



PHYSICS FUNDING AT THE GERMAN RESEARCH FOUNDATION

■ Karin Zach – Deutsche Forschungsgemeinschaft (DFG), Bonn – DOI: 10.1051/ePN/2013603

The German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) is the central German organization to support basic research primarily at German universities. An important difference to other national funding organizations is that DFG works as a self-governing organization of German Science in a “response mode” by funding proposals made by scientists, but also contributing strategically to the development of priority areas. In both cases the research objectives are defined from science and within the research system itself. There is no political guidance to fund or to favour special fields of political relevance.

DFG promotes projects in all fields of science and humanities. This includes support for individual projects and research collaboration, awards for outstanding research achievements, and funding for scientific infrastructure and scientific cooperation.

In organizational terms, the DFG is an association under private law. Its membership consists of German research

universities, non-university research institutions, scientific associations and the Academies of Science and the Humanities.

The DFG receives the large majority of its funds from the Federal Government and the 16 German states, which are represented in all Grants Committees. At the same time the voting and the procedural regulations guarantee that all decisions made are science driven.

▲ Building of the German Research Foundation in Bonn (copyright DFG)

The funding opportunities

The German Research Foundation offers a broad variety of funding opportunities. Figure 1 shows the different programmes and the amount of research funding awarded by programme in 2012. The total sum is about 2 677 Million €.

The most traditional and at the same time – given its possibilities – broadest programme is the **individual grants programme**. This enables individuals who have completed their academic training to conduct research projects with clearly defined topics, regardless of the subject. The typical duration of such a project is 3 years with the possibility of prolongation. Every scientist having a PhD and working at a German university at any time can apply for support for a research project on any topic. There are no deadlines. DFG supports direct project costs, project specific staff, and instrumentation necessary to carry out the project.

As a special possibility the application for an individual research grant can include the position for the applicant as a project leader to be funded with a temporary position. This enables the project leader to realize his/her own ideas more independently than as a staff member in a project of another person.

Research Fellowships are another form of an individual grant. These stipends intend to help early-career researchers to conduct a defined project at a location of their choice outside Germany to familiarize with new research methods and at the same time with another scientific system.

The **Emmy Noether Programme** provides outstanding researchers at an early stage of their career with the opportunity to rapidly qualify for a leading position in science, preferably for a university teaching career, by leading an independent junior research group. It is our high-end excellence programme to recruit young

outstanding postdocs having international experience (back) to Germany. Foreign applicants are expected to continue their scientific career in Germany following the funding period. The funding possibilities in this programme include, for a period of five years, the position for the project leader, positions for staff, consumables, money for travel, project specific equipment; in brief - all that is necessary to run the group. The programme is highly competitive, as holding such a grant is a major step in a scientific career.

As seen from Figure 1 there also is a big amount of funding to different programmes for collaborative work.

A **Research Unit** is made of a team of researchers working together on a research project which, in terms of thematic focus, duration and finances, extends beyond the funding options available under the individual Grants Program. Research Units provide the staff and material resources required for carrying out intensive, medium-term cooperative projects.

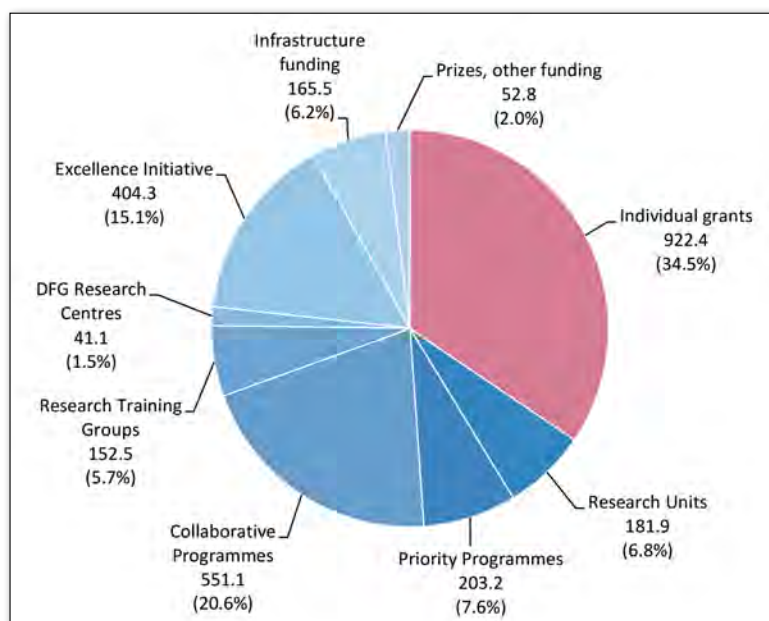
Priority Programmes serve for nationwide cooperation between its participating researchers. The Senate of the DFG (for organizational structures look at www.dfg.de/en/dfg_profile/index.jsp) establishes Priority Programmes when coordinated support given to the area in question promises to produce particular scientific gain. This is the only programme for which the DFG announces a call for proposals.

Collaborative Research Centres (CRC) are institutions established at universities for a period of up to 12 years that enable researchers to pursue outstanding research programmes, crossing the boundaries of disciplines, institutes, departments and faculties. They facilitate scientifically ambitious, complex, long-term research by concentrating and coordinating the resources available at a university.

Research Training Groups (RTG) are established by universities to promote young researchers. Their emphasis is on the qualification of doctoral researchers within the framework of a focused research programme and a structural training strategy. RTGs with an interdisciplinary approach are welcome. There are also very successful examples of international Research Training Groups.

Writing about the actual funding landscape in Germany must include the **German Excellence Initiative**. This initiative aims to promote top-level research and to improve the quality of German universities and research institutions in general, thus making Germany a more attractive research location, making it more internationally competitive and focusing attention on the outstanding achievements of German universities and the German scientific community. The DFG runs this initiative together with the German Science Council. The Excellence Initiative started in 2005. In 2009 the federal and state governments approved continuing the Excellence Initiative for another five years (2012

▼ FIG. 1: Amount of DFG funding awarded by programme in 2012 to all fields of science, in Million Euros



through 2017), allocating 2.7 billion € in funding for this period.

The DFG is responsible for two of the three funding lines – the Graduate Schools and the Clusters of Excellence. A third line dealing with institutional strategies is under responsibility of the German Science Council. The **Graduate Schools** serve as an instrument of quality assurance in promoting young researchers and are based on the principle of training outstanding doctoral students within an excellent research environment. They offer ideal conditions for doctoral students within a broad scientific area and, as integrative institutions with international visibility, they encourage students to be active members of their academic and social communities. As a result, graduate schools will extend far beyond DFG Research Training Groups and differ from them substantially.

Clusters of Excellence will enable German university locations to establish internationally visible, competitive research and training facilities, thereby enhancing scientific networking and cooperation among the participating institutions. They should form an important part of a university's strategic and thematic planning, significantly raise its profile and reflect its considered long-term priorities.

With its enormous possibilities the German Excellence Initiative was a starting point for a new kind of thinking at German universities and brought together a lot of people, who otherwise would have never talked to each other and who now collaborate to realize new ideas.

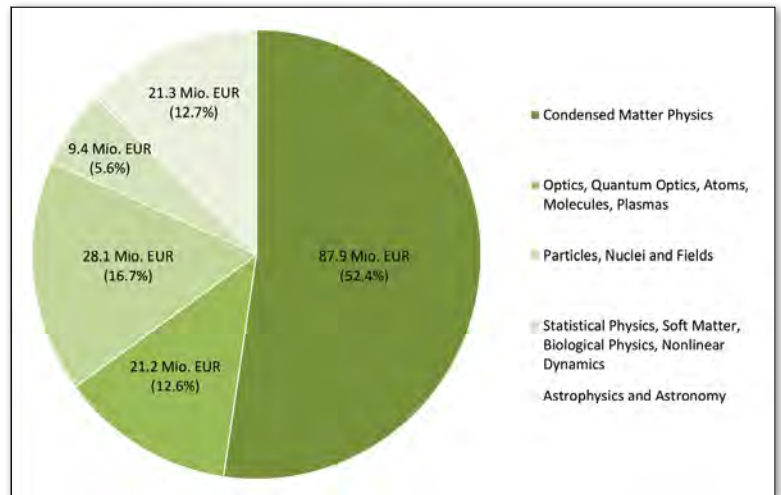
A much more detailed overview on funding possibilities and funded projects is given on the DFGs websites www.dfg.de/en/index.jsp.

The decision making process

Similar to other funding organizations the German Research Foundation makes its decisions on the basis of a peer review process. For all individual proposals we ask at least two national or international peers familiar with the field of the application to write an assessment on the quality of the project, the qualification of the applicant, the aims and work programme of the project and the planned allocation of funding. To prioritize the proposals on the basis of the statements of the reviewers (usually we have positive opinions for many more proposals than could be financed) we work with **elected review boards**. This is a big difference to other organizations as by the election process the members of these review boards have the mandate and at the same time the confidence of the scientific community to do this work. Actually 48 such boards from all fields of science with 606 members elected from the scientific community for the duration of 4 years work for the DFG on a voluntary basis.

In Physics we have five such boards:

- Condensed Matter Physics

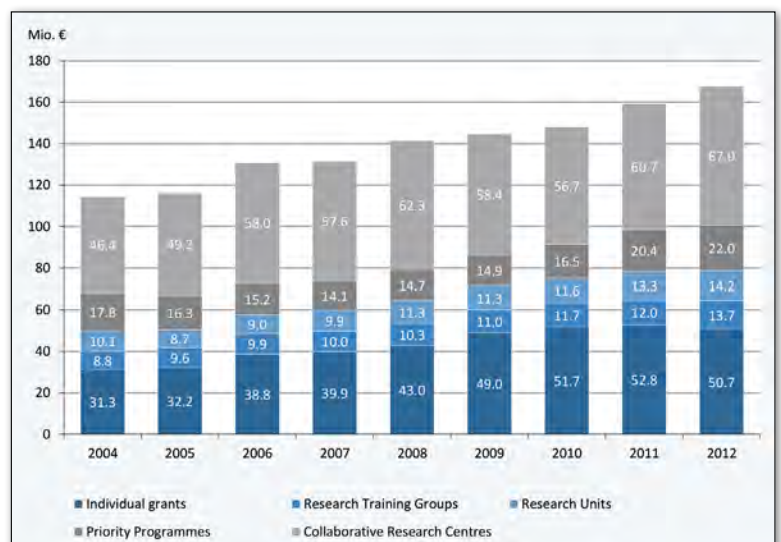


- Optics, Quantum Optics, Atoms, Molecules and Plasmas
- Particles, Nuclei and Fields
- Statistical Physics, Soft Matter, Biological Physics, Non-linear Dynamics
- Astrophysics and Astronomy

▲ FIG. 2: DFG funding to the different fields in physics in 2012

These boards meet four to six times per year to discuss all individual proposals from the respective subject area and to prepare the final decision on the proposals considering the financial possibilities. This way we ensure that all proposals within the subject area are assessed using a common standard. At the same time an important task of the boards is quality assurance. For example, they check if the selection of peer reviewers made by the DFG head office was the right one. In the DFG's coordinated programmes, which involve reviews by panels, review board members participate at the on-site evaluation to ensure the same quality standards in all funding programmes. Figure 2 shows the amount of funding to the different fields in physics in 2012. The whole sum was 167.6 Million €. This number includes the Individual grants programme, Research Units, Priority Programmes, Collaborative Research Centers and Research Training groups. It does not include the Excellence Initiative (difficult to count

▼ FIG. 3: Development of funding in physics over the last years for the different programmes (for better comparability all sums are divided into yearly amounts even if the project duration is much longer, this means that a 3 years grant is calculated as 3 parts for 3 years)



because of interdisciplinary approaches) nor the overhead of 20% which comes on top. The major part of the money goes to Condensed Matter Physics with more than half of the proposals and initiatives, whereas the amount for the other fields is smaller. We have to consider that there are fields in physics requiring large infrastructures, for example experimental particle physics, for which the funding responsibility in Germany is at the Ministry for Science and Education. There DFG money is only a small part of funding for these fields.

Development of DFG Funding in Physics

Figure 3 shows the development of funding in physics over the last years. For comparability all numbers given are counted as funding sums for the respective year. Physics is the strongest among the Natural Sciences (physics, chemistry, mathematics, geosciences). It receives approximately 10% of the whole DFG funding. The figure clearly shows the growth of the funding sums with time. We have the very favourable situation that the Federal Government and the 16 German states agreed to increase the DFG funds until 2015 by 5% per year. This is the basis for a substantial increase of funding in all programmes. Nevertheless the need for science funds grows faster than the financial possibilities, also in Germany. So, the elected review boards at every meeting have to reject very interesting proposals for financial reasons.

The individual funding programmes are the core of DFG funding as they give the scientists very flexible possibilities to realize innovative ideas. During the time shown the amount for individual grants in physics rose from 31.3

Million € to 50.7 Million € per year. Even if the rejection rate is actually quite high, very good proposals have a good chance to be funded.

Another point should be made on the part of money physics raises in programmes for collaborative work. For Collaborative Research Centres and Research Training Groups there is a common budget for all fields of science, "from archeology to zoology", and all proposals are decided in competition to each other. Physicists are very successful in these programmes. With attractive concepts they gain approximately 48% of their funds from these programmes whereas the average over all scientific fields adds up to approximately 35%.

We are convinced that the positive development of physics funding will continue at a national as well as at an international level. Most of our programmes enable common work with scientists from other countries. On the basis of what we have reached up to now one task for the future will be to further strengthen collaboration between physicists in Europe. ■

About the author



Karin Zach studied physics at Kharkov University in the former Soviet Union. She received her PhD in 1984 at Jena University (Germany). Her field of interest was experimental condensed matter physics. In 1994 she started working at the German Research Foundation, since 2005 as the Head of Division of Physics, Mathematics and Geosciences.

[Letter to the Editor]

by **Giorgio Benedek**

University of Milan-Bicocca

About 'Crossing borders'

I enjoyed reading 'Crossing Borders' by Herman Beijerinck in EPN 44/4, page 21. I agree on everything, and wish to answer the question about the play on the Heisenberg/Bohr discussion: see the article Revisiting Farm Hall by Amand Lucas in *Europhysics News* 38 n. 4, p. 25 (2007), directly accessible

through www.europhysicsnews.org. Amand Lucas also wrote a play on the same subject, published by Amazon 2011: "The Bomb and the Swastika" (Moral dilemma faced by history's greatest scientists, who tickled the tail of the sleeping nuclear dragon) Paperback – December 22, 2011, in the excellent English translation by Milton

W. Cole and Stephane Coutu from the original French. It is quite informative and enjoyable. Amand (amand.lucas@fundp.ac.be), will be happy to let readers have further information. Incidentally, I wrote a comment on this play: "Science Ethics in Four Acts", in *Revue des Questions Scientifiques* 184, n. 3 (Université de Namur, 2013). ■