Foreword

James Franck was a great physicist and an exemplary human being, one of the twentieth century's most respected scientists. Before the First World War, he was an early leader in creating the imaginative experiments that led to a deeper understanding of the quantum energy levels of atoms. Decades later, at the end of the Second World War, he was a wise and heroic leader of the scientists at the University of Chicago who sought to prevent both the use of the atomic bomb against Japan and a postwar nuclear arms race with the Soviet Union that they predicted would be an inevitable consequence of its use. This definitive biography of James Franck's life is a welcome addition to the history of that remarkable generation of physicists who transformed our understanding of the universe and, in so doing, put life on earth at risk.

In 1914, Franck and his colleague Gustav Hertz devised and performed two key experiments—for which they received the Nobel Prize in 1926—that later confirmed the validity of Niels Bohr's theory of the atom (1913). Over the next several decades Franck and the many physicists who were drawn to work with him from Europe and the United States went on to illuminate the structure of simple molecules and how they absorb energy and dissociate (the Franck-Condon principle).

During these early productive years in Germany—despite the Great War and its harsh aftermath—Franck built his institute of experimental physics at Göttingen University. By the early 1920s, it had become one of the world's most distinguished centers of physics and had set a new standard for university physics departments worldwide. Pioneering interdisciplinary collaboration between experimentalists and leading theoreticians (including Max Born, Werner Heisenberg, and Niels Bohr), and mathematicians (including David Hilbert and

Richard Courant), Franck's Göttingen institute served as the model for all future scientific environments that produced groundbreaking discoveries. As a result, Franck was offered the leading professorships in experimental physics in Germany.

But Hitler's rise to power precipitated dramatic change. Franck, an assimilated German Jew, was a reluctant activist, having once even written to Einstein: "Any publicity is so abhorrent to me that I would gladly find excuses to avoid it." But in the post-1933 German environment his conscience drove him to risk everything. When Hitler decreed that, with certain exceptions, Jews could no longer be employed in government agencies or universities, Franck rebelled. A World War I veteran with a distinguished record, he was qualified to be exempt from this decree, but his moral outrage could not be stilled. (It is possible that his sensitivity to moral issues involving science may have stemmed from his war experiences with Germany's poison gas program.) He publicly resigned his professorship in protest against the Nazi edict and, given his reputation, his act of conscientious defiance drew sympathetic attention worldwide. But, predictably, at home it was loudly denounced, most vociferously by a group of pusillanimous Göttingen lecturers who declared Franck's action "an act of sabotage" against the Third Reich, which of course it was.

In 1935 Franck changed both his country and the focus of his research. After emigrating to the United States he chose to blaze a new scientific trail in the emerging field of biophysics. Concentrating on understanding the physics underlying biological processes, he focused in particular on elucidating how chlorophyll absorbs solar energy and converts it to the chemical energy that supports most life on earth.

But in February 1939 news of a fantastic event once again altered the direction of Franck's research, and his life. Uranium fission had been discovered by Otto Hahn, Fritz Straßmann, Lise Meitner, and Otto Robert Frisch. The discovery set off a wave of scientific inquiry within physics communities the world over. If nuclear fission was a reality, a nuclear weapon was a distinct theoretical possibility. Fragile peace still reigned in Europe. James Franck, in residence at the University of Chicago, joined Enrico Fermi, Leo Szilard, and their colleagues in the Manhattan Project's Metallurgical Laboratory, in a presumed race against German scientists for an atomic bomb.

In December 1942 the laboratory successfully completed the experiment upon which the advancement of the Manhattan Project's goal depended: a controlled nuclear chain reaction. But that success also precipitated, among the most thoughtful scientists, considerations about the consequences of a world armed with nuclear weapons. Franck was a visionary in this regard, and in June 1945 he led a small group of his colleagues in discussions of the "social and political implications" of nuclear weapons.

The result of their deliberations was a memorandum addressed to Secretary of War Henry L. Stimson. Commonly referred to as the "Franck Report," the memorandum urged that the use of nuclear weapons without warning against Japan would make a nuclear arms race with the Soviet Union inevitable. Two of Franck's coauthors, Eugene Rabinowitch and Leo Szilard, became leaders of the postwar scientists' movement for nuclear arms control. A third, Glenn Seaborg, became chairman of the U.S. Atomic Energy Commission during the Kennedy and Johnson administrations.

After the war Franck spoke out again, this time about the inadequate supply of food available to the starving German population. The U.S. government appeared to be more concerned about preventing Germany from rising again as a military-industrial power than about humanitarian aid. Franck joined other prominent American Jewish refugees in a public call for such humanitarian aid, pointing out that many children and innocents were suffering.

Readers will find within this volume a fascinating exchange of letters between Franck and Einstein in which Einstein refused to join in the call, warning that most Germans were unrepentant and "would do it again if they could." Franck, by contrast, had a more generous view and chose not to burn all bridges so impulsively. But he kept reminding his former colleagues in Germany of their responsibility to face up to the humanitarian catastrophe that Germany had set in motion and to turn over a new leaf.

James Franck was thus not only an important contributor to the development of quantum physics during its "heroic age" in the early twentieth century but also one of the scientists participating in many of the key policy debates that resulted from the midcentury confluence of fascism, war, and the invention of nuclear weapons. Franck exerted this influence effectively, whether in science or politics. His hallmark was cooperation and teamwork. Science was what made Franck famous, and his biographer has rightly provided a detailed road map of his work. But nonscientists may comfortably skim over these scientific sections and find much that is of more general interest about the role and influence of scientists and science in the making of our world. Indeed, this biography is being published in the Stanford Nuclear Age History Series because of Franck's important contribution to the secret debate inside the U.S. World War II atomic-bomb project over whether or not to use nuclear weapons against Japan.

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Stanford Nuclear Age History Series