

THE DEUTSCHE PHYSIKALISCHE GESELLSCHAFT (DPG)

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The Deutsche Physikalische Gesellschaft (DPG, German Physical Society) is the German sister society to the Societa Italiana di Fisica and has changed over the past decades from being a small, elitist academic specialist society into a large publicly visible community of people who are interested in physics.

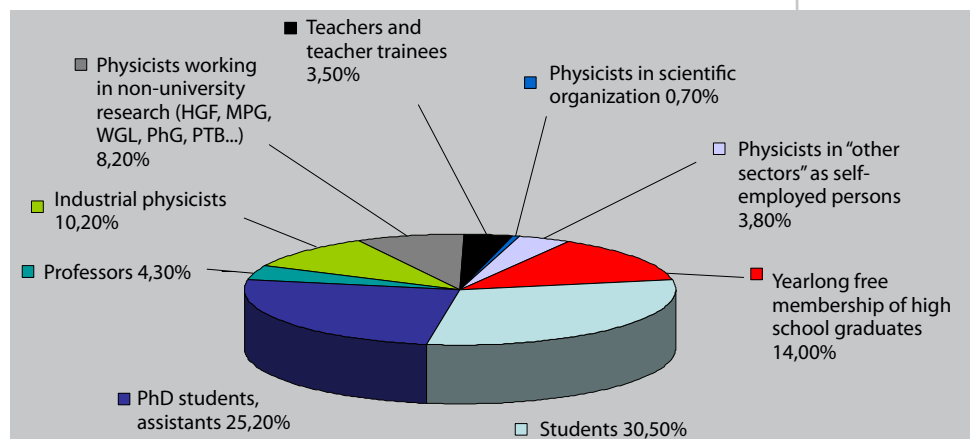
1 Development and role of the Deutsche Physikalische Gesellschaft

The DPG, the origins of which go back to the year 1845, is the oldest and currently largest physics society in the world, with more than 57 000 members at present. Almost every second physicist in Germany is a member of the DPG. Famous DPG presidents include Albert Einstein, Hermann von Helmholtz and Max Planck. The DPG sees itself as a forum and multiplicator for physics. With congresses, events, free memberships and book prizes for high school graduates, the fact sheet "Physik konkret" and the DPG journals (the members' journal "Physik Journal" and the open-access journal "New Journal of Physics" published in cooperation with the British Institute of Physics), it promotes the exchange of information about the latest findings in physics.

DPG members are from all kinds of professional groups: The DPG has members who are professors, students, teachers, working in industry or simply people who are interested in physics, as well as scientific journalists, patent lawyers and, currently, no less than nine Nobel prize winners. DPG members primarily feel committed to the aim of promoting natural sciences.

The organs of the DPG are the Annual General Meeting, Council, Executive Board, Chief Executive with the Head Office. The members of the Council with the right to vote are the speakers of the Divisions and coequal bodies, as well as an equal number of people elected by the DPG members in four electoral areas (school, university, industry, other areas). The Executive Board is made up of the President (two year term of office), Vice President (two year term of office, usually the previous President) and Treasurer. In addition, there are specialist Executive

Current distribution of the DPG members.



Board members responsible for the fields of public relations, journals, higher education and junior scientists, conferences and awards, physics education, industry, business and professional matters as well as the newly instituted Executive Board member for external relations. The term of office of these specialist board members is two years, they can be re-elected once. The position of President alternates between a person from university, extra-faculty research and industry. All board members are honorary members. In addition, the DPG has around 40 divisions and working groups. Regional groups also exist. The management of DPG, *i.e.* financial management, member management, organisation of conferences and various events, is supported to a decisive degree or carried out by a salaried team of 12 employees under the Chief Executive at the Bad Honnef and Berlin offices.

The DPG started off in a small way, at the Magnus-Haus in Berlin. A small meeting of a few academics that took place here regularly developed into the “Physikalische Gesellschaft zu Berlin” in 1845, later renamed DPG. For this reason, the Magnus-Haus is of great academic and historic cultural interest for the DPG and physics in Germany. German physicists feel committed to this legacy. Until German reunification, the Magnus-Haus was the headquarters of the Physikalische Gesellschaft of the GDR, and thus the centre of physics in the GDR. When the two societies were merged, Magnus-Haus passed over to the DPG members in East and West Germany together, with the obligation of being used and preserved. Today, the Magnus-Haus is intensively used for academic events. At the same time, the Magnus-Haus contains the historic archive of the DPG.

The foundation of the *Physikzentrum* (Physics Centre) Bad Honnef on 12th June 1976 was the fulfilment of the wish for a “summer training centre” expressed by many physicists in the 1960s. This academic centre has developed into an excellent academic discussion forum for physics in Germany and the DPG over the 30 years since it was founded. The DPG’s head office is also in the Physikzentrum Bad Honnef.

The current size of the DPG and the welcome continued increase in members, particularly among young people, are not a random occurrence, rather they are the result of specific advertising efforts and PR work with different partners. These activities can be mainly assigned to three areas:

- Public communication and academic exchange
- Support programs
- Studies.

2 Public communication and academic exchange

The year 2000 was proclaimed the *Jahr der Physik* (Year of Physics) by the physicists within the Deutsche Physikalische Gesellschaft and the Federal Ministry for Education and

Research (BMBF). The professional world and the public were surprised by this initiative. The campaigns linked with this year were so convincing that by the end of the year, initial reservation had turned first into a positive response and then great recognition. More than 100000 people visited events related to the *Jahr der Physik*. The impact of this great success had not been anticipated by anyone, and led to the years of the sciences proclaimed by the BMBF in following years becoming a fixed institution for other disciplines in Germany, too. The “World Year of Physics 2005” initiated by UNESCO also benefitted from the experiences made during the *Jahr der Physik*.

Inspired by the great success of the year 2000, the BMBF and DPG decided to continue their partnership through a new kind of events beyond the year 2000: through the annual academic festival *Highlights der Physik* (Highlights of Physics), which takes place in a different German city every year. The DPG Spring Meetings play a central role in DPG activities. Almost 10000 scientists from both Germany and abroad meet up each year for these traditional conferences. For young students and PhD students in particular, the DPG Spring Meetings are often the first opportunity they have of presenting their research results to a specialist audience. The resounding success of the Spring Meetings would probably not have been possible without the long years of cooperation with the Wilhelm and Else Heraeus Foundation, which has been supporting DPG conferences, programs and projects for more than 20 years.

The Physikzentrum Bad Honnef and Magnus-Haus are two further central factors in promoting physics and academic exchange. The Physikzentrum Bad Honnef has about 12000 overnight stays a year. Science and research take place in a wide variety of ways at this physics centre. First of all, the Heraeus seminars financed by the Wilhelm and Else Heraeus Foundation must be mentioned. Up to 20 of these specialised research seminars take place every year, with participants including the world’s top physicists such as recent Physics Nobel prize winners Theodor Hänsch or Anthony Legget as speakers and discussion partners. The *Deutsche Forschungsgemeinschaft* (DFG, German Research Foundation) enjoys visiting the Physikzentrum Bad Honnef and holds between 10 and 15 expertise colloquia from DFG priority programs there every year, and finances several more minor conferences. The one-week DPG physics schools, which are also financed by the Heraeus Foundation, are of immense importance. Since 1980, almost 60 such schools have been held in the Physikzentrum Bad Honnef, with a total of 3000 young physicists as students. These schools deal with topical subjects of modern physics and attract mainly young researchers. In addition, the commitment of the Physikzentrum Bad Honnef and the DPG to the further training of teachers must be mentioned, which has been

carried out for many years using the society's own resources and with contributions from different foundations. Since 1990, 32 one-week teacher courses have been held with a total of 1550 participants.

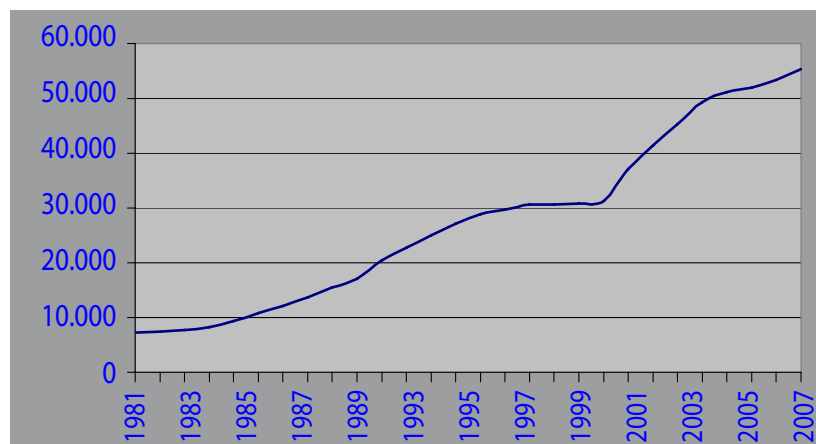
The Magnus-Haus in Berlin is the physics bridge into the capital of Germany. Magnus-Haus is used by the Deutsche Physikalische Gesellschaft for academic events. Physics research and teaching is consolidated here in evening lectures, Berlin industrial talks and physics colloquia through intensified exchange of ideas between physicists and within an inter-disciplinary context.

A significant part of public communication is the awarding of prizes. The DPG honours top performances in physics with internationally renowned awards. The two most important awards are the "Max Planck Medal for Theoretical Physics" and the "Stern-Gerlach Medal for Experimental Physics". This year, Friedrich Wagner from the Max-Planck-Institute for Plasma Physics in Greifswald and Robert Graham from the University of Duisburg-Essen received these prestigious awards during the annual conference in Hamburg. Some of the DPG awards – such as the "Gustav Hertz Prize for Young Physicists" – are specifically to encourage young people. Others – such as the "Otto Hahn Prize" – are awarded by the DPG in cooperation with other organisations within Germany and abroad. With the *Medaille für Naturwissenschaftliche Publizistik* (Medal for Scientific Journalism), the DPG honours personalities or institutions – which do not have to be from the field of physics, by the way – that have rendered outstanding services to the representation of scientific facts in public.

3 Support programs

An important instrument for acquiring new DPG members is the honouring of excellent school performances in physics. For this purpose, the DPG has developed a support program through which excellent high school graduates receive a book prize from the DPG and a one-year free DPG membership. Around 2800 schools take part in this program every year. Within the context of this campaign, more than 8000 high-school graduates each year receive free membership of the DPG for one year. This support program is extremely successful. Around one third of these high school graduates joins the DPG as paying members when their free membership expires.

Initial results of a perennial survey of the high-school graduates of 2007 who received a free DPG membership showed that early motivation for the subject of physics can be successful in terms of the later choice of studies. More than 90% of the high school graduates who received a prize for good performances in physics took up a place at university, while only 2% started an apprenticeship. Of those starting at university, almost 50% decided in favour of a degree in maths or natural sciences, another 40% in favour of engineering. The fact that the DPG school awards really do go to the best school-leavers is shown by the fact that 11.5% of those surveyed had received a scholarship from a foundation towards financing their studies – compared with 2% of students overall in Germany who receive a scholarship. With its support program "Physics for pupils" the Deutsche Physikalische Gesellschaft works together with the Wilhelm and Else Heraeus Foundation to



Development of DPG membership figures between 1981 and 2008.

alleviate the shortage of financing for state schools, which hits lessons in natural sciences particularly hard. Within the context of this program, support is provided for teachers who suggest sample projects for increasing the attractiveness of physics lessons. Schools can apply for financial means for the purchase of laboratory equipment or materials for series of physics lessons and experiments.

Since 2008, the DPG has also been supporting a project "fobinet" for further training of teachers, with financial support from the Wilhelm and Else Heraeus Foundation. Improved further training of teachers is an absolute must, particularly on the back of the large increase in the numbers of career changers who are becoming physics teachers in Germany – in other words people who have not been through special teacher training programs and start work in schools without the necessary didactic and pedagogical knowledge. With training courses throughout Germany, this project, is intended to supplement the already established further teacher training held by the DPG at the Physikzentrum Bad Honnef, and is supposed to provide around 20 000 units for further teacher training within three years. With "fobinet", the DPG wants to support teachers with suggestions and methods for more demonstrative, practice-oriented and – most important – exciting physics lessons to make more and more pupils interested in this fascinating subject. Because only those who have been interested in physics or natural sciences in general at school will study a natural science or technical subject later.

The DPG particularly focuses on supporting young females interested in physics. The DPG advocates winning over girls and young women for science studies and the resulting professions. In addition, the annual conference for female physicists brings together several hundred female physicists for professional debate and exchange. Furthermore, the Lise Meitner Lectures (LML) were set up by the DPG in 2008 together with the *Österreichische Physikalische Gesellschaft* (Austrian Physical Society) offering an attractive program for girls interested in physics. The LML are also a contribution by the DPG to the "MINT-Role-Model-Project" of the *Verein Deutscher Ingenieure* (VDI, Association of German Engineers), a national German initiative that is aiming to make mathematics, engineering, natural sciences and technology more attractive for young female professionals through "role models", i.e. women who are already working successfully in these areas of science and industry. The aim of the Lise Meitner Lectures is the long-term increase in the share of women in technical and natural science-related professions, and it receives financial support from the Federal Ministry for Education and Research (BMBF) as a contribution to the national pact for women in MINT professions. With the LML, DPG would like to underline that the MINT subjects play an important role in guaranteeing our present and future

culture. For this purpose, outstanding female scientists from Germany and Austria are to be presented to a wider public as "role models" at this annual series of events. Alongside public and generally understandable lectures in Berlin and Vienna, as well as an annual competition for pupils (title: "Following in the tracks of great explorers"), German and Austrian role models are presented in a poster exhibition with the title "Lise Meitner's daughters: female physicists introduce themselves". The poster displays are also available from the DPG website as downloads.

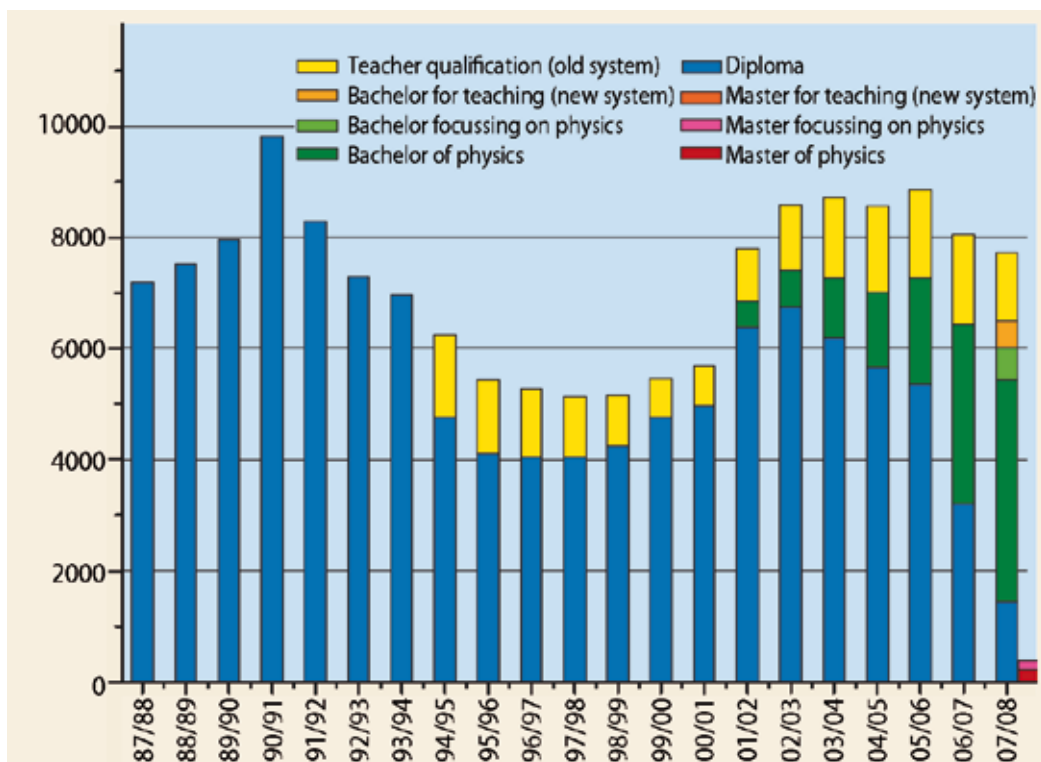
The success of the DPG programs becomes obvious from the fact that the numbers of students starting to study physics at German universities are consistently high. Current figures:

- Freshmen studying physics: 8124 students in total. Of these, 1340 have started studying to become a physics teacher.
- Of the new students total, 28% are women. Of those studying to be teachers 40% are women.
- Diploma qualifications: 2425; proportion of women: 17%. Bachelor qualifications (many courses of study have not been running long enough for there to be any students qualifying): 398; proportion of women: 21%.
- PhDs: 1224; proportion of women: 16%.

The DPG would like to continue cooperating with national and regional partners to ensure that the numbers of physics students and graduates remain at this high level. Despite the current global economic crisis, there is still a chronic shortage of physicists on the employment market: On the basis of studies carried out in Germany, the DPG assumes that there are around 5000 vacancies available for physicists, which correspond to about two complete years of graduates. Physicists are extremely highly regarded in business. This is demonstrated by the unusually low unemployment rate of only around 2%.

4 Publications and studies

The DPG produces various publications and studies, of which only a few as examples will be mentioned in the following. The central organ for providing information to DPG members is the membership journal – the "Physik Journal". In addition, the DPG publishes an electronic specialist journal together with the British Institute of Physics: the "New Journal of Physics". All the articles in this open-access journal can be read and downloaded for free. The articles published here have undergone strict peer review, because the "New Journal of Physics" relies on top scientific quality. This is also shown by the very good impact factor of 3.440 and the high rejection rate of 80%. Non-specialists who search for facts from the world of physics find a lot of information at the web portal www.weltderphysik.de, which is operated jointly by the DPG and BMBF.



Number of freshmen in physics at German universities in the past twenty years.

In addition, the DPG has been publishing the fact sheet "Physik konkret" since 2008 in order to attract more readers outside the physics world. "Physik konkret" presents physical relationships in a generally understandable form and is aimed at opinion formers in politics, industry, business and society as well as at interested members of the public. Following the first four issues, a positive balance can be drawn. The issues published so far have been very well received by politicians and opinion formers, and have led to intensive public discussions.

In close cooperation with the Conference of the Physics Faculties, which represents the physics faculties and departments at German universities, the DPG has commented several times on the conversion of physics courses to the bachelor and master system within the context of the Bologna Process. The DPG has clearly stated its

support for the Bologna Process and its aim of creating a joint European university region, but has also expressed significant criticism of the current implementation of the system in Germany. The problem is that it must be feared that the good element of diversification and competitive focussing on different subjects at the universities is more likely to prevent compatibility between the courses of study and thus reduce possibilities of changing between universities in Germany and Europe. In addition, the tendency has been observed in Germany that the national implementation of the Bologna resolutions has led to the contents of the new bachelor and master courses being condensed to such a large extent that they can hardly be completed within the prescribed number of semesters. Corrections must be made urgently here, in order to keep physics degrees attractive and manageable – particularly in view of the lack of qualified physicists. One

important factor is the number of academic employees at the universities, which is well below the level of professors and assistants required due to the modernisation of the courses. In the realisation of the Bologna resolutions within Europe the preparation phase of the PhD thesis is also under consideration. There is a tendency to define this phase as the so-called third cycle of higher education. It should be considered that the candidate for a doctor's degree in physics is set the task of independently working on a complex and challenging modern subject in the very front line of research and finding solutions. Therefore, DPG does not consider this phase to be just the third cycle of academic training, but rather the first phase of a career in science.

Getting young people interested in physics starts at kindergarten and school. For this reason, the DPG is continually dealing with issues related to the training of teachers in physics. The DPG demands well trained teachers who have a sound knowledge of both education and science. This will only work if the universities offer special optimised courses of study. Besides the activities described above for the improvement of training and further education for physics teachers the DPG presented a study "*Thesen für ein modernes Lehramtsstudium*" (Theses for modern teacher training courses) in 2006. On the basis of data collected by the University of Frankfurt with financial support by the DPG, it becomes obvious that there are still far too few professionally trained teachers in Germany. In the years 2002 to 2007 in Germany, for example, 45% of the physics trainee teachers for senior high schools had not done a university course leading to a teaching certificate. Despite the good professional competence of such career changers, they are

not sufficiently prepared for the didactic and pedagogical requirements of school teaching – particularly those who come into the job without having done any kind of preparatory teacher training whatsoever.

Alongside educational policies, another DPG focus is climate change and its consequences. Here, the DPG requires all its professional competence. As early as in 1980, the DPG issued statements about CO₂ emissions and the greenhouse effect. In 2005, the study "*Klimaschutz und Energieversorgung in Deutschland*" (Climate Protection and Energy Supply in Germany) was published. This study has been distributed in 3000 printed copies, downloaded more than 35 000 times from the DPG website and translated into English. How intensively the DPG climate study is received can be seen by the fact that the results of the study appear in written or spoken statements by politicians, journalists and experts. Taking into account the targets of the German government for the reduction of the CO₂ emissions, this DPG study concludes on the one hand that the existing nuclear-power plants would have to be kept running longer and, on the other hand, Germany should push the construction of solar-thermal power stations in sunny countries.

Reaching the public is of central importance for the DPG. To be able to cope with future challenges in Germany, the climate of acceptance for the natural sciences and technology by the population at large and those responsible for our society must improve even further. This is certainly not just a German problem, it is an European one, which is another reason why close cooperation with the other European physics societies and the EPS is especially important for the future of physics.

Bernhard Nunner

Bernhard Nunner is the Chief Executive of the Deutsche Physikalische Gesellschaft (DPG).

Physics degree (1988) and doctoral degree (1993) both from the RWTH Aachen, Germany. Research stays at the MIT-Harvard Health Science and Technology Department, Cambridge, USA (1989) and in McMurdo, Antarctica (1992). Main fields of his research activities were experimental semiconductor physics and materials research.

In 1992 he switched from active research to science management and administration when he started a career at the *Deutsche Forschungsgemeinschaft* (DFG, German Research Foundation) in Bonn. The DFG is the central, self-governing research funding organisation that promotes research at universities and other publicly financed research institutions in Germany. In 1996 he became the DFG Program Director for Mathematics, Nuclear and Particle Physics.

Since 2003 he is the Chief Executive of the Deutsche Physikalische Gesellschaft (DPG) and is the Head of the two DPG offices in Bad Honnef and in Berlin.