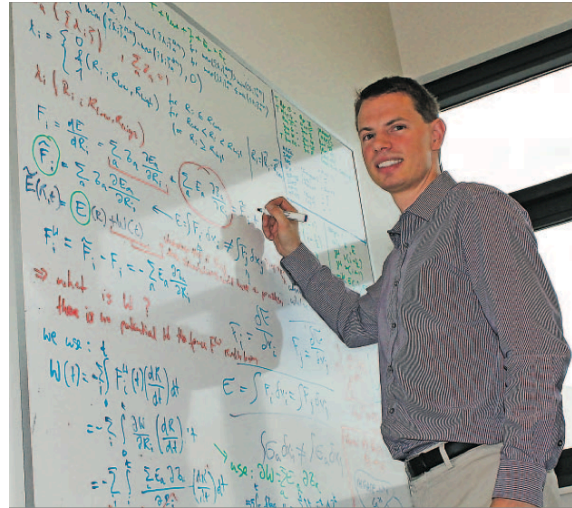


Life and work of SDSC employee Dr. Andreas Goetz was highlighted in an article (in press June 3<sup>rd</sup>, 2013) of the “Nürnberger Zeitung”, newspaper of the city of Nuremberg, Germany. Dr. Goetz grew up in Nuremberg, the second largest city in Bavaria with 510,600 inhabitants and 3.5 million people in its metropolitan area.

*Translated into English by Andreas Goetz.*

## **Nuremberg citizen works at the Supercomputer Center in San Diego – Homesick despite the dream job**

Andreas Goetz is sitting in his office. His desk is tidy, the bookshelf contains books about programming languages, physics and chemistry. A large whiteboard is hanging on the wall, tightly covered with complicated mathematical equations. The 35-year-old citizen of Nuremberg is a scientific employee at the Supercomputer Center in San Diego. He has an exciting job and the weather is almost always nice here in the most southwestern part of the USA. Nevertheless he is missing his home. This is also evident from the package of *Spekulatius* (*note: a type of cookie traditionally eaten during the Christmas period in Germany*) that is lying on a cupboard in the corner of the room.



At times, Andreas Goetz solves complicated mathematical equations on the whiteboard in his office. (Photo by Stephanie Siebert)

*By Stephanie Siebert*

“It is a bit strange to eat these while it is so warm”, says Goetz smiling while looking at the cloudless, blue sky. “But I could not resist when I saw them.” In a store that imports international food, he sometimes can even get German gingerbread. “It is not comparable to the *Elisen*-gingerbread from Nuremberg, but it’s still great”. However, it is not the food from his home in Franconia, which Goetz, chemist by education, is missing most. It is the people. Especially the people on the streets.

“Here in the USA almost nobody is walking, people tend to drive everywhere by car. There is no public transport system that works as well as in Germany. I do miss seeing more people on the streets.” At night the streets are very dark, in some places there is almost no street lights, no public illumination. Andreas Goetz seems almost exotic here since he cycles to work.

He has been working at the Supercomputer Center since over three years now. Together with his colleagues, he is developing software to simulate chemical processes. This makes it possible to investigate, for example, the way medical drugs and proteins or enzymes interact in the human body. Using these insights, more efficient medicines can be developed. Another prominent example for currently conducted research is simulations on how ethanol (that is fuel) can be produced from biomass. Naturally occurring enzymes are able to digest plant fibers by splitting the chains of sugar molecules which these are made of.

During this process, bio-ethanol can be produced. Unfortunately this is happening on time scales that are too slow to be used for commercial biofuel production. The enzymes thus have to be genetically modified. This will probably still take a few years, estimates Dr. Goetz.

The fact that we know so much about the process at all is due to simulation software such as the one developed by the Nurembergian. The simulations are very complex. They are only feasible with the machines that give the Supercomputer Center its name. Here the simulations are running over days or weeks on thousands of processors.

The fastest supercomputer in San Diego is called Gordon. It manages 340 Tflop/s, that is 340 times  $10^{12}$  floating point operations per second. It boasts a total memory size of 64 Terabyte and in addition can access 300 Terabyte of flash memory. For comparison: Modern notebooks are usually equipped with four to eight Gigabyte. 1,024 Gigabyte correspond to one Terabyte.

Gordon is standing in line with the other supercomputers. It looks as if one had put many oversized computers of over two meters height next to each other. Optically it is distinguished from the other computers mainly because its housing is not black, but purple.

It is cold in the compute center. Because all these powerful computers emit an extreme amount of heat, the machine room is cooled and subdivided with transparent plastic curtains in order to separate the warm outgoing air from the cool air of the air conditioning system and thus optimize the cooling system. It sounds as if there was a contest between the humming of the computer ventilators and the air conditioning.

All these huge computers perform unimaginable complex scientific computations right this moment. Among these are simulations of earthquakes, weather, and the formation of galaxies. One supercomputer is located in a cage behind bars since it is handling confidential data.

The project deals with an improvement of the digital network between physicians and hospitals, for example to simplify access of the primary care physician to digital

data such as computer tomograms. One of the problems with such networking is that the privacy of the patient cannot be compromised.

Dr. Goetz was very fortunate to get this job: It allows him to enjoy his fascination with theoretical chemistry and much more. He describes chemical processes with the help of physics and quantum mechanics.

Various disciplines of the natural sciences are working together. Already at school, he had difficulties deciding which subject he liked most. Dr. Goetz also enjoys foreign languages very much. Nevertheless, it became clear that he would go into research early on.

He did not have to study hard until after high school. Nevertheless he was not known as a geek: "Because I did not have to sit down and learn, I had a lot of time to go out, to skateboard, to do all the fun stuff kids usually do during that age." After excelling in the German University entrance qualification, Andreas Goetz finally had to adjust: "The pace at the university is very different from high school. I first had to learn how to learn."

Despite his dream job, the 35-year-old can imagine returning to Nuremberg one day. But for now his girlfriend is moving from the East Coast to join him in San Diego. And to be honest, life can be quite good under the sun of southern California.