

BOOKSHELF



Im Wirbel der Atome: Lise Meitner, Eine Frau geht ihren Weg (In the turmoil of atoms: Lise Meitner, A Woman pursues her Way) by Thea Derado, Kaufmann Verlag 2007. Hardback ISBN 9783780630599, €19.95.

Using letters, articles and biographies the author of this book paints a lively and private picture of the tragic life of Lise Meitner, which was thorny for two reasons: she was Jewish and a woman. Born in 1878 Meitner attended school in Vienna but could pass her maturity examination only after expensive private lessons. After studying in Vienna, she moved to Berlin in 1907, and for many years had to earn her living by giving private teaching lessons. Eventually she was accepted by the radiochemist Otto Hahn as a physicist collaborator at the Kaiser Wilhelm Institute in Berlin (but without pay), and so began a creative co-operation and a lifelong friendship. Since women were not allowed to enter the institute, Meitner had to do experiments in a wood workshop in the basement accessible from a side entrance.

Derado describes Meitner's scientific achievements in an understandable way, particularly experiments leading to nuclear fission and the discovery of protactinium. The technical terms are explained in an appendix.

During her stay in Berlin, Meitner met all the celebrities in physics at the time, such as Max Planck, James Franck, Emil Fischer and Albert Einstein, whose characters are all described in a colourful fashion. She developed warm relations with Max von Laue, one of the few German physicists who had bravely withstood the Nazi regime. Apart from science, music played an important role in her life, and through music Meitner made friends with Planck's family and happily sang Brahms' songs with Hahn in the wood workshop.

During the First World War Meitner volunteered for the Austrian army as a radiologist. Working in a military hospital she learned the horrors of war. These experiences, and discussions with Hahn and Einstein led to some inner conflicts. During the persecution of the Jews by the Nazis, Meitner enjoyed a certain protection thanks to her Austrian passport, yet after the annexation of Austria it became impossible for her to leave Germany legally. Neglecting her colleagues' warnings she hesitated too long, until in July 1938 she saved herself by escaping to Holland. Hahn gave her a diamond ring that he had inherited from his mother as a farewell present.

After a short stay in Holland Niels Bohr arranged for Meitner to stay at the Nobel Institute in Stockholm, which was directed by Manne Siegbahn, and finally in 1947 she obtained a research professorship at the Technical University in Stockholm. I was able to work with her there for a year and can confirm many of the episodes mentioned in the book. She was a graceful little person, with a combination of Austrian charm, Prussian orderliness and a sense of duty; she was also very kind and motherly.

Derado discusses, of course, why Meitner did not share the Nobel Prize with Hahn in 1944. Her merits were uncontested, and even after the publication of the Nobel Prize documents questions remain unanswered. It seems that being a woman had negative influences. However, numerous German and international honours and awards, as well as an overwhelming reception in the US, have compensated to a certain extent.

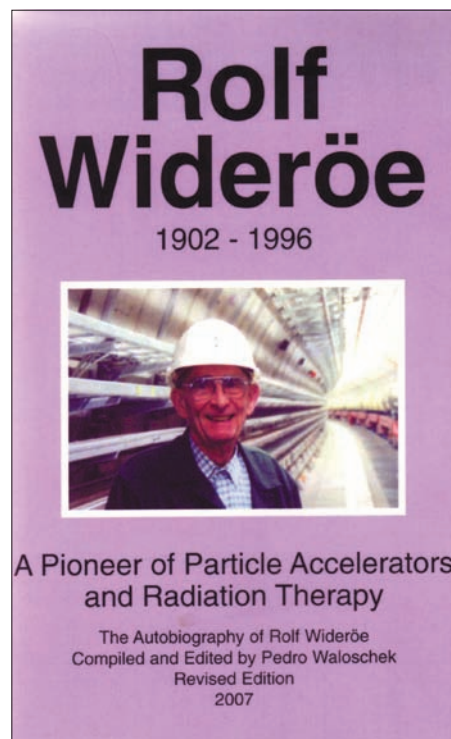
Meitner never married, but various family ties played an important role in her life. She was particularly attached to her nephew Otto Frisch, with whom she interpreted nuclear fission. She spent her last days with him in Cambridge, where she died in 1968.

In all, this book provides an historically accurate account, at the same time from a female perspective, of the turbulent life of one of the greatest scientists of the 20th century. It is worth reading, not only for those interested in history, but also perhaps as encouragement for young women scientists. *Herwig Schopper, University of Hamburg and CERN.*

Rolf Wideröe 1902–1996. The autobiography of Rolf Wideröe, compiled and edited by Pedro Waloschek, Books on Demand. Paperback ISBN 9783837005578, €16.

Bruno Touschek and the art of physics by Enrico Agapito and Luisa Bonolis, INFN. DVD. Available in Italian or English editions from pancheri@lnf.infn.it. Good books for students of particle physics are often careful to lay a clear historical trail of who first did what in both experiment and theory. Try to dig deeper to find out more about the pioneers, however, and the literature becomes patchy. While some physicists have reached an almost legendary status, others are more difficult to track down. It is interesting, then, to have the opportunity to find out more about some of the "unsung" heroes of the subject.

Rolf Wideröe does of course appear in many

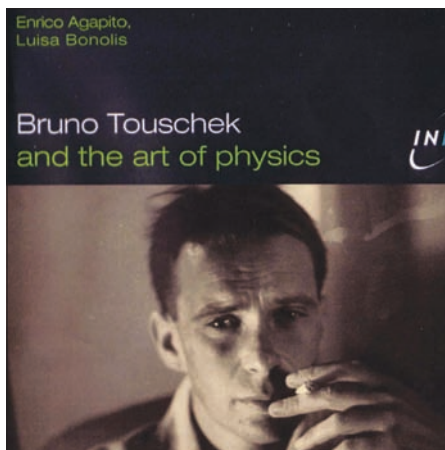


introductions to particle physics. His linac of 1927 famously inspired Ernest Lawrence to invent the cyclotron. Less well known is that Widerøe had already in 1922 worked out the principles for a “ray transformer” – in effect, a betatron accelerator – and that his ideas for colliding storage rings and the synchrotron date back to the mid-1940s.

This autobiography by Widerøe was first published in 1994, when he was 92 years old. Pedro Waloschek compiled and edited material from various sources for Widerøe to correct and modify. He also provided a chronology and extra background information, and in this new edition of the English translation, he has corrected a few errors and added some new pictures. The end-product is a fascinating first-person account of the life of a highly inventive Norwegian engineer, who studied in Germany in the 1920s, went into industry in Norway in the 1930s, and ultimately settled in Switzerland after the Second World War, working for Brown Boveri and Company (BBC). He also taught at the Swiss Federal Institute of Technology, Zurich and became highly respected for his contributions to radiation therapy.

Widerøe's life story is inextricably linked with the betatron. In 1943, hoping to free his brother from imprisonment by the Germans, he agreed to go to Hamburg to build a 15 MeV machine. At the end of the war, while the betatron ended up at Woolwich Arsenal in Britain, Widerøe found himself imprisoned in Norway, accused of collaboration with the Germans. In the book he explains that he was cleared and released after the intervention, probably, of physicist Odd Dahl. In 1946 he moved to Switzerland to build the first of many betatrons for BBC, mainly for X-ray therapy in hospitals. With many years spent in industry, his ideas were often the subject of patents, two of which are reproduced in the book, including the one that represents the first proposal for a storage ring.

In his introduction, Waloschek recounts how he first heard of Widerøe in 1958 from a friend, Bruno Touschek, who was to earn his own place in the accelerator “hall of fame”, with the first proposal for an electron–positron storage ring. Born in Vienna in 1921, Touschek was still a student when he worked with Widerøe in Hamburg in 1943 on theoretical calculations for betatrons. Arrested by the Gestapo for reading foreign magazines, he was allowed to



continue working in prison, and Widerøe and colleagues were able to provide him with food and cigarettes. Following the war, Touschek obtained his diploma thesis at Göttingen on the theory of the betatron, and after a PhD from Glasgow, he arrived at Rome University in December 1952.

The film on Touschek, produced with support from INFN, brings to life this creative theoretical physicist who pioneered one of the most important accelerator techniques for modern particle physics. In Rome, he joined the band of researchers under Edoardo Amaldi who were rebuilding Italian physics after the Second World War. The creation of INFN in 1953 led to the construction of a 1100 MeV electron synchrotron at Frascati near Rome. This aroused the interest of Touschek, who until then had been working on mainly theoretical topics since his arrival in Rome. However, he felt that the synchrotron would not yield the most important physics, and came back to an idea first put to him in Hamburg by Widerøe – to collide beams, and in particular electrons and positrons.

After Touschek's initial proposal in February 1960 to convert the synchrotron to an electron–positron collider, the Frascati laboratory decided instead to build a new small ring to test the ideas. This was the 250 MeV ring, AdA. A year later the first particles were circulating, with lifetimes of several hours, but injection from the synchrotron was very inefficient. So in summer 1962, AdA was moved to the linac at Orsay, and in 1963 it successfully stored 10 million of each kind of particle, although the beam lifetime was now limited. Touschek realised that this was due to intra-beam scattering in the more intense beams – the effect that now

bears his name. AdA was followed by ADONE at Frascati, and SPEAR at SLAC, where the J/Ψ was discovered in 1974.

Touschek's work was the inspiration later for Carlo Rubbia, who masterminded proton–antiproton collisions at CERN, as well as for the LEP project, AdA's giant successor. He came to CERN to advise on these projects, but by then was ill and was to die in 1978 back in Austria, before he could see their ultimate success. The film documents all this history and more, with commentary from many key people involved, and cartoons by the gifted Touschek. It provides a fascinating account and is well worth watching.

Christine Sutton, CERN.

Books received

Interactions of Photons and Neutrons with Matter (second edition) by Sow-Hsin Chen and Michael Kotlarchyk, World Scientific. Hardback ISBN 9789810242145, £45 (\$78).

This book is based on lecture notes developed for a one-semester graduate course entitled “Interaction of Radiation with Matter”, taught in the Department of Nuclear Science and Engineering at the Massachusetts Institute of Technology.

The main objective of the course is to teach enough quantum and classical radiation theory to allow students in engineering and the applied sciences to understand, and have access to, the vast literature on applications of ionizing and non-ionizing radiation in materials research.

Rotation and Accretion Powered Pulsars

(World Scientific Series in Astronomy and Astrophysics – Volume 10) by Pranab Ghosh, World Scientific. Hardback ISBN 9789810247447, £83 (\$152).

This introduction to pulsars is the first to treat rotation-powered pulsars and accretion-powered pulsars simultaneously with equal importance, stressing the fact that both are rotating, magnetic neutron stars operating under different conditions during different parts of their lives. It also presents the accurate verification of Einstein's theory of general relativity through timing studies of binary pulsars, which led to the award of the Nobel Prize to Hulse and Taylor in 1993. Graduates and upper-level undergraduates, as well as researchers and teachers in astrophysics, astronomy, general relativity and related subjects will find this interesting.