

VU Amsterdam objects and their stories

1935-1940 Heavy water, G.J. Sizoo and the Physics degree programme



[photo: heavy water ampoule bought for the research of G. J. Sizoo, made by Norsk Hydro, 1935-1940, VU heritage and collections, photo: René den Engelsman, 2018]

Physics was one of the disciplines that was present at the launch of the science faculty, the 'fourth' faculty of VU University Amsterdam, in 1930. Gerard Sizoo became the first professor of experimental physics and brought research into radioactivity and nuclear physics to the VU. What is the current state of the physics research at the VU? Here, you can read about the launch of the degree programme based on an ampoule of 'heavy water' and a reflection by Prof. Wim Ubachs on today's research.

By Mariska Castelijm

In 1927, VU University Amsterdam decided to set up a Faculty of Science with three chairs. In 1930, physicist [Gerard Sizoo](#) became one of the first professors of this new Faculty of Mathematics and Physics. A fourth faculty was required as a result of legal obligations, and a Faculty of Science was thought to be cheaper than the long-awaited [Medical Faculty](#). At the same time, it was still a 'step in the right direction', because future medical students had to take science courses. During the first year, nine students enrolled for the entire faculty. In the period up to 1943 (when the VU temporarily closed due to the war), twenty students passed the doctoral examination in physics. The required building with laboratories was built on [De Lairessestraat](#) and taken into use in 1933.

Together with professors [J. Coops](#), [J. F. Koksmá](#) and actuary M. van Haften, Sizoo developed the physics, chemistry and mathematics research and education at the VU. Sizoo chose 'radioactivity' as the subject of research, since no other laboratory in the Netherlands had focused on the subject. At the time, it was still a relatively inexpensive field, an important additional consideration for the [privately funded](#) VU. This choice of radioactivity – and more broadly: nuclear phenomena – proved to be a golden opportunity, as this field was undergoing major developments. As a result of his research, Sizoo laid [the foundation for nuclear research](#) in the Netherlands, which would flourish after the war.

In 1938, a Philips neutron generator was purchased for the Physics department and Sizoo's research. A batch of so-called 'heavy water' was also purchased for this purpose. This ²H₂O (dideuterium oxide) can be used as a moderator in nuclear fission reactions, i.e. to slow down neutrons, but is not radioactive itself. Several ampoules of heavy water were rediscovered in 2017 and now form part of the heritage collection. They come from the [Norsk Hydro](#) factory, which was part of the race to develop the atomic bomb during World War II.

The graphite used by the Americans worked better, however, reducing the importance of heavy water for this type of research.

VU University Amsterdam remained very active in the field of nuclear physics after the war, and a cyclotron and radionuclide centre were built in the new [Mathematics and Physics building](#) that was constructed on De Boelelaan in the 1960s.

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prof. G. J. Sizoo, by Roeland Koning, 1965,
oil on canvas
VU heritage and collections
photo: René den Engelsman, 2010

Physics at VU Amsterdam, 1980–today

by Wim Ubachs

Until 1980, physics at VU Amsterdam was heavily focused on nuclear physics, but with the availability of increasingly powerful accelerators, research shifted to what is now known as 'particle physics' or 'high-energy physics'. Nuclear and particle research in the Netherlands was united under [Nikhef](#) located in Watergraafsmeer, where the AMPS accelerator began operation in 1992. At the same time, physicists from VU Amsterdam became involved through Nikhef in activities at CERN (Geneva), where particle collisions at ever increasing energy were being studied. When the Large Hadron Collider was commissioned, physicists from VU Amsterdam opted for the subject of symmetry breaking between matter and antimatter, which is studied primarily with the LHCb detector, one of the four large set-ups at CERN. Over the past decade, research into particles by VU Amsterdam has partly shifted towards astro particles and VU Amsterdam physicists have been involved in the detection of gravitational waves in the [LIGO-VIRGO](#) consortium.

With a higher intake of students and an expansion of staff numbers throughout the 1970s and 1980s, physics research at VU Amsterdam expanded further. In nuclear physics, research began to focus on the radiation effects on living matter. This marked the starting point of [biophysics](#), which has since gone on to focus wholly on research into photosynthesis. Initially, research into nuclear properties was the preserve of [atomic physics](#), but research evolved to become autonomous in this area as well. It now aims to test fundamental physics through extremely precise measurements of atoms and small molecules. The laser was central to both biophysics and atomic physics, leading to the foundation of the VU laser centre in 1992. Today, an important part of physics research at VU Amsterdam is integrated into [LaserLaB](#), where in addition to atomic physics and photosynthesis, research is also being conducted into living matter and medical/diagnostic techniques involving lasers. Thanks to their laser expertise, VU Amsterdam physicists were closely involved, along with UvA colleagues, in the founding of the [ARCNL](#) research institute, which works closely with [ASML](#) to improve nano-lithographic techniques for the microchip industry.

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