

*Dear TUM friends and associates,*

**Here at TUM, our scientists are as varied and individual as the topics they research. Some of them, such as the physicians and chemists we introduce in this edition, work on topics that touch people's lives on a personal level. Our engineers, on the other hand, aim to advance society by improving technical infrastructure. And our astrophysicists explore fundamental questions about our existence in their search for neutrinos from distant regions of space. Depth and diversity are the hallmarks of our research efforts.**

Deep below the Gran Sasso mountain in Italy lies the Boraxino detector that has enabled Lothar Oberauer and Stefan Schönert to measure neutrinos generated by the fusion of hydrogen nuclei at the Sun's core. These are the first direct signals of the most fundamental reaction by which the Sun creates energy, thus sustaining life on Earth.

Meanwhile, Elisa Resconi has set her sights far beyond our solar system. Her team is involved in the IceCube Neutrino Observatory, embedded kilometers into the Antarctic ice at the South Pole, in an effort to detect highly energetic neutrinos from the depths of outer space. These may have arisen from cosmic catastrophes, such as the birth of a supernova, or from the vicinity of a black hole, and thus could offer a way to discover more about such phenomena.

Tilo Biedermann's research efforts literally "get under your skin." The allergist and immunologist is working to establish the immune system processes responsible for the exacerbation of atopic dermatitis when the skin is colonized by *Staphylococcus aureus* bacteria. His investigations not only pave the way for effective treatment options, they also reveal completely new findings about the mechanisms of our immune system.

At the same time, Stephan Sieber is exploring another, highly topical side of *Staphylococcus aureus*. These bacteria are becoming increasingly resistant to conventional antibiotics, posing a major challenge for our healthcare system. Searching nature's toolbox, the chemist has come up with substances to help render the bacteria harmless without triggering fresh resistance responses.



Fifty years after Gordon E. Moore first made his projections about the development of computer chips, his law is gradually reaching its limits. Now, Markus Becherer and his team of electrical engineers have come up with a radical new approach to further increase the density of switching elements on chips – circuits based on three-dimensional nanomagnetic logic.

As part of the Visio.M project, TUM is working with an industrial consortium to develop an economically attractive electric car with a good driving range. To this end, Karsten Stahl has devised a lightweight and compact torque vectoring drive system that opens up completely new opportunities for auto manufacturers when it comes to handling dynamics, stability and regenerative braking in electric vehicles.

We hope you enjoy this edition as it takes you on a voyage of discovery to the South Pole, an expedition deep below the Italian mountains, and a tour of our clinics, labs and workshops in Munich.

*Wolfgang A. Herrmann*

Prof. Wolfgang A. Herrmann