



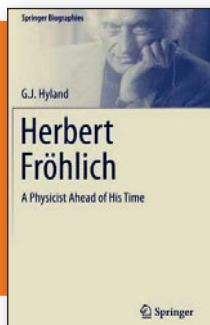
analysis is limited to one page discussing line profiles. SPM lithography is mentioned only in the context of esoteric single-atom placement studies.

The 70 references given are very scant for a book of this scope, but Voigtländer has adapted the approach that original works are only cited where they

add something to his own lucid treatment. Rather than supply an exhaustive accounting of the varied applications of SPM, the book attempts to provide a technical, theoretical, and conceptual framework to understand how SPM works and what can be done with it so that a reader wishing to further learn

about newer topics will have the basis to do so. This book could thus serve as a useful reference and textbook for anyone desiring an advanced introduction to the fascinating world of SPM.

Reviewer: *Sidney Cohen of the Weizmann Institute of Science, Israel.*



**Herbert Fröhlich:
A Physicist Ahead of His Time**

G.J. Hyland

Springer, 2015

263 pages, \$89.99 (e-book \$69.99)

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This authoritative biography of Herbert Fröhlich (1905–1991), a well-known theoretical physicist, paints an intimate portrait of a pioneering scientist who made seminal contributions to condensed-matter physics and left his mark on other domains, such as biology, over a 60-year career. From his vantage point as the last graduate student of this eminent physicist, Hyland has produced an account that weaves the personal experiences and travails of Fröhlich with detailed discussions on the theory of dielectrics. The political upheavals in Europe during the 20th century provide a dramatic backdrop for the narrative.

The volume has a total of seven chapters—five main chapters that are bookended by a prologue (chapter 1) and an epilogue (chapter 7). Chapter 2 focuses on Fröhlich's early life in Germany and portrays a mind relentlessly at work on pivotal physics problems, such as the photoelectric effect. When he was dismissed from his appointment as Privatdozent at the University of Freiburg in 1933 under the “cleansing” laws for Jews, Fröhlich used the back of his letter of dismissal to perform useful calculations. Hyland shines a spotlight on his subject's courage by describing Fröhlich's perilous efforts to retrieve his family's assets that had been confiscated by the Butcher of

Warsaw, Josef Meisinger. This courage is also highlighted in chapter 3, which documents Fröhlich's life in exile, by his single-minded pursuit of semiconductor physics that was held in low esteem at that time as “dirt physics.”

When he eventually escaped the Nazis by traveling through Strasbourg to Leningrad to take up an offer from Yakov Frenkel, Fröhlich took the time to write a paper with Hans Bethe on superconductivity. This is another fine example of his relentless creativity. Hyland makes it clear that Fröhlich put his nimble mind to good use not only to advance condensed-matter theory but also to survive under a series of extraordinarily hostile circumstances. His quick thinking and prior experience in Germany served him well once again in Leningrad, when he anticipated Joseph Stalin's Great Purge and had to convert his rubles into assets that he could take with him to England through Vienna on short notice. On his way to Bristol to work with Nevill Mott, Fröhlich worked with Max Born to develop the crystal-size dependence of the electrical and optical properties of small metal particles.

Chapters 4, 5, and 6 describe, respectively, Fröhlich's life in Bristol, his subsequent tenure as professor at the University of Liverpool, and his

transition from professor to professor emeritus. Hyland delightfully brings out the irony of a man escaping Hitler and Stalin only to be interned in Shropshire in 1940 as an “enemy alien.” The restlessly creative mind of Fröhlich turned lemons into lemonade by setting up a tent university in the internment camp. It is moving and inspirational that Fröhlich was not at all bitter about his horrific wartime experiences but instead published 30 papers between 1939 and 1945, working on subjects ranging from the influence of impurities on dielectric strength to night vision for tanks. In these chapters, an engaging personal narrative is juxtaposed with a detailed treatment of the theory of dielectrics, polaron theory, electron–phonon coupling, and superconductivity. While the intent is to showcase Fröhlich's pioneering work in quantum field theory, the physics sections can be a challenging read for those not well versed in condensed-matter theory.

Hyland excels time and again when he highlights the humanitarian side of Herbert Fröhlich. The book is meticulously referenced and filled with photos and historical letters. Hyland has presented an inspiring account of a trailblazing physicist and outdoorsman who counted Schrödinger, Sommerfeld, and Feynman among his inner circle, and who had a decent shot at killing Adolf Hitler with a steak knife in the 1930s.

Reviewer: *Ram Devanathan is Technical Group Manager of Reactor Materials and Mechanical Design, Pacific Northwest National Laboratory, USA.*