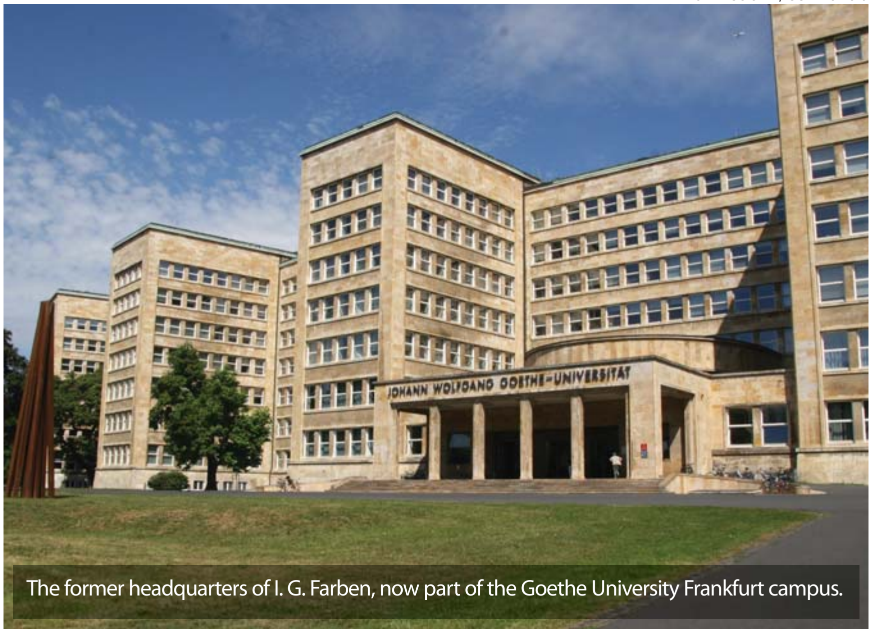


The former headquarters of I. G. Farben, now part of the Goethe University Frankfurt campus.

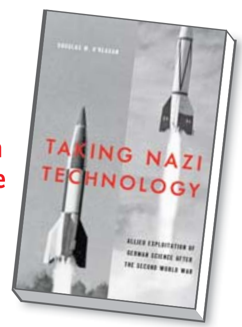
Technological reparations in the aftermath of World War II

As the Allied armies fought their way across Europe in February 1945, leaders of the Big Three—the US, UK, and Soviet Union—met at Yalta in Crimea to plan the postwar occupation of Germany. After carving up the country into four occupation zones, with the fourth going to France, they set their sights on the destruction of Germany's war potential, denazification and war crimes trials, and extensive reparations to the Allied nations. Although each of the occupation powers tended to pursue its own policies, reparations were a common goal as they snapped up technological weapons, documents, and personnel to whisk them out of Germany for their own use and deny them to rival Allies.

Those efforts resulted, as Douglas O'Reagan writes in *Taking Nazi Technology: Allied Exploitation of German Science after the Second World War*, in "the largest-scale technology transfer program in history, aimed at almost every field of industrial technology and academic science." O'Reagan leaves to others the important moral, legal, and economic issues surrounding the "taking" of German technology, some of which was produced by enslaved laborers, and of German personnel, some of whom were Nazi Party members. I would like to have seen at least a brief discussion of those issues. O'Reagan's archive-based history focuses instead on the nature and process of the technology transfer. He places particular emphasis on the crucial discovery that technology transfer cannot succeed without the human element—what the Americans called skilled know-how and is today often referred to as tacit knowledge.

Taking Nazi Technology
Allied Exploitation of German Science after the Second World War

Douglas M. O'Reagan
Johns Hopkins U. Press, 2019. $54.95



Moreover, writes O'Reagan, "in the postwar world, this focus on the know-how element took on a life of its own, shaping business, law, and politics around the world." To support that bold statement, O'Reagan leaves the occupation far behind to explore the legacy of know-how that grew out of the technology transfer. He examines such later developments as the rise of information science, US international aid programs, and the Atoms for Peace initiative. Those chapters are intriguing, but a complete discussion of such movements and programs requires fuller consideration of the many other factors involved beyond tacit knowledge.

Amid the growing literature on postwar reparations and occupation policy, this book is admirably unique in that it offers an in-depth comparative history of technology transfer in all four occupation zones. O'Reagan devotes a chapter apiece to each. In the US zone, hundreds of military and civilian technicians swarmed over German universities and industrial facilities, including the infamous I. G. Farben chemical conglomerate. The Americans were in search of "intellectual reparations" in the form of documents, blueprints, and patents rather than equipment. Reportedly, they sent home 55 tons of such material. They also transported tens of thousands of on-site investigative reports.

Improved microfilm technology eventually streamlined the process. Because documents and patents no longer needed to be shipped back home, they were used to aid the West German economy as the Cold War set in. American agents also sent German technicians to the US. The enormous transfer enabled US engineers to fully use valuable technologies they did not already possess in such fields as aerospace technology and chemical manufacturing.

Technical know-how played a different role in the French zone. France pursued a policy of "exploitation in place," sending French students to train in German institutes while German experts visited French industries. That approach enabled the French to monitor the Germans while learning directly from them. Rather than extracting documents, Soviet occupiers pursued both exploitation in place and the literal transfer to the Soviet Union of entire buildings together with all the equipment and the people who worked in them, willingly or not.

But it was in the British zone, as O'Reagan recounts, that scientific know-how became the basis for the revival of academic research in West Germany. The zone included the University of Göttingen and several Kaiser Wilhelm research institutes—soon renamed after Max Planck. It also had many of the most prestigious scientists still in Germany, among them Otto Hahn, Werner Heisenberg, and Max von Laue. German scientists lobbied for the revival of German science under Allied control, which fit well with British plans to use a science-enhanced zonal economy in support of the British economy, now bankrupted by the war. With British support, German scientists founded new scientific institutions and revived old ones important for the future Germany. They also gained connections in the American zone that aided the founding of the Federal Republic of Germany in 1949.

Technology transfer across boundaries and cultures is difficult to accomplish. In the end, O'Reagan concludes that despite its vast scale and scope, the German technology transfer was only partially successful. Much of the technology was already known, many of the US microfilm reels remained unread for lack of content indices, many of the buildings sent to the Soviet Union remained unbuilt for lack of blueprints, and many of the displaced scientists remained underused for lack of need.

O'Reagan's masterful study of the Allies' technology transfer in all four zones and in all of its many facets, successes, and shortcomings is a most welcome contribution to Allied occupation history and to the history of technology in general.

David C. Cassidy
Hofstra University
Hempstead, New York

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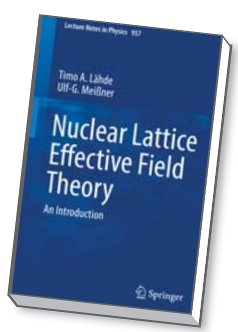
Creating atomic nuclei on a lattice

Nuclear Lattice Effective Field Theory
An Introduction
Timo A. Lähde and Ulf-G. Meißner
Springer, 2019. $59.99 (paper)



A major goal of contemporary nuclear physics is to explain the structure of atomic nuclei and their reactions in a microscopic way. That approach, also known as the *ab initio* method, starts from two- and many-body forces between protons and neutrons and applies quantum many-body theory to deal with the multitude of nucleons. Many methods, including Faddeev–Yakubovsky equations, the no-core shell model, coupled cluster methods, many-body perturbation theory, and quantum Monte Carlo, have been designed to treat such strongly interacting multiparticle systems.

The methods listed above use continuous spacetime coordinates. A recent alternative approach instead represents a physical system in a finite volume with discrete spacetime coordinates subjected to sampling by Monte Carlo methods. That sounds simple and straightforward, but it is not, as the new book by Timo Lähde and Ulf-G. Meißner, *Nuclear Lattice Effective Field Theory: An Introduction*, explains thoroughly. Meißner, a professor of physics at the University of Bonn in Germany, is well known for his research on effective field theories in nuclear and particle physics. Lähde, a staff member at the Research Center Jülich in Germany, has been heavily involved in lattice calculations in condensed-matter and nuclear physics.

The text's first two chapters provide helpful background information not specifically about lattice calculations. One offers a general introduction to effective field theories (EFTs), and the other introduces nuclear forces in chiral EFT. The authors give several beautiful examples that demonstrate the basic ideas underlying an EFT. The section entitled "A Short Recipe for the Construction of an EFT" is a remarkably concise and clear explanation of the concept. The book's introduction to chiral EFT-based nuclear forces, in which nucleons and pions are the typical active degrees of freedom rather than quarks and gluons, is also clear and accessible.

The main body of the book consists of six chapters that present lattice methods in a systematic way. The first of those chapters introduces the basic mathematical concepts of the lattice approach, such as Grassmann fields, transfer matrices, and auxiliary fields. The next chapter addresses chiral nuclear forces, with a special focus on how they are put on the lattice. The discussion evolves from leading order to next-to-leading order and finally next-to-next-to-leading order. Each order is presented in small steps that make the chapter easy for the unacquainted reader to follow.