time. Besides being proceedings of that meeting it also surveys the previous ones.
In 1991, at the 30th meeting, I announced that this was the last Arbeitstagung that I would arrange. After that it was decided that there would be meetings every odd numbered year. There have already been three meetings in this new series.

BB: *You kept your professorship at Bonn University while you were director of the "Max-Planck-Institut für Mathematik" in Bonn. This seems to me to be a very personal choice.*

FH: If I had insisted, the Max Planck Society would certainly have agreed to pay me full time as director. But I like teaching very much, in particular I like to follow students from the start, so a number of times I taught a consecutive sequence of courses from the beginning and all the way leading to specialised courses. When I became the director of the Max Planck Institute in 1982 it was agreed with the university that I would keep my teaching duties, but be given some privileges. I had less administrative duties inside the university, only when it was really needed I had to participate in special sessions, for instance hiring committees for professorships. I also had more sabbaticals than other people. This was mainly done with the purpose that I could concentrate on my work as director of the MPI and not go away as other people would usually do during their sabbaticals. This was a good solution, but I must say that I had to give up the idea of running seminars.
I retired from my professorship at the university in February 1993 and as director of the Max Planck Institute in October 1995.

BB: *Has the way in which the MPI in Bonn is organized changed over the years?*

FH: No, we have tried not to enlarge the number of visitors. It has a good size, people still know each other. Sometimes we have special activities, but this is not regular. We have kept a very flexible structure. Individual mathematicians can apply at any time. But if a mathematician will be the only one working in an area then we will advise him or her to go somewhere else. People here should talk together and work together.
We shall soon move to a larger building. A report about this plan is contained in a recent issue of the Notices of the American Mathematical Society.

BB: *As in the Scandinavian countries, there are very few female mathematicians in Germany, at least in the former West Germany. Do you foresee any changes in this situation?*

FH: There are very few women who continue after the Diplom Exam to get their Ph.D. degree and Habilitation. At Bonn University only two or three women have finished a Habilitation in mathematics. But there are female applicants to most positions at universities. There are certain rules, that vary in the different states, which imply that if a woman applies she should get a chance to present herself. But still often she ends up as number three on the list of candidates and not number one. So she finally does not get the position. I don't want to say that there is discrimination, I hope not. The competition is very hard. But I do not see any real changes in the situation coming up.
At the Max Planck Institute we have always had a fair number of female visitors, reflecting the international level. In July this year I organise a special programme at the MPI on the Topology of Algebraic Varieties together with Mina Teicher from Israel.

BB: *You have close relations to Israel.*

FH: My first visit to Israel was in 1981 as a Sackler lecturer at Tel Aviv University. But since I received the Wolf Prize in 1988 I have returned almost every year.
The Minerva Stiftung is a daughter of the Max Planck Society. It is funded by the Federal Government for the scientific co-operation with Israel. There exist 42 Minerva Centers in Israel at universities, the Weizmann Institute and other research institutions. Minerva supports the host institution with a capital endowment (in many cases 2 Million DM) to be invested. The interest is matched by the host institution and both add up to the annual budget of the centre.
Three centres are devoted to mathematics (the Edmund Landau Center for Mathematical Analysis at the Hebrew University established 1987, the Emmy Noether Mathematics Center in Algebra, Geometry, Function Theory and Summability at Bar Ilan University established 1991, and the Herman Minkowski Center for Geometry at Tel Aviv University established 1995). The centres have visitor programmes, post doc positions for Israelis and Germans and organize meetings and summer schools. Each centre has an advisory board consisting of three or four Israelis and the same number of Germans, always with a German in the chair. I was the chairman of the board of the Edmund Landau Center and am the chairman of the board of the Emmy Noether Center.

BB: *You have been the president of the "Deutsche Mathematiker-Vereinigung" twice, and both times happened to be very special.*

FH: I was elected as president of the DMV in 1961 at the last joint meeting in Halle in the DDR. Shortly before that meeting the wall in Berlin was erected and suddenly it was not possible for all members of the presidium to meet in the same place. East Germans had to stay in East Germany (including East Berlin). West Germans could travel to East Berlin and East Germany, with some trouble to obtain visas, but West Berliners could not. There was no place in Germany where all types of Germans could meet together. I invited the presidium to Berlin. We met twice, in East Berlin and West Berlin. I went through the wall for the first time. A separation was unavoidable, moreover the government of the DDR and in particular the DDR Academy of Sciences, wanted an independent representation in the International Mathematical Union. In 1962 the Mathematical Society of the DDR was founded and mathematicians in the DDR were no longer allowed (by their government) to be members of the DMV. You can read about this development in the new book *"Mathematics without Borders: A History of the International Mathematical Union"* by Olli Lehto, secretary of the IMU 1983 1990. It was published by Springer-Verlag, 1998.
The second time I was president was in 1990, the year when the DMV celebrated its 100th anniversary. I had been asked some couple of years before and had agreed. I was told there would not be much to do, but suddenly I found myself very busy with problems concerning how to unify the two mathematical societies. The Mathematical

Society of the DDR had, contrary to the DMV in the West, many secondary school teachers as members and it was debated if they could all become members of the new reunified society (if they wanted). At the end it was agreed that all members of the DDR society could become members of the new society which, in fact, legally was the old DMV. The DMV did not make any political investigations. In case of suspected co-operation with the Stasi such checks had to be done at the working place of that person.
The new DMV immediately started to prepare the invitation to host the International Congress of Mathematicians in Berlin in the year 1998.
I received the last medal of merit of the Mathematical Society of the DDR.

BB: *You are the honorary president of the International Congress of Mathematicians in Berlin.*

FH: I am the honorary president of the organising committee of the ICM. I did not do much work. But I managed to obtain a special postage stamp for the congress with a mathematical motive. There have been special stamps in connection with five of the earlier congresses, namely 1966 in Moscow, 1978 in Helsinki, 1982 in Warsaw (although the congress was postponed to 1983), 1990 in Kyoto, and 1994 in Zürich. I submitted a lot of material which was distributed to several artists. From the proposals, drafted by the artists an independent non-mathematical committee selected a motive showing an almost square subdivided into different squares. Behind this the artist has chosen to show the beginning of the decimal extension of π, repeatedly arranged in arcs, so that it reminds us of a full auditorium. The special stamp will be presented at the opening of the ICM by the state secretary of the federal ministry of finance.

BB: *Thank you very much.*