



Obituary

# Hannelore Emmi Saraph (1936–2020): Her Life in Atomic Physics

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Hannelore Emmi Saraph (Figure 1, and hereafter “Hannelore”) was an atomic physicist based at University College London. During the early part of her career, Hannelore’s work was devoted to the study of electron collisions with atoms and ions. Later on, Hannelore made contributions to the Opacity Project [1] and Iron Project [2].



**Figure 1.** Hannelore Emmi Saraph (née Schulz; photograph courtesy of University College London Educational Media).

Hannelore was born in Berlin on 3 August 1936, her father running a tailor’s shop and the family living in the flat above it. Difficult and at times traumatic experiences must have defined Hannelore’s childhood, particularly during the bombing raids carried out by the Royal Air Force, with the United States and Soviet Union also participating in the later stages of the Second World War. Additionally, although evacuated to stay with her grandparents in a rural setting, Hannelore must have worried about the safety of her parents, who remained in Berlin to continue operating their business. In order to spare Hannelore and her mother from the worst of the trauma experienced by the civilian population of Berlin in 1945, her father evacuated them to a German North Sea island, which later fell under British control.

After the war, Hannelore and her mother returned to Berlin and the family gradually and secretly transferred their moveable possessions into a new and, as it turned out,



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temporary residence in what was to become West Berlin. The family was fortunate to find themselves in West Berlin when the Berlin Wall was built in August 1961. Shortly afterwards, the family decided to relocate to London. Once in London, Hannelore's father needed to visit West Berlin on several occasions to sort out financial and pension arrangements; he died around 1966, on the last of these expeditions. As we recall, Hannelore's mother died in London in 1993.

Hannelore's education was fragmented: From 1942 to 1958 she attended various schools and finally the Technische Universität Berlin (TUB), first coming to London in the late fifties with the aim of improving her use of English. Having completed three years of a TUB physics degree, she enquired about continuing her studies at the University of London. She was referred to the University College London (UCL) Physics Department and sent to see the late Professor M.J. Seaton FRS. Mike Seaton had some grant money, and provided her with a temporary job as a computer programmer.

In the early sixties, Hannelore's family took the big decision to move permanently from Berlin to London. Once settled in London, Hannelore wanted to develop her career. It was a shock to find that the University of London was unwilling to take any account of previous university studies in Berlin. Not only that, the University of London would not accept any of Hannelore's German school qualifications. Representations were made on Hannelore's behalf by the UCL Department of Physics, but to no avail. Hannelore therefore ended up sitting O-level and A-level examinations, followed by an external physics degree at Birkbeck College, which was awarded by the University of London in 1969. Although by 1969 Hannelore had been carrying out research at UCL for several years, she enrolled in that year as a doctoral research student, supervised by Mike Seaton; the University of London awarded her a PhD degree in 1971 for a thesis entitled "Electron Collisions with Complex Ions".

By 1971, Hannelore was a highly valued member of the Department of Physics, which was to merge in 1972 with the Department of Astronomy to form the Department of Physics and Astronomy. With the appointment of the late Professor R. Wilson FRS to the Perren Chair, following the 1972 retirement of Professor C.W. Allen, UCL became involved in ultraviolet astronomy through the launch of the International Ultraviolet Explorer Satellite in 1978; this was to provide an exciting new opportunity to apply the results of atomic physics calculations to the interpretation of ultraviolet astronomical spectra.

There was therefore an obvious demand for research workers with Hannelore's skills in computational atomic physics; her postdoctoral role was to continue as Mike Seaton's research assistant, eventually joining the permanent staff at the UCL Department of Physics and Astronomy. Hannelore became internationally recognized as an atomic physicist in her own right, collaborating with colleagues in France and in the seventies holding a Visiting Fellowship at the Joint Institute for Laboratory Astrophysics (Boulder, CO, USA). After Professor Seaton's retirement in 1988, and until her own retirement in 2001, Hannelore became involved in undergraduate teaching; with Dr. Gillian Peach, she was responsible for giving classes on computing and programming skills. Throughout her employment at UCL, and on into her retirement, Hannelore was an active researcher in atomic physics, publishing some sixty papers in the period between 1961 and 2009.

Until 1992, stellar envelope opacity calculations were based on photoexcitation and photoionization data calculated for many elements and their ionization stages with necessarily rudimentary methods. By 1982, it had become clear that better estimates of the metal (all elements except hydrogen and helium) contribution to stellar envelope opacities were urgently needed. Professor Seaton accordingly initiated the Opacity Project (OP), in which Hannelore became involved, along with most of his former research students and postdoctoral research assistants. The large-scale production of data for OP work was made possible through the R-matrix implementation of the close-coupling equations; the collaboration therefore involved the late Professor P.G. Burke FRS (Queen's University Belfast) and Professor K.T. Taylor MRIA (Royal Holloway College), the latter being able to know Hannelore particularly well through this work. Following the success of the Opacity

Project, it was recognized that the team involved could usefully work on electron collision data; for this reason, in 1993 the late Dr. D.G. Hummer (then a visitor at the Munich University Observatory) formed the Iron Project, in which Hannelore proceeded to make an important contribution.

Hannelore had many activities outside UCL; in particular, she became a property owner, provided rented accommodation in London, and took on the usual responsibilities of a landlady. Following German reunification, Hannelore claimed ownership of much of the family property left behind in what had been East Berlin. The process proved to be quite complicated, and it took some time to legally establish Hannelore's claim to her childhood home. Once in her possession, many urgent repairs had to be arranged after more than forty years of neglect. After retirement, Hannelore gave German classes in London and was able to satisfy her lifelong desire to travel and see the world. Hannelore died on 1 October 2020 at Homerton Hospital, London; she was predeceased by her son Hans, who experienced a fatal car accident in 1990.

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