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Mathematician and stargazer – software expert Rolf Hempel

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Rolf Hempel, the Head of DLR's Simulation and Software Technology, has an asteroid named after him. No wonder, as he devotes much of his spare time to astronomy. A mathematician by training, he manages the development of new software technologies that has applications such as the construction of complex space systems. Rolf Hempel applies his logical streak in equal measure to both his work and to his hobby.

By Manuela Braun

Rolf Hempel, Head of DLR's Simulation and Software Technology Facility

"Look!" says a moonstruck Rolf Hempel. On the computer screen is a detailed image of the Moon. Hempel reaches for his green and red glasses. The flat Moon acquires contours, crater rims curve upwards and the hills between which there landings have taken place can be seen vividly. This 3D effect is the result of a trick he has played using a telescope in his home garden, sacrificing many hours of his spare time. "The Moon is simply unique." The Head of DLR's Simulation and Software Technology Facility is a 54-year old amateur astronomy enthusiast – he points out the significant elements in his image of the Moon, one by one. "Here is the Apollo 15 landing site; that is Mount Hadley…"

On the trail of asteroids

His passion for heavenly bodies began when 13-year-old Rolf Hempel sat in front of the television watching Neil Armstrong become the first man on the Moon. "That was an unbelievably exciting time," he says. "I have spent a lot of my spare time on astronomy." It also inspired Rolf Hempel to become engrossed in planetary orbit calculations for 'Youth Research' ('Jugend forscht', a German contest for young scientists), winning second place in the North Rhine-Westphalia regional competition in 1974. The International Astronomical Union gave the number 519 to his asteroid research station, situated in the garden of his parents' house in Sauerland at that time. Hempel published many hundreds of asteroid positions through the Minor Planet Center in the USA and in doing so became one of the most active asteroid observers in Germany.

Stargazing in his spare time

As a schoolboy, he carried out his first orbit calculations by hand using logarithm tables. In those days it would take two weeks to work out an orbit. "If you made a mistake …" Hempel waves his hand dismissively. Calculation errors mean that observers will be pointing telescopes and cameras at the wrong place and at the wrong time. Later on, as a student, it was a logical step for Hempel to develop a software system for the Astronomische Rechen-Institut (ARI) in Heidelberg, to carry out orbit calculations. Inaccuracies are the stuff of nightmares for the trained mathematician – so even back then he approached his first software development project with the greatest possible precision. "Twenty-five years later, I had the chance again to meet Dr Schmadel, the professional astronomer in charge at the time, and he was still using my software."

Combining spaceflight and software development

Hempel has a knack for logical connections and a passion for space. "I could work anywhere in the world in software development, but only at DLR can I combine this with spaceflight," he says. This is why he moved to the research centre nine years ago. Previously, he had spent 15 years working with high-performance computers. When the Earth Simulator supercomputer went live in Yokohama in Japan in 2002, Hempel took a share of the plaudits; he and his team at NEC had collaborated on the two computers' communication software. The software expert was also involved in the development of the Message Passing Interface (MPI), a global standard for programming parallel computers.

3D views of the Moon

Then, as now, his activities took place in the background. "A great deal of complex software is being developed at DLR, but this is not high profile activity," says Hempel. But still, it is important for developing space systems, constructing aircraft, or if engineer A needs to share data with engineer B regarding very different activities that are ultimately intended to become a successful whole. "Much of our work involves integration. One institute may be working on a flow simulation; another may be optimising engines, while a third is working on improving the structure of an aircraft. They are all using their own planning and simulation software, and our task is to bring all those development tools together into a single software system." The DLR Facility staff members are currently looking after some 30 projects. “The most thing is for everyone to have a good overview. What is already available on the market? What do we need to program ourselves?" The Facility's sphere of activities is constantly growing. "Scientific visualisation, such as converting data sets into 3D models, is becoming more and more important – and for this we need high performance computers as well".

A Hempel in space

Child's drawing of Asteroid Hempel

Rolf Hempel is always happy to look for new challenges – at work as well as in his spare time: photographing the International Space Station as it flies overhead, or the Moon in even better quality, or Jupiter and its Great Red Spot. He has stitched together 38 individual shots of the Moon on his computer. The result hangs in a frame on his office wall. They were taken from his garden in Westerwald. "From there you can see the Milky way really well!" But his favourite image of a celestial body hangs on his pin board. The planets are painted in vibrant gold against the inky blackness of space. 'Sun, Mercury, Venus, Earth, Mars' is written in a child’s handwriting. And then there is 'Hempel'. Rolf Hempel's nine-year-old son has positioned it precisely in his drawing – the asteroid named after the DLR employee by the International Astronomical Union lies between Mars and Jupiter. Discovered in the early 1970s, it was previously known by the sober title '3064 T-1' and has a diameter of six kilometres. "It's no giant, but anyway," says Rolf Hempel.

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