



AMONG THE GERMAN SCIENTISTS INTERNED AT FARM HALL
were (from left) Werner Heisenberg, Max von Laue, and Otto Hahn.

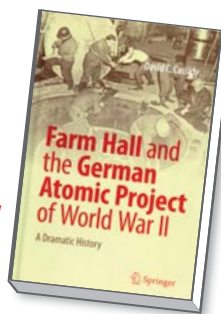
History meets drama in a play about German physicists

At the end of World War II, Werner Heisenberg was interned with nine other colleagues in Farm Hall, an English country house, where the German scientists were both treated well and overheard via hidden microphones. David Cassidy's "dramatic history," *Farm Hall and the German Atomic Project of World War II*, is a concise yet ambitious work that incorporates a play based on historical actors and events, a brief traditional history, and reprints of historical sources.

Cassidy is well qualified to write such a book. His two biographies of Heisenberg, *Uncertainty: The Life and Science of Werner Heisenberg* (1992) and *Beyond Uncertainty: Heisenberg, Quantum Physics, and the Bomb* (2009), set the standard for historical work on Heisenberg and his science. Cassidy has also published

Farm Hall and the German Atomic Project of World War II
A Dramatic History

David C. Cassidy
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\$29.99



widely on the history of modern physics, including books on two other scientists—Albert Einstein and J. Robert Oppenheimer—whose lives blurred the line between science and politics.

The middle part of *Farm Hall*, "A Brief History of the German Project, Alsos, and Farm Hall," provides a useful chronicle of the discovery of nuclear fission,

the wartime German efforts to harness chain reactions in uranium for nuclear reactors and nuclear explosives and the Alsos mission to uncover what German scientists were working on, and the post-war Allied intelligence gathering to assess Nazi progress on an atomic bomb. The last part of the book consists of excerpts from the Farm Hall reports—that is, transcribed portions of the secretly overheard conversations—and the diary of one of the scientists, physicist Erich Bagge.

The first part of the book, and the most original contribution, is a play about the events at Farm Hall. Cassidy's drama follows in the footsteps of other plays that have brought physics into the theater, including Bertolt Brecht's *Life of Galileo* (1939), Friedrich Dürrenmatt's *The Physicists* (1962), Heinar Kipphardt's *In the Matter of J. Robert Oppenheimer* (1964), Michael Frayn's *Copenhagen* (1998), and Tom Morton-Smith's *Oppenheimer* (2015). All of those plays explore and illuminate the dilemma faced by scientists when the knowledge they pursue is useful for political and military power.

A historian like myself is perhaps not the best person to review a play based on a true story. The playwright's craft, as Cassidy explains to his readers, requires that complex history be streamlined and simplified to fit onto the stage. There were far too many people at Farm Hall to be included in a play, and Cassidy has condensed events and reduced the number of characters.

He highlights several incidents that bring the story to life, including the Germans' confused reaction to the news of Hiroshima and Nagasaki, the surprise announcement of Otto Hahn's Nobel Prize in Chemistry and the exclusion of Lise Meitner, the conflict between Heisenberg and Nazi Party member Kurt Diebner, and perhaps most importantly for the drama, Samuel Goudsmit's anger that Heisenberg did not do more to save Goudsmit's parents from their deportation to Auschwitz and murder at the camp. A Dutch-born physicist who spent the wartime years working on radar at MIT, Goudsmit was the head scientist on the Alsos mission.

As a historian, I have some concerns about Cassidy's treatment of the Goudsmit story. Here is what we know. On

16 February 1943, Heisenberg wrote the following to Dirk Coster, a physicist in the occupied Netherlands known for helping Jews hide from the Nazi regime:

I am happy to write that I consider Dr. Goudsmit to be one of the best researchers in the area of theoretical physics. His name has become known in the entire scientific world through the development of the magnetic properties of the electron. . . . Since Goudsmit has always been very hospitable towards us Germans, also in America, even during a period in which one could already sense currents hostile to Germany (I was his guest in the summer of 1939), I would be very sorry if, for reasons

unknown to me, difficulties would arise for his parents in Holland. (author's translation)

On 7 June of the same year, Coster replied to Max von Laue: "Thank you very much for your friendly letter of February 15th. Unfortunately just like Heisenberg's response, it came into my possession too late in order to try to do something with it, and the inevitable had already happened."

Anyone well versed in the history of the Third Reich and especially the Holocaust, as Cassidy certainly is, knows that there was little if anything that Heisenberg or anyone else could have done to stop the deportation of Goudsmit's parents. Even cautious expressions of support like the one Heisenberg sent could

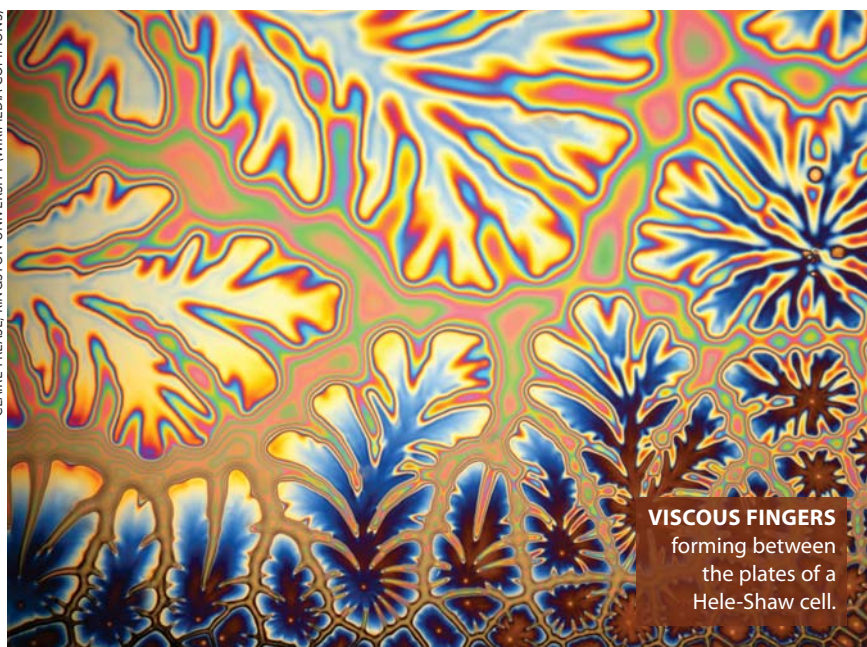
well have had negative consequences—something that both Heisenberg and von Laue undoubtedly understood very well. Although it is certainly possible that Goudsmit blamed Heisenberg after the war for his parents' deaths, documents from the immediate postwar period suggest instead that he appreciated what Heisenberg had done.

Ultimately, however, Cassidy has made Farm Hall come alive, with all the important contradictions and conflicts it embodies. His book should be of special interest to physicists and physics students and is a valuable addition to our understanding of this ambiguous chapter in the history of modern physics.

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VISCIOUS FINGERS
forming between
the plates of a
Hele-Shaw cell.

Mathematics of pattern growth in condensed matter

Jian-Jun Xu's book *Interfacial Wave Theory of Pattern Formation in Solidification: Dendrites, Fingers, Cells and Free Boundaries* covers a large and well-chosen collection of fundamental results in the field of interfacial stability and pattern formation. The author is an accomplished the-

oretical materials scientist who has made valuable contributions to the fields of asymptotic analysis and nonlinear partial differential equations, which are relevant in materials science, solidification physics, fluid dynamics, interfacial wave theory, pattern formation, and crystal growth.

Interfacial Wave Theory of Pattern Formation in Solidification

Dendrites, Fingers, Cells and Free Boundaries

Jian-Jun Xu

Springer, 2017 (2nd ed.). \$159.00



Throughout the book, Xu starts from real-world problems and details analytical methods to describe pattern formation. Because he avoids numerical methods, his book will be a useful reference for those who are teaching courses focused on mathematical modeling or applied mathematics. The author does not hide his preference for asymptotic methods, even though they are often limited in their applications. Xu's approach contrasts with that of other textbooks, such as *Pattern Formation and Dynamics in Nonequilibrium Systems* (2009) by Michael Cross and Henry Greenside, which place more emphasis on the physics of fractals and the nature of the periodicity in fractal patterns.

Xu is able to draw analogies between phenomena appearing in completely different contexts—for example, solidification of pure melts, hydrodynamic instabilities in porous media, and the eutectic