



“How We Discovered Darmstadtium”

Prof. Sigurd Hofmann (74) started his career at GSI in 1974 as a research associate, and after a series of promotions he was appointed to lead the experiments for the synthesis of new elements. He has worked as a guest researcher at GSI since his retirement in 2009. In the particle accelerator, elements are shot at a target consisting of another element

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Nuclear physicists use known elements to create new ones. We want to understand the structure of matter, and thus to understand the development of the universe. At the Gesellschaft für Schwerionenforschung (GSI), we use a particle accelerator to make two atomic nuclei collide at a speed of 30,000 kilometers per second. The fusion of these two nuclei creates a new, previously unknown element that we filter out using a separator and then investigate. The process of detecting these new elements is complicated. They are unstable, and they decay within a fraction of a second. That’s why I have to precisely calculate the energy with which the atomic nuclei are accelerated and adjust our instruments accordingly. We discovered three new elements in the 1980s, but after that we had to do ten years of development work to refine our detection method. In case you’re wondering if I ever lost my patience, my answer is “absolutely not”! We always had a lot to do, and we had set our sights on a clearly defined goal: being able to indisputably detect the next element. Our work was eventually successful. I’ll always remember the day when we were able

to detect Element 110. Two of my colleagues and I were working alone on the experiment. We discussed the measurements we had made to date—and there we had it: the proof of the new element! The number of protons in the atomic nucleus of the newly created element matched our calculations. Naturally, we were eager to announce this important discovery immediately. But if we had done that we wouldn’t have had any time to write a paper about it. So we stayed mum and immediately started to write the paper. At 3 a.m. we were finished, and we placed

our report on our colleagues’ desks. When they read it a few hours later, they were absolutely astonished! On the basis of our precise calculations, we subsequently discovered two more new elements in short order. I’m especially proud of the fact that our team was allowed to name these elements. Following my suggestion, we named element 110 darmstadtium as a tribute to the city where I studied physics and where I’ve been pursuing my passion for the past 45 years. —