

## **The German Science Foundation extends the funding for the collaborative research centre – *Transregio 49* – between the universities of Frankfurt, Kaiserslautern and Mainz for fundamental research on novel solid state materials**

At the meeting held on 20th and 21st May 2015, the Senate Committee of the German Science Foundation (DFG) approved the collaborative research centre (Transregio 49) “Condensed Matter Systems with Variable Many-Body Interactions” for a second funding period of four years with a package volume of 8.0 million Euros. The DFG made their decision following the very positive recommendation of an international peer review panel that had evaluated the application of the project on 19th and 20th March in Mainz. Taking part in this Special Research Programme are scientists from the universities of Frankfurt, Kaiserslautern and Mainz as well as the Max-Planck-Institute for Polymer Research at Mainz.

Collaborative research centres enable scientists, who are working in up to three different locations, to pool their expertise and to work on a jointly chosen topic. With this support, the DFG aims to promote excellent research by providing a challenging and long-term – up to 12 years – conceptual framework for redefining the focal points for the research institutes involved.

The target of the Special Research Programme is the comprehension of complex ordering phenomena in solid state materials, whose origins lie in the interactions of a large number of quantum objects. The state of the exotic materials observed here – such as unusual forms of superconducting or novel magnetic and metallic states – is characterized such that the materials do not just reflect the features of individual quantum objects. It is rather the case that they are a result of complex and as yet still widely unknown ordering mechanisms.

In the strongly interdisciplinary-related research plan, where scientists conjoin from the varied disciplines of solid state physics, solid state chemistry, materials science and quantum optics, the fundamental ordering principles of such strongly interactive many-body systems can now be systematically investigated. As objects of study, a broad palette of selected materials with varying degrees of complexity is used. At the bottom of the complexity scale are the “artificial solids”, called into play as so-called quantum simulators. This means, for example, that gas atoms influenced by laser-light are forced into a regular array, as it is the case in real solids. Thus, particular features can be simulated and studied in detail under well-controlled conditions. The spectrum of the objects, to be examined, ranges from the simple model systems up to complex real-space solid states, which the chemists and materials scientists are able to assemble from molecular building blocks. All materials share a high measure of variability, where it is possible for the scientists to manipulate a particular material design by altering the chemical or physical system parameters. By comparative studies of the related phenomena on these varying systems, the complex interplay of the various influences can be untangled and new theoretical concepts designed.

An important component of the Transregio 49 is the support of the young academics. In this network of outstanding research conditions, the budding scientists find a stimulating interdisciplinary environment with much scope for the realisation of their own ideas. In addition to the involvement in highly topical, excellent research with international networking, the Transregio 49 offers an integrated research training group as a supplement to the graduate training. On offer is a wide range of courses with specialist and multidisciplinary elements so that the young master/diploma students and/or doctoral students are able to acquire knowledge and skills, standing them in good stead in their later professional activities in a variety of ways.

Coordinator and Speaker of the Transregio 49 is Prof. Dr. Michael Lang, Goethe-Universität Frankfurt. The training of the young academics is coordinated by Prof. Dr. Sebastian Eggert, TU Kaiserslautern.