CHAPTER 1

Introduction

> Science is not humanity's only mission, nor is she its highest; but those under her dictate should carry out their mission wholeheartedly and with all their might. No matter what shape a scientific epoch may take, the mission always basically remains the same: to keep the sense for Truth pure and alive and to re-create as a cosmos of thoughts this world handed down to us as a cosmos of forces.
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> Adolf von Harnack, Bicentennial address before the Prussian Academy of Sciences, 1900

Unless there was some clear link to daily life, the nineteenth-century German public took little notice of the few scientists, let alone physicists among them or their research results. Justus Liebig's Familiar Letters on Chemistry in the *Augsburger Allgemeine Zeitung* and Alexander von Humboldt's *Kosmos* are exceptions, as these authors shared a personal interest in publicizing their scientific findings. But very few people realized that progress was the work of research and physical measurement. Hermann von Helmholtz's appointment to his chair for physics at the Friedrich-Wilhelms-Universität in Berlin in 1871 and the construction of a new institute for physics on the banks of the Spree near parliament sparked more interest in the daily papers. Another occasion for reporting about the tasks of physical research and the reich's science policy was the founding of a national bureau of standards. The debates in the Reichstag for and against the project were duly recorded. When the researchers took up their work in the new Physikalisch-Technische Reichsanstalt (PTR), few people were aware of the kinds of problems, affecting both science and the economy, attached to the manufacture of standards for the meter, for example, or for the kilogram, the second, the volt, the ampère, or the ohm. The first president of this new institution in the capital's suburb of Charlottenburg was a familiar name among educated circles: Helmholtz had offered many public lectures and written many popularizing articles, such as On the Sensations of Tone as a Physiological Basis for the Theory of Music, that united the humanities with the natural sciences. His most influential pa-

pers in the areas of mathematics and epistemology lay beyond the reach of a more popular readership.

Wilhelm Conrad Röntgen's discovery in 1895 was different. The reporting on those extremely mysterious rays capable of penetrating through the human body was much more extensive. X-rays had medical significance. But the science behind them remained largely unmentioned in the press. The nineteenth-century clash between those who were knowledgeable about physics and the government or church had yet to be fully settled, and new problems only added to these tensions, even though they lay less in epistemology than in physics. These debacles between academics and the wielders of power took place in the political arena. In 1837 seven professors at Göttingen protested against a constitutional amendment affecting their professional oath of allegiance as civil servants. Their protest, directed against the local regent, the king of Hanover, Ernest August, led to the professors' dismissal and expulsion from the land. In those days the making and keeping of an oath was a highly held ethical value, so this deed by the Göttingen Seven, irrespective of its later Enlightened wrappings, was a sign of a new attitude among scholars toward state authority.

Almost forty years later, in November 1880, seventy-five notables, Theodor von Mommsen and Rudolf von Virchow among them, felt obliged to send Bismarck a manifesto against anti-Semitism.[1] It declared:

> Racial hatred and the fanaticism of the Middle Ages is now being revived and directed against our fellow Jewish citizens in an unexpected and deeply shameful way in various places, especially in the Reich's largest cities. [. . .]
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> The legal precept as much as the honorable precept that all Germans have equal rights and obligations is being broken. Implementation of this equality does not lie with the tribunals alone but also within the conscience of each individual citizen.

At that time, Lise Meitner—born in 1878—was two years old and Albert Einstein almost one. Max Born and James Franck would be born two years later, and the Dane Niels Bohr, in 1885.

James Franck spent his entire youth—almost a quarter of his life—in the Free and Hanseatic City of Hamburg and another quarter in Berlin, where he became an accomplished scientist.[2] His first research was conducted during a period of peace. Only dystopians were painting a dark picture of the destruction of mankind and the world by scientific knowledge. Kaiser Wilhelm II's "saber rattling" was not taken seriously. The Great War then revealed the terrifyingly destructive power of modern technology in general and poison gas in particular. The war also exposed an overflowing sense of nationalism joined in by many scientists. The image of the scientific community was badly tarnished.

Franck accepted a full professorship at Göttingen at the beginning of the twenties. There his renown as a researcher grew with his importance as an

academic teacher. The signs of political unrest and of latent and open anti-Semitism only gradually became perceptible in liberal Göttingen. The National Socialists' lunge for power in 1933, their illegal measures and state-ordered indignities toward Jews, first inside Germany and five years later throughout large areas of Europe as well, brought profound and fatal changes to Jewish life. Franck refused to serve under such a state and resigned his lifetime position in protest in 1933. Many of his more resourceful friends only barely escaped death under the inhumane Nazi regime, and many others became its victims. The Francks managed to emigrate to the United States with their two daughters and sons-in-law. The effect on Franck's research was drastic. His focus changed fundamentally.

The lives of those among Franck's scientific friends who had stayed behind in Germany, like Otto Hahn and Max von Laue, were hampered and endangered. These were descendants of the Enlightened men of 1880. But, unlike during the kaiser's reign, during Hitler's dictatorship they had to live under the constant awareness that if they dared to call publicly for the rights of their persecuted Jewish fellow citizens, they would be eradicated.

Most physicists were united internationally not only by a professional commitment to science but also by personal friendships. This union was broken by an unforeseen result of pure research: the discovery that neutron bombardment could cause the fission of uranium. The huge amount of released energy exposed the feasibility of an atomic bomb. Albert Einstein, prompted by Leo Szilard and Eugene Wigner, decided to urge action dictated by reason. He warned President Roosevelt of the danger that Germany was possibly building such a weapon. The American government decided to counter this threat by building its own. Franck was asked to collaborate on this project. When Germany was forced to capitulate, he and some of his former collaborators turned against the idea of deploying nuclear arms. These events banished irretrievably to the past the centuries-long period of peaceful scholarly study in the tranquillity of one's own laboratory.