

# Friedrich Hirzebruch Memorial Session at the 6th European Congress of Mathematics. Kraków, July 5th, 2012

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The first president of the European Mathematical Society and eminent mathematician, Friedrich Hirzebruch, passed away on the 27th of May this year. In this session we will honour and celebrate his life and achievements.

*I invite the audience to stand up and to hold one minute's silence in his memory.*

Professor Hirzebruch was one of the most influential mathematicians of the 20th century. His early work on the signature theorem and on the high-dimensional Riemann-Roch problem paved the way for important advances such as Atiyah-Singer index theory and Grothendieck's work in algebraic geometry. He was himself one of the contributors to these developments, as well as many others in the fields of topology and geometry. For this, he received awards, like the Wolf Prize for Mathematics, the Lobachevski Prize and the Albert Einstein and Georg Cantor Medals, among others.

His activity was not solely concentrated on his own scientific production but also to set up and to develop suitable structures – both physical and social – for the development of mathematical activity.

Hirzebruch contributed in an essential way to the reconstruction of German mathematical research after World War II. He is the founding director of the Max-Planck Institute for Mathematics in Bonn, an outstanding mathematical centre that, since its creation, has provided excellent conditions for international contacts and collaborations between researchers across the world, independently of their origin and gender.

He served as president of the German Mathematical Society for two different terms and, as has been mentioned earlier, he was the first president of the European Mathematical Society.

My last contact with him was related with a modest initiative I undertook at the beginning of my appointment in 2011. It consisted of editing a "gallery" of past-presidents on the EMS website. We immediately got his kind collaboration. Later, I was able to appreciate from the inside his enormous contributions to the society. Starting from scratch, he built the basic structure that underpins the society nowadays: its basic committees and editorial activity, the contacts with the EU political bodies, the ECMS, the EMS Prizes and an incredible network of collaborations across Europe, in a period where the continent was still politically split into two blocs.

I was privileged to be a member of the Scientific Council of the Banach Centre when he was the chair. During the meetings, I always enjoyed his insight, his perceptiveness and his friendly and constructive style.

On behalf of the EMS, I express heartfelt thanks to all the contributors of this memorial, colleagues and friends who will evoke different aspects of his life: Christian Bär, Jean-Pierre Bourguignon, Stanislaw Janeczko, Yuri Manin and, in absence, Sir Michael Atiyah and Gert-Martin Greuel. Our thanks go also to all the participants in the audience, for joining us in this well-deserved tribute to such a relevant mathematician and wonderful human being.

*Marta Sanz-Solé  
President of the EMS*

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It is sad that the Congress in Kraków follows the death of Fritz Hirzebruch last month. He was the first President of the EMS at a time when the new Europe was emerging and he played a key role in ensuring that mathematicians from all over Europe were able to participate in the new society.

I was a close friend and collaborator of Fritz for over 50 years so I got to know him very well both as a mathematician and as a person. In fact, his personal qualities were crucial to his achievements. He was kind and considerate to all, young and old, and he was able to handle difficult issues with skill and finesse.

Fritz was the outstanding figure of German mathematics in the post-war world and he was the person who rebuilt mathematics in his country after the terrible years of the Nazi regime. Through his mathematical and personal leadership, Bonn became the centre that Gottingen and Berlin had been before. The Max Planck Institute that he founded in Bonn attracted scholars from all over the world and had a major impact on countries as varied as Japan and the (former) Soviet Union.

The *Arbeitstagung* that he organised on an annual basis for over 20 years was typical of his style. The meetings were informal, with no set programme, and moved with the times, following the most exciting developments in various fields. His own mathematical taste affected the atmosphere and over the years covered areas in all branches of geometry stretching from number theory to physics.

He was a remarkably lucid thinker, speaker and writer. His lectures were beautifully planned, his papers were a joy to read and his theorems were works of art. He was a virtuoso with algebraic formulae but he always integrated these into a grander design.

His legacy, in Europe and beyond, has many dimensions. Besides the institutions that he shaped such as the EMS and the MPI, he had many students and others

whom he profoundly influenced. His own mathematical contributions are deep and varied and have left their mark on our science. But, above all, we will remember him with warmth and affection as a friend.

*Sir Michael Atiyah*  
*University of Edinburgh, UK*

On 27 May, Friedrich Hirzebruch died at the age of 84.

His death came as a surprise not only to his colleagues but also to his family. We were all shocked when we heard the sad news.

Every mathematician anywhere in the world knows Hirzebruch's name. This is due to his outstanding contributions to our science. Hirzebruch's scientific *œuvre* consists of about 140 publications including several very influential books. His work contains:

- The signature theorem for differentiable manifolds and a proof of the Riemann–Roch theorem for algebraic varieties of arbitrary dimension.
- Integrality results for characteristic numbers of differentiable manifolds as opposed to topological manifolds.
- The complete theory of characteristic classes of homogeneous spaces of compact Lie groups (with Armand Borel).
- Complex topological K-theory and applications to geometry (with Michael Atiyah).
- Relations between differential topology and algebraic number theory, in particular a proof of the Dedekind reciprocity theorem through 4-manifold theory.
- Hilbert modular-forms and -surfaces and their relations to class numbers.

The list shows that Hirzebruch covered many fields in mathematics including topology, differential and algebraic geometry, and number theory.

This is certainly not the right occasion to give a mathematical talk but I would like to illustrate the importance of his work by an example.

To put things into perspective let me remind you of the classical *Gauss–Bonnet* theorem. It says

$$2\pi\chi(M) = \int_M K dA,$$

where  $\chi(M)$  is the Euler–Poincaré characteristic of  $M$  which can be computed by counting vertices, edges and triangles of a triangulation of  $M$ . It is a topological invariant. On the right side we find the integral of the curvature of  $M$ .

This classical result can be generalised to higher dimensions. In odd dimensions the Euler–Poincaré characteristic vanishes but in even dimensions we have the *Gauss–Bonnet–Chern* theorem:

$$\chi(M) = (2\pi)^{-n/2} \int_M Pf(R),$$

where the integrand on the right side is the Pfaffian of the curvature matrix.

Hirzebruch has two important results of a similar flavour. The first one is the *signature theorem*

$$\text{sign}(M) = \int_M L(R),$$

where the signature is another topological invariant of closed oriented manifolds of dimension divisible by 4 and  $L(R)$  is the L-polynomial evaluated on the curvature matrix.

The second one is a generalisation of the classical Riemann–Roch theorem for Riemann surfaces to higher complex dimensions, the *Hirzebruch–Riemann–Roch* theorem:

$$\chi(M, E) = \int_M \text{Td}(M) \cdot \text{ch}(E).$$

Here  $\chi(M, E)$  is the holomorphic Euler number of the holomorphic vector bundle  $E$ ,  $\text{Td}(M)$  is an expression in the curvature of  $M$  and  $\text{ch}(E)$  an expression in the curvature of  $E$ .

A full proof is contained in Hirzebruch's habilitation thesis which appeared as a book: *Neue topologische Methoden in der algebraischen Geometrie*. Let me cite from a book review by Chern:

*The book uses many of the deep results in different branches of mathematics, and may cause difficulty even to readers with a good background. One should realize, however, that this is essentially an original paper. For such the introductory material is ample; it is also well written. If the reader succeeds in reaching the summit, the panorama is highly recommendable.*

These two theorems are not only central results with many applications; they were also crucial in paving the way for one of the most exciting developments in the mathematics of the 20th century. To understand this let us reinterpret the signature theorem: Classical Hodge theory tells us that the signature of  $M$  is the Fredholm index of a certain elliptic first order operator  $D$  acting on differential forms on  $M$ ,  $\text{sign}(M) = \text{index}(D)$ . Chern–Weil theory tells us that the curvature integral on the right side is the evaluation of a characteristic class built out of the Pontryagin classes of  $M$ . Hence Hirzebruch's signature theorem now reads:

$$\text{index}(D) = \langle L(p_1, \dots, p_k), [M] \rangle.$$

A similar discussion applies to the Hirzebruch–Riemann–Roch theorem. Both theorems were a strong indication that the analytic Fredholm index of elliptic first order operators can be expressed in terms of topological characteristic numbers. Indeed, Atiyah and Singer found the general index theorem which finally explained this phenomenon.

So much for the mathematics. Hirzebruch was extraordinary in various other respects. He not only did wonderful mathematics himself; he also supported mathematics and other mathematicians as much as he could. For instance, he founded the Max-Planck Institute for

Mathematics in Bonn that many of you probably know from your own visits. He started the famous series of conferences known as “Arbeitstagung”. He was the first president of the European Mathematical Society. We will hear more about this from the other speakers.

He was President of the German Mathematical Society in 1962 and in 1990. Let me say a few words about this. Hirzebruch was elected as president in 1961 at the last joint meeting of German mathematicians in Halle in East Germany. He was a young man in his early 30s and had to manage a very difficult situation. Shortly before the meeting, the wall in Berlin had been erected and the division of Germany and of Europe had been finalised. Due to travel restrictions, it was no longer possible for all members of the executive committee to meet in the same place. Hirzebruch arranged for the executive committee to meet twice, once in West Berlin and once in East Berlin. In 1962, political pressure became so strong that finally the Mathematical Society of the German Democratic Republic was founded and East German mathematicians were no longer allowed by their government to be members of the German Mathematical Society. Nonetheless, Hirzebruch made a big effort to stay in contact with East German colleagues in the years that followed.

In 1990, the German Mathematical Society would celebrate its 100th birthday and Hirzebruch had agreed several years before to serve as president in that special year. History held an unexpected surprise for him. In 1989 the Berlin wall came down and Germany was reunited the following year. Hirzebruch found himself having to organise the reunification of the two mathematical societies. It was debated whether there should be any checks on whether the members of the Eastern Society had been collaborating with Stasi before allowing them to become members of the newly reunited society. It was finally agreed that everybody could become members of the German Mathematical Society if they wanted. Political checking was left to employers. Hirzebruch’s personality was crucial in finding a solution that would, to the extent possible, avoid hurting people. He also played an important role in restructuring the mathematics departments in former East Germany including the one I am now working at: the University of Potsdam. Hirzebruch received the last medal of merit of the Mathematical Society of the GDR.

The newly united society immediately started to prepare the invitation to host the ICM in Berlin in 1998. Hirzebruch was honorary president of the organising committee and managed to obtain a special postage stamp on the occasion.

There was another concern about which he felt very strongly. He got engaged with the Minerva Foundation which provides stipends and exchange programs for German and Israeli scientists. Encouraging cooperation between Jewish and German mathematicians was very important to Hirzebruch. He visited Israel almost every year.

For both his mathematical work and his other activities Hirzebruch received many honours. He was elected member to at least 23 academies, he was awarded doctor-

ates from at least 15 universities including mine and he won many prestigious prizes including the Wolf Prize for Mathematics, the Lomonosov Gold Medal of the Russian Academy of Sciences and the Stefan Banach Medal of the Polish Academy of Sciences.

Let me conclude with a few personal words. I had the privilege to meet Professor Hirzebruch when I was a student in Bonn. He was not my supervisor but I attended several of his lecture courses and seminars. We, the students, loved his enthusiasm, his great sense of humour and his ability to explain mathematics in such a way that it appeared totally natural and crystal clear. When a very technical proof had to be carried out, however, it would often happen that he was travelling and his assistant had to deal with the technical details. I once mentioned this to him and he assured me that this was pure coincidence. But he would say it with a twinkle in his eyes.

Thank you very much!

*Christian Bär*  
*President of the*  
*Deutsche Mathematiker Vereinigung, Germany*

Personally, over the last 40 years, I owe a lot to Friedrich Hirzebruch, for his unfailing support and the continuous inspiration. I met him in Bonn in 1970, while I was visiting Wilhelm Klingenberg as a very young researcher in differential geometry. At this time, French mathematics was strongly dominated by algebraic geometry “à la Grothendieck” and in Bonn, although Friedrich Hirzebruch was also an algebraic geometer, I could feel a more open attitude towards other sorts of mathematics.

The *Arbeitstagung*, a major mathematical event that he organised with his Bonn colleagues for more than 30 years, offered each year in June a broad overview of the most exciting mathematics of the time. It was an exceptional place to meet mathematicians of all sorts, famous and less famous, senior or just beginning. As like many young mathematicians, I have benefited a lot from it, directly through the new perspectives gained by listening to the lectures and indirectly through the great number of encounters, some of which had a great impact on my professional life.

It is really during the academic year 1976–1977, spent in Bonn with my family as guest of the Sonder-ForschungsBereich 40, that I got to know him better. I would also meet there Jacques TITS, whom he attracted to Bonn.

He was always curious to know what kind of mathematics was on your mind and showed special interest in young mathematicians. Note should be made also of his determined, proactive attitude towards women mathematicians at a time where gender equality was not given much priority. Several women colleagues consider that they owe him a lot because of his continued support.

The numerous encounters with him that followed the wonderful year in Bonn gave me ample opportunity to witness his many talents: as an outstanding mathematician of course but also as a remarkably clear lecturer, an

efficient communicator and an exceptionally talented manager. Some of them were quite unexpected for me, such as accompanying him to a press conference with German journalists to discuss the development of mathematics in his country. We also had rather intense discussions when, as Chairman of the Programme Committee for the International Congress of Mathematicians 1986 to be held in Berkeley, he supervised me as I was in charge of the geometry section, most likely due to his support. The establishment of the *Max-Planck Institut für Mathematik in den Wissenschaften* in Leipzig was yet another occasion for extensive exchanges.

He has been a great supporter of the collaboration between the Institut des Hautes Études Scientifiques (IHÉS) and the Max-Planck Gesellschaft (MPG). He represented the MPG on the Board of Directors of IHÉS for several years. He, as director of the Max-Planck Institut für Mathematik, and Sir Michael Atiyah, as founding director of the Isaac Newton Institute in the Mathematical Sciences, endorsed immediately the idea of the European Post-Doctoral Institute (EPDI) that I proposed in the Autumn of 1994, shortly after becoming the director of IHÉS. Already in 1995, the three institutions would join forces to get young post-docs to move around Europe. For the inaugural ceremony in Bures-sur-Yvette, he gave a very inspiring speech on the role of institutes in mathematics.

### Friedrich Hirzebruch and International Relations

Very early in his career, Friedrich Hirzebruch had an international dimension to his professional life:

- He visited Heinz Hopf at the ETH in Zurich in the early 1950s and visited the US, where he stayed at the Institute for Advanced Study and the University in Princeton later in the 1950s.
- His involvement in the EUROMAT project as early as 1956 and his leading role in the attempts at broadening the 'Oberwolfach Mathematisches Institut' into a Max-Planck Institute, as discussed in the contribution by Gert-Martin Greuel.

Friedrich Hirzebruch held many responsibilities at the international level during his career. He chaired many evaluation committees, was an editor of several scientific journals and was an active member of numerous scientific



Chern Shiing-Shen, Samuel Eilenberg, Friedrich Hirzebruch in the early 1950s in the US.

committees for conferences of all sorts. The extraordinary number of distinctions and honours that he received shows the very high level of recognition that he enjoyed in many countries, with a special mention for Japan and Israel, where his action was particularly appreciated.

He was of course instrumental in bringing the International Congress of Mathematicians (ICM) back to Germany in 1998, exactly at the time of the 100th anniversary of what has now become the major *rendez-vous* of the international mathematical community and 94 years after the third ICM was held in Heidelberg. It was therefore natural that he be declared Honorary President of the ICM'98 Organising Committee.

### Friedrich Hirzebruch's Special Relation to Henri Cartan

All through his career, Friedrich Hirzebruch had a lot of interactions with Henri Cartan: his first interaction was in relation to Cartan's efforts to renew contact between German and French mathematicians. Indeed, as early as November 1946, Henri Cartan lectured in the Lorenzenhof in Oberwolfach. Henri Cartan's long friendship with Heinrich Behnke was the context in which Friedrich Hirzebruch met him.

In this connection, Friedrich Hirzebruch wrote the following:

*"The 'Association Européenne des Enseignants' ('European Association of Teachers') was founded in Paris in 1956. Henri Cartan was president of the French section. As such he took the initiative to invite participants from eight European countries to a meeting in Paris in October 1960. Emil Artin, Heinrich Behnke and I were the German members. The second meeting of this committee was in Düsseldorf in March 1962. As a result, the Livret Européen de l'Étudiant (European Student's Record) was published and distributed by the Association. The booklet contained a description of minimal requirements for basic courses. It was supposed to increase the mobility of students from one country to another. The professor of one university would mark in the booklet the contents of courses attended by the student. The professor at the next university would then be able to advise the student in which courses to enrol. The booklet was not used very much."*

A lot on their relationship can be learned from reading the letter that Friedrich Hirzebruch wrote in 1994 to Henri Cartan on the occasion of his 90th birthday (see a facsimile of this letter on the next page).

### The Beginnings of the European Mathematical Society

The European Council of Mathematics (EMC) opened the way to the European Mathematical Society (EMS). The EMC met regularly in Oberwolfach under the leadership of Sir Michael Atiyah but no Germans were involved in running the EMC.

The foundational meeting of the EMS was held in October 1990 in Madralin and it was not an easy affair, as

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 3. Juli 1979

Lieber Herr Cartan!

Zu Ihrem 90. Geburtstag möchten meine Frau und ich ganz herzlich gratulieren und Ihnen und Ihrer Frau Gesundheit und Wohlbefinden wünschen. Köpftlich wird Sie dieser Brief zum 8. Juli rechtzeitig erreichen. Wegen gelegentlicher Postverzögerungen in Deutschland ist dies nicht ganz sicher.

Ich freue mich sehr, daß Sie die Ehrenmitgliedschaft der Deutschen Mathematiker-Vereinigung angenommen haben, und danke Ihnen sehr herzlich für Ihre Güte an mich in Ihrem Antwortschreiben an Herrn Grötschel, wo Sie auch meine Habilitation erwähnen (1955). Damals fragte ich Bekke, wie mein Vortrag sein sollte. Er antwortete: „Ganz einfach. Der Dekker, ein Pharmazent, muß es verstehen, und Cartan muß es interessiert finden.“ Meine Frau und ich sind Ihnen und Ihrer Frau häufig begegnet. Das war immer eine große Freude für uns. Wir danken nun besonders an das Zusammenreffen in Dubai und Moskau beim ICM 1966, als Sie zum Präsidenten

gewählt wurden und Ihre regensreiche Tätigkeit für die IMU, u.a. auch mit der Vorbereitung des ICM 1970 in Niiza, Japans. Anfang August reisen meine Frau und ich zum ICM 1977 nach Zürich. Vorher ist die Versammlung der IMU in Luzern, an der ich teilnehme. Ich hoffe, daß dort die Einladung nach Berlin (1998) endgültig akzeptiert. Heinrich Bekke hat immer gesagt, der Kongreß müsse endlich einmal wieder in Deutschland stattfinden (schlotet Heidelberg 1909), und war traurig, daß die Einladung nach Deutschland für 1966 nicht realisiert werden konnte, da die erste Einladung in die Sowjetunion natürlich vorging. Ähnlich war es 1990, als Ostasien vorging. Nun wird vielleicht im Jahre seiner 100. Geburtstages der ICM nach Deutschland kommen.

Ich weiß nicht, ob ich Sie bei Ihrem Besuch in Münster 1977 gesehen habe. Gesehen habe ich Sie wohl zum erstenmal, als ich 1951/52 als junger Assistent von Erlangen aus nach Oberwolfach kam. Ich gehöre zu den vielen Mathematikern in Deutschland, deren Sie nach dem Kriege Mut und Kraft geschenkt haben. Im Dezember 1953 haben Sie im Bourbaki-Seminar über meine Dissertation vorgetragen. So danke ich darüber an vielen zurück.

Ihren frühen Einsatz für den Europäischen Gelanben konnte ich bewundern, da ich bei den Beratungen über das Europäische Struktur-Buch dabei war. Für den Europäischen Kongress in Paris 1992, und damit auch für die European Mathematical Society, haben Sie viel getan. Deshalb möchte ich Ihnen heute auch im Namen der EMS herzlich gratulieren und danken. Meine Zeit als Präsident der EMS ist bald vorbei, am 31. 12. 94 scheidet ich aus. Im Anschluß an den Kongreß in Zürich trifft sich der Council der EMS. Mein Nachfolger wird dort gewählt.

Meine Frau und ich hoffen, daß wir Sie und Ihre Frau bald einmal wiedersehen.

Nachmals ganz herzlich Glückwünsche

Ihr  
 F. Hirzebruch

opposite views on the structure of EMS were presented by some delegations. One of the key issues was to decide whether the new society could accept individual members or be only a federation of societies. The first day, while the EMS was not yet in existence, ended in a dangerous situation of tension, with no clear compromise in sight. Friedrich Hirzebruch, who had accepted being considered as the first EMS president, led to success that rather tense meeting held the first evening until late at night behind closed doors, between supporters of the conflicting positions. As President of the Société Mathématique de France, I was one of the troublemakers on this occasion. The next day, the new society would be created with statutes ensuring a good balance between individual members and member societies, a feature that still remains to this day.

Under Friedrich Hirzebruch leadership, the EMS developed successfully. A lot had to be achieved in a short time to take advantage of the dynamics that accompanied the creation of the society. Among milestones of his mandate, one can single out the setting up of the first European Congress of Mathematics in Paris in 1992 and laying the ground for the creation of the *Journal of the European Mathematical Society (JEMS)* that was finally created in 1999.

To my great surprise, he asked me to become his successor as EMS President in 1994, to serve for the second term 1995–1998, another great honour that he bestowed on me.

**Friedrich Hirzebruch's Long Friendship with Shiing Shen Chern**

Friedrich Hirzebruch shared with Shiing Shen Chern a long friendship. They met in 1953 and had regular and substantial exchanges.

In the book gathering tributes to the late S. S. Chern on the occasion of his centenary, he wrote “Shiing-Shen Chern, one of the greatest mathematicians of the 20th century, was for me a fatherly friend whom I owe very

much. I knew him since 1953 and will always remember our meetings in Chicago, Princeton, Berkeley and Bonn.”

He felt that he could not take part in the conferences celebrating the centenary of S. S. Chern held in October 2011 at the Chern Institute in Nankai University, Tianjin, and in November 2011 at the Mathematical Sciences Research Institute in Berkeley but he accepted immediately the invitation I sent him to take part in the more modest part of the celebration held at IHÉS on 17 November 2011. He came with his son and his daughter-in-law. Unfortunately, his beloved wife Inge Hirzebruch, whom I want to thank for her kind friendship and support to my wife and to me over all these years, could not accompany him because of a last minute injury. He lectured brilliantly on “Chern Classes” and could on this occasion meet Mae Chern, the daughter of S. S. Chern. At the end of his lecture, he told me: “I am afraid that this will be my last visit to Paris.” It is very sad to remark that he was indeed right.

*Jean-Pierre Bourguignon, Director of the Institut des Hautes Études Scientifiques, France*



Friedrich Hirzebruch lecturing on “Chern Classes” at IHÉS on 17 November 2011.



**Friedrich Hirzebruch**  
All photos from the Archives of the Mathematisches Forschungsinstitut Oberwolfach

With Friedrich Hirzebruch the mathematical community has lost a great mathematician, a gifted teacher and a wonderful person. Being a student of Egbert Brieskorn, who himself was a student of Hirzebruch, I am mathematically a grandson of Hirzebruch. I have known Hirzebruch since my early days in Bonn, but only during the last years, as the director of the Mathematical Research Institute Oberwolfach,

did I have very close contact with Fritz. This article should serve as a reminder of the early activity of Hirzebruch, closely associated to the founding of Oberwolfach of which very little is known.

The following text is mainly drawn and translated into English from the essay of Friedrich Hirzebruch “Euromat, Oberwolfach und ein geplantes Max-Planck-Institut, Erinnerungen an die Jahre 1958–1960”, published in the Festschrift on the 60th anniversary of Oberwolfach.<sup>1</sup>

In 1956 Hirzebruch started his professorship at the University of Bonn after he had returned from his stays at the Institute for Advanced Study (IAS) in Princeton (1952–1954) and at Princeton University (1955–1956). He was so impressed by the IAS in Princeton that he immediately thought about a similar institution in Germany. He started to invite guest professors to Bonn, the first being Nicolaas Kuiper, later director of IHES, and the second being Raoul Bott. In 1957 Hirzebruch organised the first Mathematische Arbeitstagung in Bonn. At that time there were not so many conferences as today and the Arbeitstagung in Bonn was an important annual event and it became a tradition continuing to present day.

In April 1958 Hirzebruch was rather unexpectedly invited to a meeting of mathematicians in Brussels, initiated by members of the EURATOM commission, who discussed and prepared a memorandum about the founding of a European Mathematical Institute Euromat within EURATOM. Hirzebruch was chosen to replace Wilhelm Süss, the Rector of the University of Freiburg and Director of Oberwolfach, who was very sick and who died in May 1958. The second representative from Germany in this meeting was Helmuth Kneser. Although the Euromat plan was very promising, it did not work out in the end. One of the reasons was that, in 1958, Léon Motchane, also inspired by the IAS in Princeton, had successfully created a mathematical institute of this sort in Paris, namely the IHÉS.

Hirzebruch realised that, after the creation of IHÉS, it was rather unlikely that Euromat would be created. He therefore developed a plan to make Oberwolfach an Institute for Advanced Study on a smaller scale, so that there would be one in France and one in Germany.

<sup>1</sup> The essay by Hirzebruch is written in German. Citations are marked by quotation marks but they are translated into English from the original German text.



The old “castle” where the Oberwolfach workshops took place until 1974.

As one of the authors of the Euromat memorandums and as an intermediary of Helmuth Kneser in Bonn, who had become the successor to Süss as the director of Oberwolfach till 1969, Hirzebruch was already well known in the relevant ministries in Bonn. In July 1958 Hirzebruch wrote a letter to Kneser developing his idea of a kind of Institute for Advanced Study in Oberwolfach. The letter starts:

*“Oberwolfach has been taken over by the Federal Ministry of the Interior and will be developed into an institute that could take over a role in mathematics in Germany such as the School of Mathematics of the Institute for Advanced Study in Princeton, NJ, for the United States.”*

*“An annual budget of DM 600 000 will be needed and a one-time amount of DM 1.5 million for additional buildings. Moreover, a building of 20 apartments must be provided.”*

Hirzebruch already had concrete plans and he was optimistic as only young people can be (in 1958 he was 31 years old). He believed that the project could be realised in 1959. In any case, in order to realise the idea an organisation had to be installed.



Living room in the old building.

In March 1959 the 14 mathematicians R. Baer, H. Behnke, G. Bol, H. Gericke, H. Görtler, F. Hirzebruch, H. Kneser, G. Köthe, W. Maak, Claus Müller, P. Roquette, E. Sperner, K. Stein and K.-H. Weise met in Oberwolfach. (Today you can see the photos of these mathematicians in the big lecture hall in Oberwolfach.)

The minutes of this meeting read as follows:

*“... the situation requires the creation of an institution at the federal level that takes care of the following tasks:*

- 1) Intensification of mathematical research,*
- 2) Strengthening of the scientific cooperation,*
- 3) Training of young researchers.”*

These are basically still the goals of the Oberwolfach Institute today. The minutes continue:

*“For this purpose it appears to the attendees suitable to create a society for mathematical research (Gesellschaft für Mathematische Forschung e.V.), based at the Mathematical Research Institute Oberwolfach. This institute has already gained, through the care of the scientific cooperation, a strong international reputation and is therefore particularly suited to be the starting point and centre for carrying out the above tasks.”*

On 17 June 1959 the formal inaugural meeting of the Society for Mathematical Research took place at the Mathematical Institute in Freiburg. The institute was to be financially supported by the Federal Ministry of the Interior and the Ministry of Education of Baden- Württemberg.



**The old building in Oberwolfach**

It was clear that Oberwolfach was too isolated a place for an “Institute for Advanced Study” and therefore an extension to a project with Oberwolfach plus Freiburg was discussed. However, how this should be achieved remained unsolved for a while. Finally, the idea came up to create a Max-Planck Institute for Mathematics.

In October 1959 an important meeting took place in Oberwolfach with representatives from the Federal Ministry of the Interior, the Ministry of Education of Baden-Württemberg, the Max-Planck Society and the Gesellschaft für Mathematische Forschung. Hirzebruch himself could not be present because he was on sabbatical at the IAS in Princeton. A commission of the Max-Planck Society (including Werner Heisenberg and Carl-Friedrich von Weizsäcker) was to be created in order to check, together with members of a commission of Oberwolfach, the conditions for founding a Max-Planck Institute of Mathematics at Oberwolfach.

The Max-Planck Society and in particular its president Adolf Butenand, who had just been appointed as successor to Otto Hahn, were very much in favour of this idea. Butenand even pronounced in a press release in May 1960 that a new Max-Planck Institute of Mathematics was to be founded. As a principle of the Max-Planck Society they create their institutes “around a person”. The person to become the first director of the new Max-Planck Institute of Mathematics was to be Friedrich Hirzebruch, although he was only 32 years old at that time. Then, the usual examination process including referees was started.



**The old castle. The new library and conference building was built there in 1975. Today you can still see the wall from the street.**

To cut a long story short: you all know that the creation of a Max-Planck Institute at Oberwolfach failed. The reason is to be found in the referees’ reports. There were 11 referees’ reports: five from Germany and six from abroad. The names of the referees are known but the content is confidential, except for three reports of which Hirzebruch got a copy: those by Bartel Leendert van der Waerden, Carl Ludwig Siegel and Richard Courant. Van der Waerden praised the workshops in Oberwolfach and the mathematician Hirzebruch. Siegel however denied not only the necessity of a Max-Planck Institute but he was also very sceptical about the “abstract mathematics” of Hirzebruch. He wrote: “I consider it to be possible, even likely, that this whole direction will die out within a few years.” Since Siegel was known to be against modern mathematics, his opinion was not crucial.



**Carl Ludwig Siegel**



**Richard Courant**

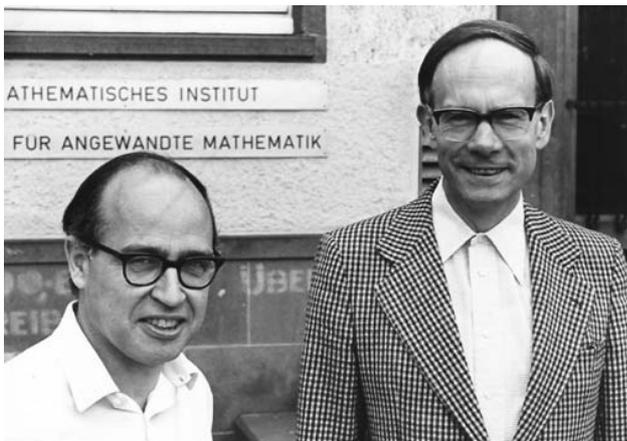
More decisive was the report by Courant. He criticised the proposal as not well thought out and about Hirzebruch he wrote: "I have always advocated for him and cherish very friendly feelings for him... In my opinion it would be a great injustice to mathematics to tear him out of his productive teaching." He also expressed his concern that Hirzebruch would very visibly symbolise the predominance of the abstract direction.

The plan of a Max-Planck Institute for Mathematics came temporarily to an end.

Hirzebruch finishes his above mentioned essay as follows:

*"Today, mathematics in Germany has two Max-Planck Institutes: the Max-Planck Institute for Mathematics in Bonn and the Max-Planck Institute for Mathematics in the Sciences in Leipzig, which was established after reunification. With Oberwolfach and with the two Max-Planck Institutes and the successful participation in the programme of the DFG Collaborative Research Centres, the mathematics in Germany will be very satisfied. Even Courant would be satisfied. (There is no predominance of abstract direction. As he wished, I stayed as a professor at the University of Bonn.)"*

*"It is a good development that Oberwolfach and the MPIMs with their different tasks are connected in friendship but are separated organisationally."*



Michael Atiyah and Friedrich Hirzebruch in front of the Mathematical Institute in Bonn, 1977.

*Gert-Martin Greuel, Director of the Mathematisches Forschungsinstitut Oberwolfach, Germany*

Friedrich Hirzebruch was 18 years old in December 1945 when he started his study at Münster University. Reminiscing about this time in 2009 he wrote:

*"Wenn ich damals einen kurzen Lebenslauf abgeben musste, dann enthielt er immer den Satz: 'Von Mitte Januar 1945 bis zum 1. Juli 1945 durchlief ich Arbeitsdienst, Militär und Kriegsgefangenschaft.'"*

*"In those days, whenever I had to supply a short CV, it always contained the sentence: 'From mid-January 1945 till 1 July 1945, I served fatigue duty, military duty and was detained as a prisoner of war.'"*

This statement puts the double distance between the present day and the painful youth of the war years, defies any attempt to express this pain more eloquently and does so by silence.

Settling in Bonn in 1956, Hirzebruch put great efforts into the re-creation of the European mathematical community, destroyed, along with so many other institutions and lives, by the war. The brilliant idea of the annual *Arbeitstagungen* and, later, the founding of the Max-Planck Institute for Mathematics (MPIM) bore rich fruit. Hirzebruch struggled for the new Europe, as did Henri Cartan in France, using all the influence at his disposal as an internationally renowned researcher.

My first close contact with Fritz and Inge Hirzebruch came in 1967. I spent six weeks at the Institut des Hautes Études in Bures-sur-Yvette, where Grothendieck taught me the fresh from the oven project of motivic cohomology. After that I got permission and a German entry visa, which enabled me to visit Bonn and to participate in the *Arbeitstagung* on my way back to Moscow.

The blissful stress of study with Grothendieck and of Paris magic did something to my body but in Bonn Inge and Fritz treated me as their son and helped my healing, and their kindness and generosity forever remained in my memory.

The last two years of the 1960s put an end to these budding direct contacts between mathematicians of Western Europe and their colleagues in the Soviet Union and Eastern Europe. The next generation, coming after Hirzebruch's and then mine, was different. As one of the then young men recalled recently: "We thought it highly likely we would be blown off the planet and that, somehow, it was up to us – children after all – to prevent it."

I had not the least premonition that this epoch would pass as well during my life and that, almost a quarter of a century afterwards, I would meet Fritz again and become a colleague of his at the MPIM. And after 1990 and the fall of the Berlin Wall, Friedrich Hirzebruch helped immensely many mathematicians from East Germany to find jobs and continue their scientific lives in a new environment. Somebody better informed than me should record his efforts and describe his human care.

Mathematics is a *travail de longue haleine*. Leonard Euler (born in Basel and working in St Petersburg), inspired perhaps by the seven bridges of Königsberg (mostly destroyed by bombings in 1944 and 1945), discovered the notion of the *Euler characteristic* of a graph. This notion evolved for two centuries and by the time Friedrich Hirzebruch was maturing as a mathematician, was re-incarnated as an alternating sum of dimensions of cohomology groups of (invertible) sheaves on an algebraic manifold. The celebrated Riemann–Roch–Hirzebruch formula (1954) expressed this number through geometric invariants of the base, crucially using Todd's genus; its discoverer A. J. Todd was born in Liverpool. At the first

*Arbeitstagung* in 1957, Alexander Grothendieck, son of a Russian anarchist and eternal expatriate in France and everywhere, presented its great generalisation.

Perhaps the Riemann–Roch–Hirzebruch–Grothendieck theorem, which fused and crowned efforts of dozens of great creators from all corners of Europe, deserves to be put on the flag of the United Europe more than any other symbol.

*Yuri I. Manin*  
*Max Planck Institut Bonn, Germany*

*Stanislaw Janeczko*, Director of the Banach Centre, Poland, participated in the memorial session giving a presentation in which he focused his speech on the influence of Friedrich Hirzebruch on the Banach Centre; a specific article on this topic will appear soon.

## Mathematics in the Streets of Kraków

Ehrhard Behrends (Freie Universität Berlin, Chair of the EMS rpa committee)

The 6th European Congress of Mathematics took place in Kraków, 2–7 July 2012. As a special activity associated with this event the EMS rpa committee organised “Mathematics in the Streets of Kraków”.

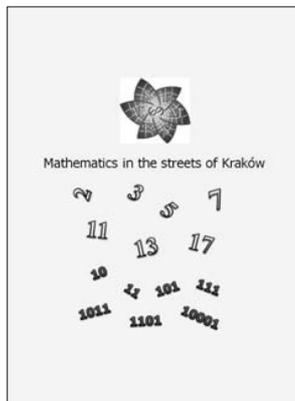


The idea was to increase the profile of mathematics during these days in the city with as many people as possible (inhabitants and tourists) made aware of the fact that an important mathematical congress was taking place in the first few days of July.

The rpa committee decided at its meeting in Bilbao (November 2011) to realise this idea by performing “maths busking”, going into the street and interacting with the people directly! Some members of the committee (Franka Brueckler, Croatia, Steve Humble and Sara Santos, UK) have experience with this kind of public awareness activity, and one “only” would have to run a Polish version.

The preparations started early. Krzysztof Ciesielski from Kraków (thank you, Krzysztof!) negotiated with the local authorities and finally we had permission to be active in the central marketplace and in a small place close to the university. He also took care of the numerous preparations: printing of the papers that would be used during the busking project, finding a team of students to help us, production of the special T-shirts, etc.

These T-shirts not only announced the busking activities but also advertised [www.mathematics-in-europe.eu](http://www.mathematics-in-europe.eu), the public awareness webpage of the EMS. (On [www.mathematics-in-europe.eu/krakow](http://www.mathematics-in-europe.eu/krakow) the English and Polish versions of our presentations were – and still are – available.)



Franka, Sara and Steve had a meeting with the Polish students on Sunday and Monday to prepare the busking activities. These took place on Monday and Tuesday afternoon between 4 and 8 pm. Unfortunately conditions were not optimal: immediately after we started it was necessary to convince the police that we had all necessary permissions, many other (non-mathematical) performances were competing with us and it was very, very hot (about 35 degrees!). Nevertheless, several hundred people participated in our “mathematics in the streets of Kraków”.



The police and some of the competitors.

The “buskers” had prepared a large variety of interactive presentations. They performed magical tricks with a mathematical background, provided mathematical riddles with surprising solutions, etc. The Polish students were very helpful in assisting the project, in particular as translators.