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Cover picture: Walter Thirring (1927-2014)

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Walter Thirring

(April 29, 1927 – August 18, 2014)



Walter Thirring, a pioneer of modern mathematical physics and the founding president of IAMP, passed away in Vienna on August 18, 2014, at the age of 87.

Born in Vienna on April 29, 1927 as son of the physicist and professor at the University of Vienna Hans Thirring (known for the Lense-Thirring effect in general relativity), Walter initially aimed at a career as a musician. His grandfather was also a physicist, and an elder brother had been designated to carry on with this family tradition. The death of the brother in 1945 changed Walter's plans and right after the Second World War he took up his study of physics at the University of Innsbruck. He did this without having the formal qualification of a high school diploma, and obtained his PhD in 1949 at the age of 22. He spent the following 10 years at various research institutions in Europe and the USA: The Institute for Advanced Studies in Dublin, the University of Glasgow, the Max Planck Institute in Göttingen, the ETH in Zürich, the University of Bern, the IAS in Princeton, MIT in Cambridge Massachusetts and the University of Washington in Seattle. During this time he had contacts with Erwin Schrödinger in Dublin, Werner

Heisenberg in Göttingen, Wolfgang Pauli in Zürich and Albert Einstein in Princeton.

In 1959 Thirring followed his father as professor of theoretical physics at the University of Vienna until his retirement in 1995, apart from an interlude 1968-1971 when he was Head of the Theory Division of CERN in Geneva. He played a very important role in the founding of the IAMP in the 1970's and was the first President of the organization 1976-78. He was also the founding president and first director of the Erwin Schrödinger International Institute for mathematical Physics (ESI) in Vienna. From 1998 to his death he was Honorary President of the society that ran the institute until 2011 when the ESI became a research center of the University of Vienna. He was also an initiator of the High Energy Physics Institute of the Austrian Academy of Sciences in Vienna that takes part in experiments performed at CERN.

In 1952 Thirring married Helga Georgiades who accompanied him for 58 years until her death in 2010. They are survived by their sons Klaus and Peter and four grandchildren.

The *Selected papers of Walter E. Thirring with Commentaries* (foreword by Elliott H. Lieb, American Mathematical Society, 1998) bear witness to the breadth of Thirring's research interests and the depth and quality of his scientific work. He was not a mathematical physicist from the outset but started his research career as a brilliant theoretician with focus on high energy physics and became well known as such already in the 1950's. In this period appeared his papers on the divergence of perturbation series in quantum field theory, the discovery of an exactly soluble model in relativistic quantum field theory, known as the Thirring model, and his monograph on Quantum Electrodynamics. A joint paper with S. Deser, M.L. Goldberger and K. Baumann from 1954 on *Energy level displacements in pi mesonic atoms* has been widely cited and used in laboratories to this day. The remarkable papers *On the number of fundamental fields* and *Three-field theory of strong interactions* contain ideas pointing to the "eightfold way" and the theory of quarks that were developed later by Gell-Mann and Ne'eman.

In the 1960's Thirring's research interests broadened and he extended his repertoire, first in the areas of general relativity and statistical physics and subsequently to condensed matter physics and the physics of atoms and molecules. At the same time his papers became more mathematical and he developed his distinctive style, using modern mathematics to solve hard problems in physics. He was one of the first to use the concepts and notations of modern differential geometry in general relativity, and in his other areas of interest he used sophisticated techniques from functional analysis and the theory of operator algebras. It is remarkable how quickly he was able to absorb and apply these methods that were certainly not part of the mathematics curriculum for physics students during his studies. Despite his mathematical skills his motivations came always from physics and his work was guided by deep physical insight and intuition for the tools that would be appropriate for the physical problem at hand.

In the 1970's Thirring became interested in the quantum theory of many-body systems with electric and/or Coulomb forces. This led to his joint work with Elliott Lieb on stability of matter that is one of the gems of 20th century mathematical physics. This work has been very influential and triggered manifold developments both in mathematics and in physics. The [Laudatio](#) by Gérard Emch on the occasion of the awarding of the

Henri Poincaré Prize to Thirring contains a list of many further masterpieces from his Selected Papers.

Thirring's Course on Mathematical Physics is a lasting legacy to his role as a researcher and academic teacher. This work comprises four volumes covering classical mechanics, classical field theory, the quantum physics of atoms and molecules and the quantum theory of large systems. It is a true classic with a breathtaking wealth of information and insights that will continue to educate and inspire many future generations of mathematical physicists as it did in the past.

Walter Thirring received numerous awards and honors for his scientific work. In addition to the Henri Poincaré Prize, the highest award given by the IAMP, he was recipient of the Max Planck Medal of the German Physical Society and the Austrian *Großes Ehrenkreuz für Wissenschaft und Kunst*. He was member of the Austrian Academy of Sciences, the National Academy of Sciences in Washington, the Pontificia Academia Scientiarum in Rome, the Hungarian Academy of Sciences and the Akademie Leopoldina in Halle, and he held honorary doctorates from several universities.

Physics was not the only intellectual passion of Walter Thirring. Although fate had prevented him for taking up a career as a musician, he composed many musical works, in particular for the organ but also for other instruments. Whenever possible, he would play the organ for several hours every day. He was also genuinely interested in a dialogue between science and religion as witnessed by his book *Cosmic Impressions: Traces of God in the Laws of Nature*. A further book of his aimed at a general readership is *The Joy of Discovery: Great Encounters along the Way*, which contains very interesting autobiographical material. Walter Thirring is remembered by his students, friends and colleagues not only as a brilliant scientist and teacher but also for his impressive character and human qualities.

Bernhard Baumgartner, Harald Grosse, Heide Narnhofer, Jakob Yngvason

In memoriam Walter Thirring

My Personal Relations with Walter Thirring

Walter Thirring, my good friend and mentor in many things mathematical-physical, passed away on 18 August and left a big hole in the lives of many of us, especially mine. The editors of the IAMP Bulletin are devoting a full issue to Walter's life and work, which is most fitting, and I am grateful for their request to offer remarks on my personal and professional relation with him.

I begin with the personal. These reflections are taken from an article I wrote for the Schrödinger Institute newsletter on the occasion of Walter's 80th birthday. Although it was written seven years ago it is still very much up to date.

My scientific life has natural dividing lines, like new chapters in a book, the most important of which is the day I started to work with Walter. Walter says we met in 1968, and that is undoubtedly true, but my memory goes back to a turning point in the early seventies when we were sitting around a lunch counter somewhere and Walter asked me if I ever thought about the Dyson-Lenard proof of the stability of matter. No, I hadn't really, but he had, and he realized that, while correct, it needed some new mathematical insight to make it physically understandable as well as being mathematically correct.

Walter invited me to be a "Schrödinger Gastprofessor" at the University of Vienna in the summer of 1974, and while this visit led to lots of fruitful scientific discussion (including collaboration with Heide Narnhofer) nothing dramatic happened except that I lost a key to the Institute. Fortunately, and this must be recorded for posterity, the mainstay of Walter's group, apart, naturally, from his wife Helga (who passed away three years ago), was his assistant Franziska (Franzi) Wagner. She could do everything; not only type up the stuff we generated but also figure out how to deal with a missing, priceless, irreplaceable key that was official government property and must never, under any conditions be lost or duplicated.

But to return to the story, I was a "Schrödinger Gastprofessor" again in the summer of 1975 and this time we solved the problem. The main new idea was the realization that the kinetic energy of electrons (and other particles satisfying Pauli's exclusion principle) is always greater than the integral over all space of the $5/3$ power of the particle density. This, in turn, meant that the old theory of E. Fermi and L.H. Thomas gave a lower bound to the total energy of matter, and this bound was known (by earlier work by Teller and with Simon) to satisfy the desired stability condition.

We had several collaborations after that, one of which is that gravitating matter is stable if and only if there are not too many particles (several solar masses for fermions and the size of a mountain for bosons). Our last published work together was the proof in 1986 that the attractive van der Waals force between pairs of atoms or molecules, which drops off like the negative sixth power of the distance between them (in the absence of electromagnetic propagation corrections), was a universal consequence of Schrödinger's equation.

There were enjoyable visits before and after 1986. I would visit Walter in his hideaway in Zweiersdorf, where Helga was a superb hostess, and he would often visit my wife and me in Princeton. Walter was one of the most organized people I knew. The visits followed a rigorous time schedule starting around 6 am and ending around 9pm that dictated when we would wake up, take walks, play music, exercise and do science. Walter was an accomplished piano and organ player, and composer, while I was a fifth rate recorder (Blockflöte) player. Following an internal alarm clock Walter would announce that it was time to stop the science and play some baroque sonatas, and he would very patiently overlook my missed entrances and other mistakes. It was fun and I learned a lot, but I also realized that I would never be organized enough to do all the many things, in many fields, that Walter was capable of doing.

Walter continued his work in science with the energy of a newcomer. Not only was he interested in everything but he continued to think about original research in his inimitable style – which is to do what you think is interesting and important without paying much attention to the fashion of the day. He inspired us youngsters, especially me, by doing great science!

Walter Thirring's Science

The following is mostly from my preface to Walter's collected works, which I recommend to anyone who wants a survey of what he has done in physics and mathematics. It was published by the American Mathematical Society in 1998 as volume 8 of their collected works series. The selection of papers was made entirely by Walter.

There was a time when mathematics drew some of its inspiration from physics and physics from mathematics. Unfortunately, with the huge success of the quantum theory, starting especially with the Schrödinger equation in 1926, came a feeling among the leading physicists that mathematics should keep in the background or, as one person put it, "elegance is for tailors". From the other side, mid twentieth century mathematicians were not much more hospitable about intrusions of physics, as we can see, for instance, in Hardy's well known little essay. Walter was one of the first, in the post-war years, to try to put things back together.

Before discussing his scientific highlights, however, let me mention some of the larger implications of Walter's career, for his achievements consist of more than his journal articles. Not only did he make important contributions in mathematical physics, he played a leading role in fostering the fruitful interchange of mathematics and physics that is now, once again, part of the intellectual scene. He did this in several ways: He served as the director of the CERN theory department for three years. He founded an important school of mathematical physics in the University of Vienna (on Boltzmannngasse!) and wrote a four volume course on mathematical physics that is still very much alive and is a marvel of breadth, mathematical sophistication and physical understanding. He was one of the founders, and the first president of the International Association of Mathematical Physics (whose membership spans the globe and which remains one of the few international organizations whose members are scientists instead of national delegations). Last,

but not least, he was the founder of the Erwin Schrödinger Institute in Vienna, which attracts pure mathematicians and mathematical physicists in many diverse fields.

Walter began doing physics after the war in the usual theoretical physics mode, and made important contributions to quantum field theory and particle physics. They are part of the global picture of his work in mathematical physics and its evolution. Among the most influential of these papers was the invention of the field theory model of ‘particles’ in one spatial and one temporal dimension that bears his name and which still – after four decades – is a subject of research. This model turned out to be much more subtle than many people thought at first, and it was fertile ground for the exercise of profound mathematical insight. Nowadays, everyone knows that quantum field theory and mathematics (both analysis and geometry) infuse each other, and one of the earliest examples of this was the ‘Thirring model’. This model morphed into the Luttinger model in condensed matter physics and there are people who think its origin is in Tomonaga’s work. Although Tomonaga had unrigorous ideas along these lines, it was the Thirring model, and that alone, that inspired Luttinger. He quotes only Thirring. That model, and the idea of the “Luttinger liquid”, had a huge impact, including the concept of bosonization.

A really hot topic in those days was quantum electrodynamics, (which has been declared a great victory for theoretical physics—and it is one—but one which many of us feel is still in an unfinished state). Its success was based on the predictions of perturbation theory in α (the fine-structure constant) and the question to be answered is whether this series converges for any $\alpha > 0$. The question is still open! But Walter (and others, independently) did manage to prove that the corresponding series for the simpler Φ^3 field theory is always divergent! The finding was obviously significant—at least to those physicists who felt that decent ‘physical’ functions have to be analytic.

Walter also made a name for himself as a particle physicist, which led to his appointment at CERN. He proposed a model of the strongly interacting particles based on three fundamental fields which, alas, was a near miss. Two years later Gell-Mann and Ne’eman found that the group $SU(3)$ was indeed the right one and earned a Nobel prize for it.

Walter’s interests broadened, first into relativity theory (where he was one of the first physicists to employ some of the ideas and notation of modern differential geometry in a systematic way) and then into statistical mechanics and condensed matter physics. Here the application of rigorous mathematics to hard problems in many-body theory really begins to shine through. One of the noteworthy contributions is his proof (with Wehrl) of the correctness of the Bardeen-Cooper-Schrieffer theory of superconductivity. It is not well known, but it is a beautiful example of clear mathematical and physical thinking applied to the still not well understood theory of many particle dynamics.

The statistical mechanics work led into the rigorous work on the quantum theory of many-particle systems with electrostatic (Coulomb) forces. This ranges from small systems (the theory of large atoms) to big systems (bulk matter and such issues as ‘stability’ and van der Waals forces, on which we collaborated together) and huge systems (like stars, where gravity is also an important factor).

But mathematical physics does not end there. Several important developments of an abstract, general nature were generated in collaboration with Narnhofer and others. Many

important contributions were made to the theory of states on quantum C^* algebras and quantum entropy and ergodic theory. His deep understanding of physical issues played an important role in this work and the direction it took. One of the truly noteworthy breakthroughs was the generalization of the Kolmogorov-Sinai entropy of a measure-preserving transformation to the quantum setting in which a classical measure space is replaced by a state on a suitable algebra. Many people had tried for many years, unsuccessfully, to do this but, as often happens, once something has been accomplished several other solutions make their appearance. This entropy problem was no exception.

These, then, are a few of the high points in a career that is noteworthy for an almost unbelievable breadth of fields in which deep contributions have been made.

Elliott H. Lieb



Following Walter

On the occasion of Walter Thirring's 80th birthday in 2007, the Erwin Schrödinger Institute in Vienna dedicated an issue of the ESI News to him. The following text is taken from that issue with appropriate modifications.

My first encounter with Walter was in 1976. This was not a personal meeting though. I was simply in the auditorium of the Winter School in Schladming where he lectured on Stability of Matter. Little did I know then that 20 years later I would be in Vienna as his successor.

Of course, it was not possible to succeed Walter except in the trivial sense of a temporal order in a list of professors of theoretical physics at the University of Vienna. Walter's style, both in his profession and his life in general, was so unique that it would have been preposterous even to try to imitate it. But his papers, books and lectures continue to be a standard of reference for the assessment of any work in mathematical physics and have been a constant stimulus for my own work.

Coming back to the Schladming lectures of 1976 I recall how I liked the way Walter presented the case for Stability of Matter. He did not jump right into the mathematics but explained first the importance of the question and then started off with the "private room" argument for the electrons and did the "back of an envelope" estimate of the kinetic and Coulomb energies, comparing the result also with the analogous calculations for bosons and for gravitating particles to bring out the differences. He then commented on the justly famous work of Dyson and Lenard from the year 1967 where stability of matter was proved for the first time but with an absurdly large constant of the order 10^{14} in the lower bound to the energy. As Walter remarked, the large constant was solely due to the tour de force method of proof that consisted of a long sequence of estimates, about 45 in all, losing a factor of 2 on average each time. If you do this 45 times, Walter explained, then you are close to 10^{14} . After these explanations he proceeded with his and Elliott Lieb's new and beautiful proof based on Thomas-Fermi theory that goes right to the heart of the matter and produces a reasonable constant. This work is a true masterpiece of 20th century mathematical physics and its extensions and refinements continue to be active research topics.

Walter's textbooks on Mathematical Physics are marvellous works and the denseness of information and insights they provide is truly remarkable. One reason for this was Walter's awesome skill in distilling a complicated mathematical argument into a few lines. Sometimes the result has the character of "spiritus concentratus", that must be diluted again to bring it back to drinking strength; this is in fact what I have done on several occasions when lecturing to students. Such elaborations have pedagogical merits but I sometimes wonder if I am not depriving the students of the experience of being exposed directly to the hard stuff. Also, Walter's method takes less time and I have never in my courses managed to cover a comparable amount of material as Walter apparently did in his courses. But this is one of the differences in style I mentioned before.

There was one aspect of Walter's working style that I sometimes wished I could

imitate: his extreme discipline and organization. I understand that when he had administrative duties at the University he managed them very effectively and kept them in time slots well separated from other things. In this way he had plenty of time for the things he liked most: doing physics, playing the organ and composing music.

Characteristic for Walter's scientific work was the breadth of topics he was interested in and worked on. In this respect he is for me the model case of a mathematical physicist. One often distinguishes between "method oriented" and "problem oriented" approaches in science and sometimes mathematical physics is regarded as being as a discipline solely defined by its methods. I regard this as a misunderstanding. In any field there are practitioners that have acquired some skills in a specific method and spend most of their professional life in searching for and working on problems to which these methods can be applied. In disciplines that rely heavily on expensive experimental equipment this strategy may even be perfectly justified for a limited amount of time. But in physics the true aim of the game is to understand how nature ticks at its fundamental level and for this task the methods have to be chosen to fit the questions attacked.

Walter worked in Quantum Field Theory, Elementary Particle Physics, Statistical Physics and General Relativity and made seminal contributions to all these fields. He was one of the pioneers of modern mathematical physics, to which I would also count people like Rudolf Haag, Arthur Wightman, Res Jost, Hans Borchers, Ludwig Faddeev, Elliott Lieb, Joel Lebowitz and David Ruelle, among others, who in the 1960's realized that there are deep questions in physics that require deep mathematics for their proper understanding and were prepared to learn what it takes whenever necessary. Carrying on with this tradition is the legacy for Walter's followers.

Jakob Yngvason



Personal Recollections on Walter Thirring

Professor Walter Thirring has been since the end of the 1950-ies one of the most influential Physicists and Mathematical Physicists in Austria and worldwide. He passed away in Vienna on August 18th, 2014. His death is a great loss for the Austrian Physics and Mathematical Physics communities and for all whose scientific and social life has been related to Walter Thirring. Quite a few obituaries have been written in newspapers and in scientific journals honouring his scientific and science-political achievements. In the following I write some personal recollections because Walter Thirring was very important for my and my wife's scientific career.

I obtained my PhD in Theoretical Chemistry in 1975 in Vienna, my wife Maria her PhD in Mathematics in 1973 also in Vienna. We both had had a scholarship in Germany and I started as an "Assistent" at the Theoretical Chemistry Department of the University in Vienna. So we tried to find a job for my wife in Vienna. We both had been interested in some linear algebra problems which originated in Theoretical Chemistry. Already in Germany we had met Peter Hertel, a theoretical physicist, who had a visiting position at the Theoretical Physics Department of the University of Vienna. He advised us to contact Walter Thirring, the head of this department. This worked out and my wife Maria got a grant of the FWF, the Austrian Science Research Council. Thirring and Peter Schuster, the head of the Theoretical Chemistry department, applied together for the grant for Maria.

One might wonder why Thirring was interested in us. Here is a possible explanation. He had returned from his position as head of the Theory Division at CERN to Vienna and had started to write his four volume series *Lectures in Mathematical Physics*, in particular the third volume *Quantum Mechanics of Atoms and Molecules*. Furthermore, in collaboration with Elliott Lieb the groundbreaking work about the stability of matter had just been completed. So he was interested in rigorous results concerning atoms and molecules.

At the Theoretical Physics Department we were well received though we had both our desks in the Theoretical Chemistry Department. Soon we realised that Franzi Wagner, the secretary, was the soul of the institute. All organisational problems were handled by her. She also typed the manuscripts (TeX had not been invented). Also the coffee was prepared in her tiny office and often some discussion started there among the scientists. Almost every day Thirring and a group of colleagues from the theory group including Franzi Wagner had lunch together in the Alserbach Stüberl. This was a nice little inn with a good lunch. Often visitors joined and discussions reached from science to political issues. Thirring himself was not very talkative but often he surprised with his dry sense of humour. Unfortunately I am not able to translate his ironic formulations.

Walter was an enthusiastic pianist and also composer, and from time to time he gave concerts or performed with other colleagues "Hausmusik". He played also the organ very well and gave sometimes private concerts in various small churches. Actually he was

a very serious musician and an expert in counterpoint; some of his compositions were fugues with many voices.

Every Tuesday there was the Mathematical Physics Seminar run by Thirring and Professor Leopold Schmetterer, a well-known mathematician from the Mathematics Department of the University with broad interests. Schmetterer naturally viewed several problems in Theoretical and Mathematical Physics which were discussed in those seminars from the standpoint of pure mathematics. This was inspiring. In those talks new results of the Mathematical Physics group were presented (Thirring, Baumgartner, Breiteneker, Grosse, Narnhofer, Wehrl...); also other colleagues from Theoretical Physics and often visitors gave talks. A few talks were also given by Maria and me. The questions and remarks by Thirring were always precise and often started a discussion. He had taught practically every field of Theoretical Physics. In most topics he knew the central problems and was technically up to date. Very impressive!

At those times also the Mathematical Physics group met regularly to go through the volumes of the drafts of Thirring's *Lehrbuch der Mathematischen Physik* to look for typos and possible inconsistencies. Maria and I were only involved in the third volume *Quantum Mechanics of Atoms and Molecules*. This was very instructive.

In 1976 Thirring and his group organised a wonderful conference in Vienna on the occasion of the 50 year anniversary of the Schrödinger equation. Many prominent physicists and mathematicians participated, I just mention Kato, Lieb, Simon and Wightman. There we learned a lot about Mathematical Physics and its community.

In the early 1980s the SISSA, the International School of Advanced Studies in Trieste, Italy, decided to offer advanced courses based on the *Lectures in Mathematical Physics* by Thirring. So several colleagues went to Trieste to give courses there. I was one of them and stayed in three consecutive years for a few weeks in Trieste to teach a few chapters out of Thirring's volume 3. That was not easy, but I learned a lot. In 1981 I got the *venia legendi* and Thirring was one of the referees. I might also mention that there was a position called *Schrödinger Professur* at the Theoretical Physics Department. I remember Evans Harrell who came in the late 1970s and translated the *Lehrbuch der Mathematischen Physik*. Also Kenji Yajima stayed with his family quite some time in Vienna.

In the years up to the early 80-ies we had many discussions with Walter about problems mostly concerning atoms and molecules. This was most enlightening. His insights and in particular his taste influenced us a lot and there are some problems I still carry around that date back to those years. Then Thirring, who was always interested in many things, moved on to other topics, for instance problems about entropy, and our scientific contacts were not so intensive any more but he was still interested in our work.

In the early 1990s my wife got a position at the Mathematics Department of the University. Before that she had several grants at the Theoretical Physics Department and short time appointments at the Mathematics Department. For the grants for the Physics Department Thirring had applied at the FWF.

Mathematical Physics and Mathematics became very active in Vienna starting from 1992 when due to the efforts of Walter Thirring, Peter Michor and Heide Narnhofer the Schrödinger institute (ESI) came into existence. There were other people, for instance Wolfgang Reiter from the ministry of science, and well known scientists from abroad strongly involved. In the beginning I was not part of these efforts but soon I became a member of the board (secretary) and had the honour to organise one of the first programmes at ESI (Schrödinger operators). ESI's history is well documented (see the ESI-homepage) and it is mostly a success story. I just want to stress that Thirring's outstanding international reputation and the insisting negotiations with the ministry were of utmost importance in the founding period and in the first few years of the Schrödinger institute. Due to the existence of ESI I and many other colleagues could start scientific collaborations and without Thirring's efforts this would never have happened.

There are many other aspects of Walter Thirring's interests and activities and I am sure those will be recalled in other obituaries. Personally I am immensely grateful for his openness and support of my wife and me in all those years and for the kind of taste I acquired from discussions with him and with the community he was leading in Vienna.

Thomas Hoffmann-Ostenhof



Interactions with Walter

Dear Walter,

As your former student, your former assistant, your collaborator and colleague, I was deeply moved hearing that you passed away on August 18th, 2014.

I remember very well a few different periods in our interactions: As a very young student I was told by friends that it is impossible to follow your lectures. This was a challenge for me and I found books in the library which allowed me to follow and finally to pass the examen for becoming your PhD student. In your early lectures we learnt very much from your physics insights, only partially mathematical details were given.

After you returned from your three years stay at CERN you asked me to deduce the S-matrix of the Coulomb problem purely algebraically, which I solved and in the coming years I enjoyed our collaborations. Phone calls in the morning showed your interests. After you decided to move towards mathematical physics I learnt much as assistant while the green books were written. After these years I enjoyed also lecturing your books at the newly created school SISSA in Trieste. My own first book on models of statistical physics and quantum field theory came out under the advice of you and Budinich after lectures in Vienna and Trieste.

Next I went abroad and enjoyed the international atmosphere especially in Geneva and at various other places. I had the luck to collaborate and learn from common friends like André Martin, Jurko Glaser, Khosrow Chadan and others.

After my return to Vienna it was not easy to keep the international contacts. Everything changed after the creation of the Erwin Schrödinger Institute in Vienna. I was immediately enthusiastic when you asked me to join the board and to act as a program coordinator just at the beginning of the Institute. We had to work hard to organize the first big conference at a castle in Vienna. But the idea to join physicists and mathematicians from East and West was very well represented. On the other hand, I still remember the day, when you entered my office and told me about your health problems. All this is 22 years ago. ESI allowed us to keep a high international standard, I even rejected offers of professorships mainly due to this reason. And we enjoyed the international atmosphere at ESI over all the years.

The Thirring Model

Heisenberg proposed in the fifties a four Fermi interaction model (Urformel), which, as was noticed immediately by Pauli, led to difficulties, since it is not renormalizable.

The analogous two-dimensional model, was studied by Walter in 1958. With the help of the Bethe-Ansatz he solved the appropriate many particle system in a Hilbert space of fixed particle number. The next step, to change the representation for which the spectrum condition is fulfilled, needs renormalization and is tricky. Within this physical representation Walter was able to calculate the two particle correlation function with one particle on shell, which is called the form factor.

Soon after this work Glaser proposed an operator solution to the model and obtained surprisingly an answer which differed from Walter's answer by a change of coupling constant. This puzzling situation was analyzed by a number of people like Johnson, Klaiber, Wightman and others from various points of view. Of course, nowadays, it is easy to state that only renormalized quantities make sense and the step from bare to renormalized ones depends on the renormalization scheme. Klaiber wrote down a generalized solution of the massless model. It was a common effort of many physicists and mathematicians, especially Australians around Carey to establish Wightman axioms for such models.

Despite many attempts (also by myself) the massive Thirring model resists a complete solution. Assuming factorization, unitarity, crossing and no particle creation it was possible to deduce a possible S-matrix. Again, also the form factor was obtained in closed form, but no higher correlation functions.

The completely independent developments (almost at the same time) in statistical physics are worth-mentioning. The well-known Luttinger model represents a kind of lattice regularized Thirring model, where renormalization effects can be easily studied. Its solution is due to Mattis and Lieb. Its physics implications are nowadays well-established.

Epilogue

It is interesting to note that the two main proponents of the developments in two different fields, in two-dimensional quantum field theory and two-dimensional statistical physics joined and obtained a substantial improvement of the stability of matter proof of Dyson and Lenard.

Besides this well-known result especially the early paper on dispersion relations (together with Gell-Mann and Goldberger) and the papers on the three spinor model of Walter were very influential. Especially the later influenced Gell-Mann in developing the three quark model (The Eightfold way).

Walter's first analysis of the two-dimensional spinor model gave a great impulse and led to many generalizations. As for the four-dimensional situation we (Raimar Wolkenhaar from Münster and myself) found more recently a toy model, which is completely solvable and nontrivial and hopefully will lead to new insights into the nonperturbative treatment of four dimensional quantum field theory. I was happy to recognize Walter's interests through questions in my seminars.

Although we did not collaborate during the last years, Walter showed his interests in quantum field theory through questions, when he came to my office. Even a few months ago he came in and asked about the status of the massive Thirring model. I felt honored that he even told me quite private problems.

We lost a great physicist, whose insights we always admired, I lost an elder colleague and a close friend. We will miss you.

Harald Grosse



Walter Thirring – in memoriam

My Personal Relations

Walter Thirring was my teacher and later collaborator. My sister married his brother-in-law, so I even became family.

Starting with the very beginning of my scientific career Walter encouraged me to participate in his research. I only had to decline when he started using computer calculations. Fortunately Harald Posch was happy to replace me here.

Walter had a summer house south of Vienna which he used quite often. I visited him rather regularly there in order to continue our joint research projects. His wife Helga once came in rather excitedly exclaiming “Do not quarrel!” We were both completely surprised since we considered our dispute just as an enjoyable discussion arising from our desire to understand and clarify the situation. Actually it was a weakness of Walter that he needed harmony and really did not like to quarrel. Of course at Walter’s summer home the time available for research was limited. There was hiking and swimming, and an important part of the day was reserved for music which he enjoyed playing with friends. This I could not do. But he did find a possibility for me. My understanding of music was sufficient to turn the pages and, when he played the organ, to change the registers. In fact I enjoyed the atmosphere of empty churches filled only with music, and for example touching an organ that Johann Sebastian Bach had used. In addition to playing the piano and the organ, Walter composed several pieces, mainly for the organ. He especially loved the complexity of chords which the organ offers (perhaps reminding him of multicorrelations in physics).

As a teacher he was always encouraging and open to new ideas. And he was a faithful friend. I will keep him in dear and grateful memory.

Walter Thirring’s Scientific Work

Although I met Walter only after much of his important research had already taken place, I know from discussions with him which results were close to his heart. His first big success was his proof of the divergence of the perturbation series of a quantum field theory model. This made him aware that attention to mathematical rigour is essential. Next came the solution of the Thirring model. This was a 2-dimensional quantum field theory model, which has inspired generations of physicists. He was also proud of his research on group theory in elementary particle physics, although he was disappointed that he had been close to but missed finding the quarks. But he was satisfied to know that he had been working in the right direction.

Then he turned to statistical mechanics. He was very fond of his paper on negative specific heats, especially because he had to fight (by arguing harmoniously) to justify his refutation of common beliefs. With Harald Posch he later returned to these questions using computer calculations.

Unquestionably Walter's favourite was the joint work with Elliott Lieb on the stability of matter. One reason was that he had struggled with this problem for quite some time. Secondly, their estimates were a very considerable improvement, and he believed that a physical problem is only well understood when the theoretical calculations are reasonably close to the actual situation. Also important was that in Elliott he had found a perfect collaborator and in addition a very good friend.

I should also mention that Walter was very open to new mathematical methods such as differential forms and operator algebras. He found the books by Dieudonné very useful. But he believed that a true understanding only comes by using these ideas. This led to papers on general relativity and quantum ergodicity, subjects that are natural in the Viennese tradition, following his father Hans Thirring (general relativity) and the Viennese hero Ludwig Boltzmann. However these results were rather abstract, as opposed to calculations with concrete models which he favoured.

At the end of his career he turned his attention to issues which science can not describe, especially music and the belief in God. His admiration of the beauty of the world, including its scientific structure, strongly supported his belief in God, although he did not want to explain anything in this way.

Heide Narnhofer



Translating Thirring

At some point in the 1970s, Elliott Lieb showed up in Princeton with several slim, green, paperbound volumes on the subject of mathematical physics. These were a panoptic set of notes for a course that had been taught at Vienna's Institute for Theoretical Physics over the previous few years. The course had been organized along physical lines, beginning with classical dynamics and field theory, and progressing to quantum mechanics and how the quantum theory manifests itself in bulk matter. The notes contained the most up to date results that could be established with rigorous mathematics. They were perfect for any student or young researcher wanting to work with Elliott, particularly the volume on the many-particle systems.

There was just one little difficulty, which was that Walter Thirring's notes were written in German.

Although I was writing a dissertation at the time with Barry Simon, and working on merely one-particle quantum mechanics, one of my classmates, Vinodh Narayanan, was thinking of working with Elliott and had obtained a copy of Thirring's lecture notes on many-particle systems. In those days even American graduate students were supposed to demonstrate the ability to muddle through scientific articles in other languages (two of them!), and, knowing that I had passed a language exam in German, Vinodh suggested that we form a study group to work through the marvelous little green volume on the stability of matter, which we proceeded to do in a nook in Jadwin Hall near Arthur Wightman's office. I shall always remember my sense of awe reading Thirring in this seminar as he began with remarks about physical concepts, making them crystal clear through remarkable examples and exercises, and then extracted the mathematical structure that underpins them and elaborated deep and far-reaching theorems.

One day Arthur Wightman approached me because he had seen the study group in action, and told me that Walter Thirring was in town, suggesting that I meet him. Of course I was interested, and when the three of us got together, Arthur's ulterior motive was revealed: He was an editor for Princeton University Press, and Walter was negotiating to turn his lecture notes into a textbook, as part of which he wanted assistance with the translation. I should hasten to say that Walter's English was excellent and completely fluent, but he aspired to the same top standard in the use of English as in the physical and mathematical correctness of his writing. My role, as a native speaker of English, would be to review Walter's English and touch it up for fluency here and there. Somehow that deal fell through, however, and Walter's next step was to go to Springer-Verlag's Vienna office to get his *Course in Mathematical Physics* published in German.

Some time later, while in a temporary teaching job as I finished my dissertation and prepared to enter the challenging job market at the time, I unexpectedly received an aerogram from Austria. (Historical note: Before the internet the quickest affordable communication with scientists in distant lands was via messages typed on translucently thin odd-shaped pieces of colored paper, called aerograms, which could be folded up into their own envelopes.) Walter had tracked me down to tell me that he had decided to have Springer publish English translations of his textbooks, and inquired whether I might be

interested in doing the translation of the first volume. That is, I was not just to check his own attempt, as was the idea with Princeton Press, but to do a complete translation. With my own professional future uncertain, I decided to say yes and try to trade up on this good fortune. I labored to send off an aerogram in my best German, in retrospect probably correct but stilted and not very idiomatic, to point out that if only I could have a visiting position at the famed Institut für theoretische Physik during the coming year, it would be very convenient to discuss his translation in person rather than by airmail.

Walter Thirring was not a demonstrative person, and people sometimes found him difficult to read, but he was deeply supportive of scientists as people, whether young and unknown, from advanced or less advantaged parts of the world, or having personal and educational backgrounds that were out of the ordinary. In my case, he graciously responded to my cheeky suggestion with the offer of a visiting position in Vienna and in addition made a decent royalty proposal, whereby I would receive all royalties from the books up to a certain figure, and a fraction thereafter. The visiting professorship would not begin until the late fall, but an advance on the translation contract would provide summer employment for me.

An interesting feature of the first volume, *Classical Dynamical Systems*, is that it was almost entirely translated from a remote location in the middle of America's largest Indian reservation, the Navajo Nation, a high desert territory covering an expanse not much smaller than Austria. Translation is work that can be done anywhere, which allowed me to spend the summer before going to Vienna in this exotic locale, in pursuit of a love interest (whom I married there). Now, Thirring's first volume was the one farthest from my training, and he had chosen to develop the subject in a geometrical way, whereas differential geometry was at the time a weak point in my own education. As an excellent textbook, it was possible for a diligent student to learn the subject, but not to learn how the subject is expressed in English. Evidently, access to advanced textbooks in that language was required, but these were in short supply at the trading post amidst the sagebrush near the mobile home that had been kindly provided by the tribe. I learned that at a distance of a little under an hour by car was an institution called Navajo Community College, and, without much optimism, set out there in pursuit of graduate texts on dynamical systems, manifolds, and so forth. Remarkably, the pickings were rather good, as evidently someone had donated a collection of graduate textbooks in mathematics to NCC, for a good tax write-off. Later in the summer an invitation to visit Bill Faris and Marty Greenlee at the University of Arizona for a week afforded the opportunity to fill in some gaps in what was to be found at NCC.

So Walter and I began our long collaboration to turn his books into the series of texts in English that many mathematical physicists now know. Here is how it worked. The translation proceeded in three stages. In the first, I would understand the original and render it more or less word for word into English, at which point it came across as a native speaker of German might express himself. In the second iteration I would rethink each sentence and rewrite it in a version of English that was more natural. It has to be said that, even in German, Walter Thirring's style is very special. Every word is carefully chosen, and no unnecessary words are to be found. As to understanding

the mathematical or physical content, it is sometimes necessary to ponder each sentence for a long time, and carefully work out the details of the mathematical steps that lead from one formula to the next. The real value of the Thirring books is the reward of the effort to do this. It sometimes happened, however, that a mere mortal like myself didn't see the way easily, and when this was the case, I would raise questions or suggest a translation that might replace a single sentence of the original with two or three in English, to give the readers of the translation some extra signposts to help them on their journeys. The third stage of the translation was the discussion either by mail or in person of the translation including these suggestions and questions, and Walter's own updates and improvements. As a result, the English text available today is somewhat longer than the original. Another challenge was that, to be completely honest, the books were not translated from German to English, but rather from Austrian to American. The German I had been learned in college was the standard Hanoverian dialect, but Austrians quite unapologetically have their own notions of correct vocabulary and grammar, which occasionally required some linguistic research. For instance, I first learned about the Austrian cake called the Gugelhupf from a simile Walter had used, which I struggled to translate.

In our discussions by mail the text would be typed on airmail paper, with the equations included by cut and paste. Literally! The publisher provided three copies, one to read, and two to cut up with scissors and paste or tape onto the manuscript to be passed between Walter and me, and eventually to the publisher. It was necessary to destroy two printed books because the equations were dense enough that equations on two sides of a page often overlapped.

When we were putting the final touches on the first volume, I told Walter that I wanted the preface to acknowledge the Navajo Nation for its (mostly unwitting) support of the translation, and, after looking at me for several seconds, he smiled and agreed.

That fall, the Institute for Theoretical Physics turned out to be a remarkable institution, and I became friendly with many of the outstanding younger people in Walter's entourage, including Bernhard Baumgartner, Harald Grosse, the Hoffmann-Ostenhofs, Heide Narnhofer, and Alfred Wehrl. I also became aware at that time of Walter's passion for connecting the scientists of the West and the East, which presaged the important efforts he made later on a larger scale with the founding of the Schrödinger Institute.

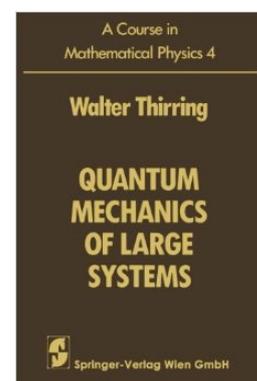
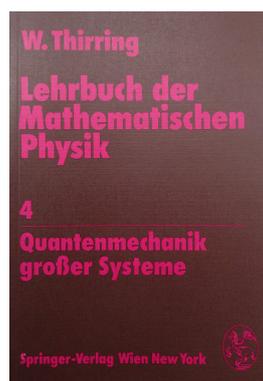
With true Viennese *Gemütlichkeit*, the members of the Institute around Walter Thirring welcomed visiting scholars into Viennese life, whether that meant musical events or the mundane activity of going to lunch at the local *Stammtisch*, where the proprietor of this typical Viennese restaurant would give a discount to people he recognized. It was a small triumph when the reduced price was at length offered to me, and I was pleased when I visited about three years later and this gentleman peered at me and then accorded me the local rate. As to musical life, the talent among the faculty for performance and for encyclopedic knowledge about classical music was impressive. Walter Thirring was perhaps foremost among this amazing group, and it was a privilege to hear him several times at the organ, playing his own compositions among a wide repertoire.

Not least among the people making visitors feel welcome was Walter Thirring's won-

derful administrative assistant Franzi Wagner. Frau Wagner looked after me in ways great and small, from making sure that I knew where to get anything I needed, to providing my first encounters with Viennese coffee, to keeping me financially solvent. This last was no trivial problem, for the Austrian bureaucracy at the time was so slow that it took about three months between the time a visiting professor showed up and when the salary would begin to show up in the bank account. In response, the system they had developed was that when I ran out of cash, I would go into Frau Wagner's office and look forlorn, at which point she would open a drawer, which was apparently chock full of bank notes, and hand them over in great piles until I began to relax. Then we would carefully write down how many schillings had been paid over. After a few months, when an enormous amount had suddenly appeared in my bank account, I went back to Frau Wagner's office and filled the drawer back up with crisp, new bank notes. Another inspiration for me was Walter's close relationship with his wife Helga, who was a wonderful hostess, whether at their home in Heiligenstadt or at their country place in Zweiersdorf, near the mountain called the Hohe Wand. Helga Thirring was a real introduction to the history of Austria, with a complicated family background involving many present-day countries stretching from Turkey to Poland.

Walter Thirring was without doubt one of the leading lights of mathematical physics in the twentieth century, but his legacy also includes his leadership in support of international science and the inspiration he gave to countless younger scientists, among which I am proud to count myself.

Evans Harrell



Walter Thirring and the foundation of the Erwin Schrödinger Institute

In August of 1990 Alexander Vinogradov, Moscow, sent a letter to Peter Michor, Vienna, with the proposal to set up an institute devoted to mathematics and physics, in particular to non linear problems, in Vienna. This proposal had been preceded by discussions between Vinogradov and Michor on the preservation of the scientific community in the Eastern European countries in the aftermath of the fall of the Communist governments in these countries. The entire region was threatened with a huge brain drain involving many of these countries' best scientists.

Setting up an institution on the interface between mathematics and physics in Vienna was seen as a potentially valuable contribution at this time of crisis: Based on Vienna's cultural and scientific tradition, especially in the field of mathematical physics, a new institute based in Vienna could provide a focal point for both Eastern and Western science and an international platform at the highest level of research in the field of mathematical physics.

This initiative was warmly welcomed by Walter Thirring who strongly felt his obligation to invest energy and time into this proposal. A first step was to sharpen the focus of the proposal on internationality, both in terms of research activities and participating scientists. In a letter to the Austrian Minister of Science and Research, Erhard Busek, dated October 18, 1990, Thirring proposed to establish an international research institute in Vienna, devoted to mathematical physics, with the name "Erwin Schrödinger Institute for Mathematical Physics". Thirring's proposal immediately won the support of eminent scientists all over the world, and Busek favourably responded in December 1990. A window of opportunity to realize this dream was opened, complemented by the Government's political intention to set up a major research institution in Austria. Michor again became active in collecting first ideas laid out in a memorandum of December that year (<http://www.esi.ac.at/material/scientific-reports-1/1992-2002.pdf>: *Scientific report for the 10 year period 1992 - 2002*, p. 153, *Gedanken zum "Erwin Schrödinger Institute for Mathematical Physics"*).

An intense phase of preparation for the start-up of the institute began during the first half of 1991, resulting in the organization of a workshop "Interfaces between Mathematics and Physics" in May 22 – 23. Due to Thirring's highly respected standing as one of the founding figures of modern mathematical physics and first president of the IAMP 1976/78, the international support was overwhelming and the list of participants of the workshop documents the broad basis of Thirring's concept for an institutional bridge between mathematics and physics: P. Budinich (SISSA Trieste), A. Connes (College de France – IHES), J. Fröhlich (ETH Zürich), L. M. Faddeev (Steklov Institute, Leningrad), A. Galindo (Universidad Complutense, Madrid), G. Marmo (Università di Napoli), V. Souček (University of Prague), A. Trautman (University of Warsaw), I. Todorov (University of Sofia), A. M. Vinogradov (University of Moscow), J. Wess (Universität München),

and the local proponents P. Michor (Universität Wien), H. Narnhofer (Universität Wien), W. Reiter (Austrian Federal Ministry of Science and Research) and W. Thirring (Universität Wien). V. Drinfeld gave his support but could not participate.

Let me cite Thirring's statement during the workshop when topics for the future program were discussed: "In addition to the challenge to find a self-contained quantum field theory, theoretical physics has to explain concrete experiments in physics, and this explanation has to go beyond perturbation theory. But also some long-standing fundamental problems are still open: for instance, mathematical physics has helped to understand stability (this turned out to be a first step for constructing dynamics for an infinite system), one of the fundamentals of statistical physics. But a complete understanding of irreversibility and of the approach to equilibrium, the passage from microphysics to macrophysics, is still missing." (Scientific report for the 10 year period 1992 - 2002, p. 157.) Trautman concluded the discussion by appealing to urgency: "The idea of this institute is so good that it may be stolen and such an institute might be created elsewhere. It is essential to act quickly." (ibid., p. 158.)

The members of the workshop constituted an International Scientific Advisory Board and elected Thirring as chair. Subsequently, an in-depth feasibility study was commissioned by the Minister and presented by Thirring, Heide Narnhofer and Peter Michor in autumn 1991 (Scientific report for the 10 year period 1992 - 2002, p. 159, *Erwin Schrödinger International Institute for Mathematical Physics, Vertiefungsstudie*). This feasibility study had to strike a delicate balance between wishful thinking and politically and financially realistic conditions for the institute proposed, a task scientists are not well prepared to do. But, as Thirring, Narnhofer and Michor – a perfect triangle of proactive collaboration – proved, scientists can be quite effective to convince politicians if their proposals are sexy and timely. A decisive next step in December 1991 on the science policy level was the positive recommendation of the Austrian Council for Science and Research, the science advisory committee to the minister, to set up the institute.

During all of 1991 a search took place for an appropriate accommodation for the new institute, taking into account locational, financial and organizational constraints.

In February 1992, during an extremely critical period in finalizing the steps necessary to set up the institute, Thirring suffered a cerebral haemorrhage during a visit to Budapest. In this dramatic situation it was Julius Wess, Thirring's former assistant and close friend, who immediately stepped in and conducted all necessary negotiations at the ministerial level and helped to keep things going.

In March 1992 a second workshop, "Interfaces between Mathematics and Physics", chaired by Julius Wess, took place with 140 participants from 17 countries. This occasion was marked by the first meeting of the newly established International Scientific Advisory Board. The first ESI-Newsletter was issued in April. At that time Thirring already had fully recovered from his ailment and was back in business.

The society "Internationales Erwin Schrödinger Institut für Mathematische Physik" was officially founded in April 1992, and on May 27 the constitutional general assembly of this society elected Thirring as its president (with Wess, Michor and Reiter as deputies) and took the formal decision to set up a research institute under the legal framework of

the society. Busek confirmed this in writing on April 24 and the ministry subsequently allocated first funds to the institute. The physical location and level of funding of the institute were still unresolved at this stage.

The great international support and formidable team work among the people involved in the foundation of the ESI once again became visible when the conference “75 Years of Radon Transform” was held in Vienna in September 1992 as one of the first widely recognized activities of the institute.

With the beginning of 1993 it became all but clear that the financial frame of the institute as envisaged in the feasibility study of 1991 had to be reduced by a factor of three. Initial disappointment was quickly overcome when an appropriate location for the institute was found near the Mathematics and Physics Institutes of the University of Vienna, in the house where Erwin Schrödinger spent his last years. The institute started to operate in January 1993 with three scientific programs (two in physics, one in mathematics), and with about 40 visitors from 10 countries. Thirring acted as scientific director and Michor as executive director. In March the institute became visible with the first ESI-preprint published.

The official opening of “The Erwin Schrödinger International Institute for Mathematical Physics” took place on April 20, 1993, at Pasteurgasse 4/7 and 6/7 in Vienna’s 9th district under the auspices of Vice Chancellor and Minister of Science and Research, Erhard Busek.

From the very beginnings of the planning of the institute a set of basic conceptual and organizational tenets was accepted by all people involved: cross-fertilization of mathematics and physics as the institute’s scientific rationale, international character of the institute, highest scientific quality, programme orientation of its activities and invitation of leading experts, flat organizational and hierarchical structure among management and visitors, and no permanent positions.

After slightly more than two years, intense discussions of hopes, aims and philosophy concerning the establishment of this new institute, a dream had become reality. The ESI, as it was soon called by its visitors, quickly made its way into the top league of mathematical physics institutes worldwide, and the institute’s attractiveness as a place to work in Vienna helped to establish it astonishingly swiftly within the international scientific community.

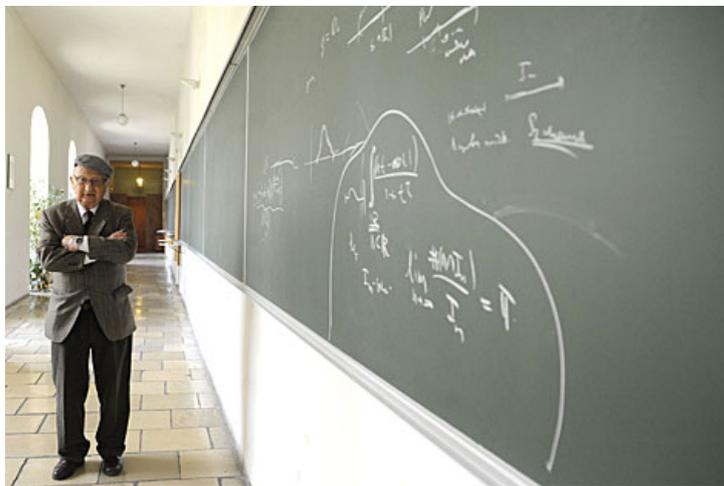
From the outset the mission of the Institute has been to promote research in mathematical physics and mathematics at the highest international level, with particular emphasis on creative interactions between mathematicians and physicists. The geographical location of the Institute in Central Europe has also made it a natural meeting place to stimulate intellectual exchange between scientists from Eastern Europe and the rest of the world.

With the growth of the Institute its original accommodation in Pasteurgasse soon became too small, and in July 1996 the Institute moved into its present premises next to the Institutes of Physics of the University of Vienna in Boltzmanngasse 9.

The foundation of the ESI was - in a sense - a perfect example for opportunism in the best sense of the word: for taking the initiative at an opportune moment to realize

a vision of scientists, when a changed geopolitical situation, the fall of the iron curtain, favourable local conditions at the governmental level, a supportive scientific community at home and on the international level, all acted in concert. However, all this would not have been sufficient. It was Walter Thirring, his person, his personality, his internationality, his scholarship and his good instinct in policy matters who made it a reality. Now, since he left us, his successors have to take care of his legacy.

Wolfgang L. Reiter



Call for nominations for the 2015 IAMP Early Career Award

The IAMP Executive Committee calls for nominations for the 2015 IAMP Early Career Award. The prize was instituted in 2008 and will be awarded for the third time at the ICMP in Santiago, Chile, in July 2015.

The Early Career Award is given in recognition of a single achievement in mathematical physics. The total prize value amounts to 3000 Euro and is reserved for scientists whose age in years since birth on July 31 of the year of the Congress is less than 35.

The nomination should include the name of the candidate accompanied by a brief characterization of the work singled out for the prize. Members of the IAMP should send their nomination or nominations to the President (president@iamp.org) and to the Secretary (secretary@iamp.org). A list of previous winners and the details of the award selection process can be found at: <http://www.iamp.org>.

Nominations should be made not later than **January 31, 2015**.

News from the IAMP Executive Committee

New individual members

IAMP welcomes the following new members

1. DR. VIVIANE BALADI, Directeur de Recherches au CNRS, DMA, Ecole Normale Supérieure, Paris, France
2. DR. SEBASTIANO CARPI, Dipartimento di Economia, Università di Chieti-Pescara, Pescara, Italy
3. DR. MICHELE CORREGGI, Department of Mathematics and Physics, Roma Tre University, Italy
4. DR. CLAUDIO DAPPIAGGI, Department of Physics, University of Pavia, Italy
5. DR. MARCO FALCONI, IRMAR, Université de Rennes 1, France
6. DR. ANTTI KEMPPAINEN, Department of Mathematics and Statistics, University of Helsinki, Finland
7. PROF. HANS KNÜPFER, Institut für Mathematik, Universität Heidelberg, Germany
8. PROF. WOLFGANG KÖNIG, Institut für Mathematik, TU Berlin, and Weierstrass Institute, Berlin, Germany
9. DR. JEAN-PIERRE MAGNOT, Académie de Clermont-Ferrand, France
10. PROF. UGO MOSCHELLA, Department of Physics and Mathematics, University of Insubria, Como, Italy
11. DR. PAOLO MURATORE GINANNESCHI, Department of Mathematics and Statistics, University of Helsinki, Finland
12. PROF. NICOLA PINAMONTI, Department of Mathematics, University of Genova, Italy
13. PROF. JÖRG TESCHNER, Theory Group, DESY, Hamburg, Germany
14. DR. RONALDO THIBES, Universidade Estadual do Sudoeste da Bahia, Brazil
15. PROF. JOHANNES WALCHER, Department of Mathematics and Statistics and Department of Physics, McGill University, Montreal, Canada

Recent conference announcements

Spectral Theory and Mathematical Physics

November 24-28, 2014, Santiago de Chile

organized by

Marius Mantoiu, Georgi Raikov, Edgardo Stockmeyer, Rafael Tiedra

Web page <http://www.mat.uc.cl/~graikov/conf2014.html>

This conference is partially funded by the IAMP.

51st Winter School of Theoretical Physics — Irreversible dynamics: nonlinear, nonlocal and non-Markovian manifestations

February 9-14, 2015, Ladek Zdroj, Poland

organized by

Wojciech Cegła, Andrzej Frydryszak, Piotr Garbaczewski, Lech Jakóbczyk, Robert Olkiewicz

School on Current Topics in Mathematical Physics

August 3-8, 2015, Federico Santa María Technical University, Viña del Mar, Chile

organized by

Christian Hainzl, Mathieu Lewin, Robert Seiringer, Edgardo Stockmeyer, Rafael Tiedra

Web page <http://www.fis.puc.cl/~smp2015/frontpage.html>

This school is partially funded by the IAMP.

Open positions

Postdoctoral Position in Mathematical Physics at the Doppler Institute.

A postdoctoral position is open in the mathematical-physics group of the Nuclear Physics Institute ASCR, a constituent of the [Doppler Institute](#), being oriented at investigation quantum systems of nontrivial geometry and topology, their spectral and transport properties, spectral geometry, models using non-selfadjoint operators, and related topics.

The offered salary is CZK 30 thousands monthly before tax, and a contribution to the accommodation expenses is possible. The position is for two years and can be extended. A successful candidate is supposed to demonstrate

- a recent PhD in theoretical or mathematical physics
- international research experience
- publications in recognized mathematical-physics journals

Familiarity with areas of spectral theory, semiclassical analysis, and partial differential equations is considered as an advantage.

Qualified female candidates are particularly encouraged to apply.

Applications should be sent to Prof. Pavel Exner, Department of Theoretical Physics, Nuclear Physics Institute, Academy of Sciences, 25068 Rez near Prague, Czech Republic.

The deadline for applications is November 15, 2014.

Tenure-track position at McGill University

The Department of Mathematics and Statistics at McGill University invites applications for a tenure-track position in Mathematical Analysis and Partial Differential Equations. The Department welcomes applications at the Assistant Professor level, but more senior applicants will also be considered. The Department is specifically encouraging applications in the following areas: geometric analysis, analysis of mathematical physics, microlocal analysis, spectral theory, stochastic and randomly forced PDEs.

Candidates must have a doctoral degree at the date of appointment, and must have demonstrated excellence in mathematical research. They must also have the desire and potential to contribute to the educational programs of the Department at the graduate and undergraduate levels.

Applications should be made through MathJobs.Org ([Position ID: McGill-ANPDE](#)) and must include a curriculum vitae, a list of publications, a research outline, a teaching statement which includes an account of teaching experience, and at least four references (with one addressing the teaching record). Candidates are also encouraged to provide web links for up to three selected reprints or preprints, or to upload them to MathJobs.Org.

Candidates must ensure that letters of reference are submitted, preferably through mathjobs.org, although in exceptional circumstances they may be mailed to

Chair, Analysis-PDE Search Committee
Department of Mathematics and Statistics
McGill University
805 Sherbrooke Street West
Montreal QC H3A 2K6 Canada

All applications received on or before 15 December 2014 will be considered: subsequent applications will be considered until the position is filled. For further details or clarifications, please email analysis.search2014@math.mcgill.ca.

McGill University is committed to equity in employment and diversity. It welcomes applications from indigenous peoples, visible minorities, ethnic minorities, persons with disabilities, women, persons of minority sexual orientations and gender identities and others who may contribute to further diversification. All qualified applicants are encouraged to apply; however, in accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada.

The deadline for applications is December 15, 2014.

Canada Research Chair in Probability at the University of British Columbia

The Mathematics Department at the University of British Columbia, Vancouver is seeking candidates for a Tier II Canada Research Chair, with a starting date of July 1, 2015. The successful candidate will have a PhD, normally obtained in the last ten years, and a record of world-class research accomplishments in mathematics, and will be expected to teach effectively at the undergraduate and graduate levels and to supervise graduate students. The priority research area is probability. Exceptional candidates may be considered from existing or emerging areas of research excellence in the department. The CRC Tier II is at the level of a tenure-track Assistant or tenured Associate Professor. Salary will be commensurate with experience and research record. Details about the federal government's CRC programme can be found at: <http://www.chairs.gc.ca>.

Applicants are strongly encouraged to apply on-line as described at:

<http://www.mathjobs.org/jobs/UBC/>

Alternatively, applicants may send a current CV including a list of publications, statement of research and teaching interests, a teaching dossier or similar record of teaching experience and supervision, and should arrange for three letters of recommendation to be sent directly to:

Chair, Departmental Committee on Appointments
Department of Mathematics
University of British Columbia
121-1984 Mathematics Road
Vancouver, B.C., Canada, V6T 1Z2

Review of applications will begin on December 1, 2014.

PostDoc position in the Mathematical Physics group at Aarhus

The position is at the Department of Mathematics, Aarhus University, Denmark, and for a duration of 6 months, during the year 2015 with February 1st 2015 being the earliest possible start date.

The ideal applicant has a strong background in the Mathematical Analysis of Quantum Mechanical Systems and/or Quantum Field Theory, as well as in Functional Analysis and Spectral Theory. The successful candidate is expected to enter into active collaboration with members of the group.

Applications should be submitted to Jacob Schach Møller at the email address: jacob@math.au.dk. Questions regarding the position may be submitted to the same address.

The deadline for application is December 15th, 2014.

More job announcements are on the job announcement page of the IAMP

http://www.iamp.org/page.php?page=page_positions

which gets updated whenever new announcements come in.

Manfred Salmhofer (IAMP Secretary)

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