Philipp Frank

A Crusader for Scientific Philosophy

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Philipp Frank was an accomplished physicist and philosopher. He was a biographer of Einstein, Einstein's successor to the chair of the Department of Physics in Prague, a member of the Vienna Circle, a fixture in philosophical life at Harvard University, and—to some extent—in the intellectual life of the postwar United States. Yet, for various sociocultural and philosophical reasons, Frank and his writings did not enter the mainstream nor the canon of twentieth-century philosophy of science. He is known usually—and simply—as Einstein's biographer and, sometimes, as a logical empiricist[1] who belonged to the Vienna Circle. Despite the extent and variety of Frank's work, he has been forgotten.

To help revive Frank's significance and to reconsider his roles in philosophy and history of science, we offer this book, *The Humanistic Background of Science*, a book we believe Frank intended to publish but that lay unpublished in the archives for more than a half century. To put the manuscript in context, we offer here an overview, both biographical and philosophical, of Frank's life that pays special attention to his

1. Throughout the text, we use "logical positivism" and "logical empiricism" (and their inflected variants) interchangeably. While internal to their original uses they marked some intentional differences, from the viewpoint of the story told in the introduction they do not matter. For some more details about this issue, see Uebel (2013).

life in America. We do not claim that Frank's mature years were more important in forming his philosophical oeuvre. But we do believe that *The Humanistic Background of Science*, while its intellectual roots extend to Europe, should be understood largely as a product of Frank's professional and intellectual circumstances in the United States.

In section 2, we attempt to date the manuscript. This is required because the manuscript itself is not dated and provides only indirect clues. In section 3, we examine the philosophical and intellectual context of Frank's manuscript. We discuss the main theses and approach of *The Humanistic Background of Science* in its American context, in relation to its potential influence and contemporary significance, and finally in relation to Thomas Kuhn, the celebrated author of *The Structure of Scientific Revolutions*. Frank's relation to Kuhn is an important but largely unexplored area in the history of philosophy of science. Finally, in section 4, we describe the editorial process and the challenges we faced in presenting Frank's book in a form that is not only readable but interesting, challenging, and potentially fruitful.

1. Vienna—Prague—Boston: The Life of Philipp Frank

Frank played an important role in developing the Vienna Circle's scientific world conception in Vienna and later in Prague with Rudolf Carnap. He disseminated the ideas of logical empiricism and modern scientific thought to laypeople and continued this task in the United States through his institutionalization of Otto Neurath's unity of science movement and his many publications. His friend in America, the philosopher of science Paul Feyerabend, remembered, "Philipp Frank was a delight. He was widely informed, intelligent, witty, and excellent raconteur. Given the choice of explaining a difficult point by means of a story or of an analytical argument, he would invariably choose the story. Some philosophers didn't like that" (Feyerabend 1995, 103).

Frank's career may be divided into three phases, characterized by different persons and places as well as fundamental ideas and commitments: (1) The early 1900s, until 1912, in Vienna; (2) 1912–1938, in Prague; and (3) 1938–1966, in the United States, primarily Boston and Harvard University.

1.1. Vienna: A City That Breathed Physics and Philosophy of Science

Philipp Frank was born on March 20, 1884, in Vienna, then part of the Austro-Hungarian Empire. His father, Ignaz Frank, originally from Heves in Hungary, was a textile merchant. He and his wife, Jenny Frank, had four children: Philipp was the oldest, followed by a younger sister, Hedwig, and two younger brothers, Rudolf and the famous architect Jozef.[2]

Frank studied mathematics and physics at the Universities of Vienna and Göttingen, where his teachers included Ludwig Boltzman, Felix Klein, and David Hilbert. He earned a doctorate in physics in 1906 at the University of Vienna and habilitated with a paper in physics in 1909 to become a private lecturer (*Privatdozent*) until 1912 (see figure I.1).

Many years later upon Frank's death, his student—the physicist Jeremy Bernstein (1966, 24)—memorialized Frank by saying that modern physics and its "ideas were part of his instinct." Bernstein's exaggeration was appropriate for the memorial meeting at which he spoke, but he was on to something substantial, for fin de siècle Vienna was perfect for anyone interested in the special sciences and the philosophical and foundational questions raised by their rapid progress.[3] When he interviewed Frank for the "Oral Histories" series of the American Institute of Physics, Thomas Kuhn asked Frank about his intellectual development, his student years, his work in Prague, and his connections to Boltzmann, Mach, Einstein, Schrödinger, and others. Frank called Prague at that time "a big school of physics."[4] Though Ernst Mach had by then retired, Frank studied with the equally important Ludwig Boltzmann. And his classmates, friends, and teachers included Erwin Schrödinger, Hans Thirring, Paul Ehrenfest, Felix Ehrenhaft, Friedrich Hasenöhrl, Karl Herzfeld, and Franz Exner—all of whom were, or would become, international leaders of their fields in mathematics and physics.

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2. On Jozef Frank's relation to the Vienna Circle and philosophy, see Thurm-Nemeth (1998).

3. On the background and various traditions of physics and philosophy in Vienna, see Stöltzner (1999) and (2003).

4. Interview of Philipp Frank by Thomas S. Kuhn on 1962 July 16, Niels Bohr Library & Archives, American Institute of Physics, College Park, MD USA, www.aip.org/history-programs/niels-bohr-library/oral-histories/4610. Hereafter "Frank/IAP."

In 1895, Mach had been appointed to a chair in philosophy in Vienna, the same chair that would be occupied some two decades later by Moritz Schlick. Mach was then engaged in scientific and philosophical debates, one of which famously concerned the legitimacy and existence of atoms. To see the relevance of this to Frank's thinking, we need not go into the details of Mach's views and the specific nature of his so-called antiatomism. More important were the stratification and complexity of Mach's views about atomism, which included his ideas about the nature and economy of science and his understanding of theory building and experimentation. After Mach's retirement in 1901 (due to health conditions) his chair was occupied by Boltzmann, a well-known theoretical physicist who worked on statistical mechanics and, like Mach, had philosophical leanings. He accepted and publicly defended the atomistic theory of matter, though not for simple-minded or naïve-realist reasons. In fact, Boltzmann agreed that economic reasoning plays an important role in the work and nature of science; but he weighted his values and experiential data differently than Mach. Nonetheless, their debate over the nature of the atom's legitimacy shaped the history of philosophy of science.

Frank was raised scientifically in this atmosphere. When Kuhn asked him whether Mach's influence had "vanished in so far as skepticism about the atom was concerned," Frank recalled the situation as follows:

> No, it did not vanish. There was always this interesting point: what was the relation between Mach and Boltzmann[?] [In fact] Boltzmann was himself, philosophically speaking, rather a follower of Mach. Boltzmann said once to me, "You see, it doesn't make any difference to me if I say that all the atoms are only a picture. I don't mind, this. I don't require that they are absolute (rules). I don't say this." "'An economic, description,' Mach said. Maybe the atoms are an economic description. This doesn't hurt me very much. From the viewpoint of the physicist this doesn't make a difference." Strange as it was, in Vienna the physicists were all followers of Mach *and* followers of Boltzmann. It wasn't the case that the people would hold against Boltzmann's theory of atoms any antipathy because of Mach. And I don't even think that

Figure I.1. The young Philipp Frank, taken presumably in the 1910s. The image is from Frank's *carte de visite*, courtesy of Gerald Holton.

> Mach had any antipathy. It never came to my mind that because of the theories of Mach one shouldn't pursue the theories of Boltzmann, the atomic theories.[5]

Frank learned that presentations of theories and historical issues may be very different and that even if a debate is conceptualized as realism versus antirealism, other conceptualizations are possible as well. Mach was not a full-blooded antirealist, nor Boltzmann a naive realist, but their views were situated within layers of epistemological, methodological, and logical issues. In later writings, Frank would explain how the same theory (e.g., the special or the general theory of relativity) may be interpreted differently—even diametrically, but still legitimately—by various authors.

5. Ibid. Emphasis added.

As a theoretically inclined and systematically minded physicist, Frank also contributed actively to the development of the physical sciences. After successfully defending his doctoral dissertation, he published important—though largely forgotten—papers on the simplification of the special theory of relativity. He also collaborated with Austrian physicist and engineer Hermann Rothe and earned a broader reputation among physicists (see Frank 1932/1998, 290–96).

Between 1907 and 1912, Frank met regularly with the mathematician Hans Hahn and the economist-sociologist Otto Neurath at the Philosophical Society of the University of Vienna and in Viennese coffee houses. (Neurath and Hahn had attended the same Gymnasium, so they knew each other well and for a long time, while Frank joined them presumably during their shared university years.) Rudolf Haller (1991) called this trio the "First Vienna Circle" that preceded the better-known circle that formed around Moritz Schlick in the 1920s.[6] Frank recalled that

> although all three of us [Hahn, Neurath, Frank] were at that time actively engaged in research in our special fields, we made great efforts to absorb as much information, methodology and background from other fields as we were able to get. Our field of interest included also a great variety of political, historical, and religious problems which we discussed as scientifically as possible. (Frank 1949b, 1)

During these years, as they pursued careers (respectively) in mathematics, economics, and physics, they were held together by philosophy and general questions about science. Facing the recent revolutionary developments and controversies of their fields, Frank, Hahn, and Neurath embraced those philosophical movements that kept up with the special sciences. The ideas they absorbed and discussed over coffee—for example, that not just individual sentences but whole theories are tested in experiments; that what we consider "pure" data may depend on our theories; and that different theories may account equally for the same data—shaped their thinking for decades. These and other influences can be seen in detail in *The Humanistic Background of Science* (hereafter: *The Humanistic Background*).

6. On the First Vienna Circle the most detailed and comprehensive account is Uebel (2000).

1.2. Prague: The City of Ernst Mach and Albert Einstein

Though Frank was educated in Vienna, joined his first philosophical circle amid the smoke of Viennese coffee houses, and participated later in discussions of the Vienna Circle, the longest position he held in Europe was in Prague. He taught, conducted research, and organized intellectual life in Prague for twenty-five years.

Shortly after becoming a *Privatdozent* in Vienna, Frank applied for a new job: Einstein's chair at the Department of Physics of the German University of Prague (currently Charles University), which became vacant in 1912.[7] Frank was among three finalists for the position, titled "Ordinary Professor of Theoretical Physics": a university teacher from Vienna named Emil Kohl, the theoretical physicist Paul Ehrenfest, and Philipp Frank.

A commission evaluated the three candidates in May 1912. Its members were Einstein himself, the physicist Anton Lampa, and the mathematician Georg Pick, who had once been Mach's assistant. According to the commission's review (written by Einstein), "Ehrenfest is a man of a lucid and critical mind who has few equals in his ability to extract what is essential in a theory, and who is completely independent vis-a-vis contemporary endeavors" (Einstein 1912/1993, 302). The commission had positive words for Kohl, too, but praise for Frank dominated the report. "The great amount of able scientific work that this merely 28-year-old man has already produced is something to be admired," it read. Frank "combines a rare mastery of the mathematical tools with a good grasp of the problems of physics" (Einstein 1912/1993, 302). The review also mentioned his mathematical papers and, more interestingly, Frank's "original essays of an epistemological character" (Einstein 1912/1993, 302). The report mentioned two in particular: "Kausalgesetz und Erfahrung" ("Experience and the Law of Causality" 1907/1949) and "Mechanismus oder Vitalismus?" ("Mechanism or Vitalism?" 1908). Together with his physical and mathematical articles, they demonstrated that Frank's "talents are singularly versatile" (Einstein 1912/1993, 303).

Because "Frank has been working regularly and successfully as an academic teacher for the past two years, while Ehrenfest has not habil-

7. Einstein started to teach in Prague in 1910, but soon after that he got an offer from Zurich where he graduated. For Einstein's time in Prague see Gordin (2020), on Frank's activities and intellectual milieu there see Hofer (2020).

itated to this day" (Einstein 1912/1993, 303), the commission suggested that Frank be ranked first for the position, followed by Ehrenfest and, finally, Kohl. In 1912 Frank was promoted to associate professor at the German University of Prague as a successor to Einstein. He later became the director of the university's Institute of Theoretical Physics until his emigration to the United States in 1938.

Frank's professional career developed alongside his relationship with Einstein. He later recalled (1962/2001, 66) that Einstein greatly admired his "Kausalgesetz" and that after his promotion they became lifelong friends and allies. In a 1917 letter to Kathia Adler, for example, Einstein recommended Frank's paper on Ernst Mach (1917/1949) instead of his own (Einstein 1916/1996). In turn, Frank wrote philosophical and popular pieces on Einstein, including, for example, "Einstein, Mach, and Logical Positivism" (1949a) for Einstein's volume in *The Library of Living Philosophers* and the concluding essay here in *The Humanistic Background*.[8]

His most important work on Einstein remains his biography of 1947, *Einstein: His Life and Times*, named recently as one of the great physicist's "authoritative biographies" (Canales 2016, 57). Frank worked on the book as early as 1939 and delivered the manuscript for translation in 1941.[9] Gerald Holton (2006, 302), first a student, then an associate of Frank, noted that the "book is still one of the best . . . even though the manuscript . . . was horribly mangled by its publisher in the English-language edition." This, Holton recalled, was because "Alfred A. Knopf [the publisher] gave the manuscript to edit to an American [George Rosen] who, Philipp told me, knew English but no science, and also to a Japanese [Shuichi Kusaka], who knew science but no English."[10]

Still, the volume was a success. Harvard historian of science I. Bernard Cohen (1948, 252) wrote that "the scientific world has long been awaiting Professor Frank's book on Einstein [and] it fully justifies our expectations." The book was published in late February 1947 and

8. The most detailed account of the Frank-Einstein relationship is given in Howard (2021).

9. Frank to Neurath, April 15, 1939, and September 5, 1943, ONN.

10. The German edition of the book has a "Preface" which explains that Frank started to write it in New York in 1939, then worked on it in Chicago (1940) and finished the majority of it Boston (1941). As the book was translated from German to English, a quarter of its material was cut. As Frank notes, the German edition is "the first complete edition of the manuscript" (1949c, 5).

reprinted two months later. With the success of the biography, Frank reached a wide audience and made a name for himself alongside Einstein that outlived his philosophical reputation. For as Cohen (1948, 253) warned Frank's readers, one "is hard put to tell when Einstein is speaking through Frank and when Frank through Einstein!" Einstein was at least prepared to speak through Frank's book, for he wrote a preface that Knopf omitted from the American edition and was only later published in German.[11] Perhaps owing to Knopf's decision, Einstein prepared another preface (Einstein 1950) at Frank's request for his book *Relativity–A Richer Truth*.

Besides a strong community of physicists, Prague presented ideal conditions for Frank's interdisciplinary approach to science (see figure I.2). Frank hired experimental physicist Reinhold Fürth as an assistant before Fürth was appointed as professor of physics. Frank also maintained good relations with mathematicians, including the professors Ludwig Berwald, Karl Löwner, and Georg Pick, as well as supporters and colleagues of the Jewish feminist Berta Fanta, whom Frank met at meetings of the so-called *Fantakreis*. This circle, visited previously as well by Einstein, Franz Kafka, and other cultural figures of Prague, was an extension of the German University where Fanta studied; as a woman, however, she was not permitted to get a degree (Wein 2016, 54).[12]

Frank's eclecticism extended into his personal life as well. After his classes, on the way back to his office he would step into the library and talk "about politics, about physics, about anything that he might picked up at the 'Kaffeehaus,'" said his student Peter G. Bergmann (1966, 5).

11. See Einstein (1979). An English translation appeared recently in Rowe and Schulmann (2007, 129–131). On Einstein's preface, see Holton (2006, 303).

12. On the Frank's personal relationship to Kafka in Prague, Nina Holton tells the following story: "One evening—it must have been 1950 or 1951—we had a large party with friends of our age, and Hania and Philipp came as sort of guests of honor. In the 1950s, everyone in our circle of friends read Kafka, and on that particular evening Kafka was widely discussed. Hania pricked up her ears, and her eyes turned large with astonishment. 'Kafka?' she shouted to someone sitting on the floor near her. 'How do you know about Kafka?' The young man so addressed seemed rather embarrassed and replied: 'You see, Madame, Franz Kafka is one of the greatest writers of this century. Everybody knows his work.' Hania listened with astonishment, then she turned to her husband and said, 'Philippushka, what have we done with Franzl's letters to me?' 'You see,' Philippushka answered in his usual unperturbed way, 'they were packed in our lift to be sent from Prague in 1938, and the lift never arrived'" (Holton 2020, 171).

Figure I.2. In the woods of Czechoslovakia, Frank is the second from the right. Image courtesy of Harvard University Archives.

Another student in Prague, the Finnish philosopher Max Söderman, confirmed Frank's outsized cultural and social presence ("his little stories are very entertaining, his suppers delicious, his wife [Hania] charming") as well as Frank's interest in possible relations between scientific philosophy and contemporary politics.[13]

Frank focused mainly on three areas in his teaching: (1) relativity theory, (2) thermodynamics, and (3) philosophy of science, while also teaching courses on Maxwell's theory of electromagnetism, probability theory, statistical mechanics and kinetic theory, and Dirac's relativistic theory of the electron.[14] Frank intended to write a textbook on the

13. In a letter, Söderman pointed out Frank's political interests because he did not share them and compared Frank unfavorably to "the apolitical *purus logicus* [Karl] Reach." Max Söderman to Kaj Saxén, Nov. 21, 1936, GHWC, 714.249–50. English translation by Anssi Korhonen.

14. Based on her research, Veronika Hofer (2020, 61) lists the following courses Frank taught in Prague: "Molecular Physics," "Electrical, Light- and Heat-Radiation,"

theory of relativity to be published by Teubner in Leipzig in 1920, but it was never realized. After continuing to teach thermodynamics at Harvard during the 1940s and 1950s, he did succeed in writing a privately circulated textbook for natural scientists and engineers.[15]

As a physicist, his most important achievement in Prague was arguably the so-called Frank-Mises (Frank and von Mises 1925–1927), a major undertaking by Frank and the engineer and mathematician Richard von Mises, an old friend from Vienna.[16] In contrast to philosophers of science who envisioned a more traditional, unidirectional, and determinate route (or correspondence) between observations and theories (such as Moritz Schlick's idea of coordination), Frank and von Mises shared a view of this connection as statistical and thus offered a more refined picture of theory building in the sciences.

Frank and von Mises first worked together in the 1920s and early 1930s to revise the famous book *Differential Equations of Mathematical Physics* by Riemann-Weber.[17] The book had been revised before, but they decided to create a wholly updated and modernized version for mathematicians and physicists. Newly titled *The Differential and Integral*

"The Principle of Relativity, It's Foundations and Applications," "Atomism," "Theoretical Mechanics with Special Reference to the Theory of Relative Motion," "Hydromechanics and Aeromechanics," "Kinetic and Thermodynamic Theory of Heat," "Advanced Mechanics," "Calculus of Probability," "Theory of the Aeroplanes," "Theory of Gravitation," "Statistical Mechanics and Quantum Theory," "Partial Differential Equations of Mathematical Physics," "Introduction in the Theory of Relativity," "Huygens and Newton," "Theory of Compression of Light," "Discussions of New Papers on Quantum Theory," "Discussions of New Papers on Radiology," "Thermodynamics," and "General Relativity Theory," "Theory of Flight of Machines," "The Partial Differential Equations in Mathematical Physics," and "Introduction in Theory and History of the Exact Sciences."

15. Frank (1945) is a typescript edition published by Brown University on the basis of Frank's lecture during a summer course. It is not listed among Frank's official papers in the 1998 English translation of his causality book (Frank 1932/1998, 290–296).

16. Von Mises was an engineer and an applied mathematician who had been appointed in 1920 as full professor in Berlin, where he founded and directed the Institute for Applied Mathematics. After his emigration to the University of Istanbul in 1933, he was a professor of applied mathematics at Harvard from 1939 to 1953.

17. The story of the Riemann-Weber book goes back in the 1860s, but it does not concern us here. About the origins, details, and significance of the Frank-Mises see Siegmund-Schultze (2007).

Equations of Mechanics and Physics, their edition was finally published in 1925 and 1927: the first volume, on mathematics, was edited by von Mises. It includes several chapters by von Mises, but many of his colleagues contributed papers on introductory and advanced-level mathematics. The second volume was edited by Frank. He contributed a long section on analytic mechanics, while his colleagues from around the world covered other topics.

Until the 1950s, the Frank-Mises was often said to be "the standard encyclopedia of mathematical physics of the twenties and thirties" (Siegmund-Schultze 2007, 28). More importantly, it may be seen today as the first attempt by logical empiricists to theoretically combine and unify different scientific fields.

From the philosophical point of view, Frank's career in Prague began with his joining the *Deutsche Physikalische Gesellschaft* (German Physical Society) in 1918. The *Gesellschaft* had a long history, and there were many members outside of Germany who belonged to regional societies: for example, in Zurich, and Vienna. Prague also had its own small group, though its membership never exceeded sixty. Until this group was formally dissolved in 1934,[18] Frank was its chairman. The *Gesellschaft* provided Frank with an official setting for the first meeting on *Erkenntnislehre der exakten Wissenschaften* (The epistemology of the exact sciences), a seminal philosophical gathering that he organized in 1929 with sponsorship from the Ernst Mach Society in Vienna and the Society for Empirical Philosophy in Berlin (Stöltzner 2020).

The conference featured lectures on probability, causation, and foundations of mathematics (see figure I.3). In his opening speech, Frank (1930, 94) remarked that the goal was to "establish a purely scientific conception of the world [*rein wissenschaftlichen Weltauffassung*], to support the scientific trend of thought in contrast to the often reoccurring philosophical-metaphysical rather aesthetical [schöngeistigen] one."

Prior to relativity and quantum mechanics, Frank claimed (1930, 93), physics books contained merely casual remarks or impressions about theories and the nature of knowledge—"ornament[s], that had little to do with the content." Though Michael Stöltzner (1995) has shown to the contrary that physicists of the time had some natural philosophical tendencies, they were not drawn toward critical philosophical consider-

18. On the German Physical Society and Frank see Stöltzner (1995) who lists the various lectures held at the Society.

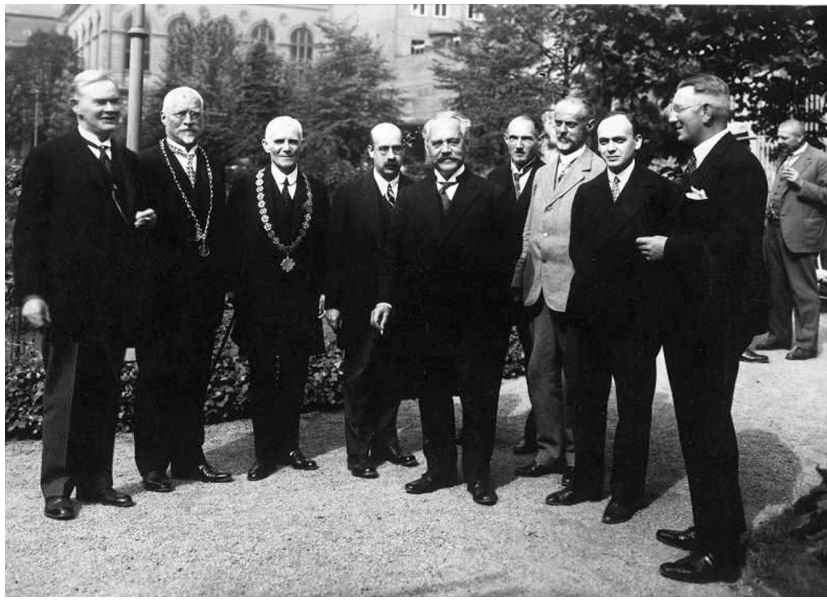

Figure I.3. The Fifth Meeting of the German Physicists and Mathematicians. Frank is fourth from the left. Image courtesy of the Vienna Circle Institute.

ations, at least not explicitly and self-consciously. Despite Prague's long traditions in natural science, philosophy of nature (*Naturphilosophie*), and the theory of knowledge (through Bernard Bolzano and Ernst Mach), Frank later recalled that

> [t]he audience, which consisted mostly of German scientists, knew little of philosophy, except that they had some sentimental ties to Kantianism. This doctrine was regarded in some intellectual quarters as a kind of substitute for the traditional forms of religion. My wife [Hania Frank] said to me after the lecture [Frank 1930/1949]: "It was weird to listen. It seemed to me as if the words fell into the audience like drops into a well so deep that one cannot hear the drops striking bottom. Everything seemed to vanish without a trace." (Frank 1949b, 40)

These observations from Frank and his wife Hania (née Gerson), a former student of his from Poland, introduce a theme Frank developed

in his later writings: while many scientists deny explicit ties to philosophy and are often unwilling to consider philosophical arguments, they remain nonetheless immersed in traditional philosophical views and frameworks—in the case of these German scientists, certain forms of Kantianism and idealism. As the New York philosopher Sidney Hook (1930, 145) remarked after attending the conference during his travels in Europe, this tacit Kantianism was not a choice made by German scholars from an array of theoretical options. It was "rather a national possession, the blazing jewel in Germany's cultural crown."[19]

Though this first philosophical meeting was not as successful as he had hoped, Frank continued to organize and create international networks supporting science and scientific philosophy. In August 1928, for example, he read a paper on quantum theory at the Sixth Congress of Russian Physicists in Saratov, which he attended with von Mises and Max Born (see Joravsky 1961/2009, 267 and Pechenkin 2014, 107). He traveled to other Russian cities to give talks,[20] and he wrote two articles (on waves [Volny] and hydromechanics [Gidromekhanika]) for the first edition of the *Great Soviet Encyclopedia* (see Joravsky 1961/2009, 380, n. 6). The resulting contacts and Frank's ability to speak Russian allowed him to later write about Russian philosophy of science and compare it to logical empiricism (Frank 1936/1949) and to also draw on Marxism and Marxist theories of knowledge in *The Humanist Background*.[21]

Frank hoped to make Prague a globally renowned center for the scientific conception of the world, much like Vienna. To this end, he and others established a chair for natural philosophy at the university. To fill the position, in 1926 Moritz Schlick recommended as his first and second choices Hans Reichenbach (then in Berlin) and Rudolf Carnap (then in Vienna).[22] Though Reichenbach was disposed to go to Prague, he remained in Berlin, allowing Frank to campaign for Car-

19. In the 1930s several American philosophers travelled through Europe, including Albert Blumberg, W. V. O. Quine, Charles Morris, and Ernest Nagel who drew a somewhat more promising picture even of Germany. See Nagel (1936).

20. See Frank to Schlick, September 26, 1928, MSN.

21. In 1960, Frank's most important published book, *Philosophy of Science: The Link Between Science and Philosophy*, was translated into Russian; two years later the Russian introductory essay was translated into English and published in *Daedalus* (see Kursanov 1962).

22. Moritz Schlick to Hans Reichenbach, January 19, 1926, MSN.

nap's appointment. Despite five years of lobbying against "the adherents of traditional philosophy" (1949b, 45) who opposed the appointment, Frank eventually arranged for Carnap to come to Prague. In the end, he succeeded "because of a happy coincidence," Frank later recalled: in Prague, philosophers worked in the Faculty of Humanities, and the Faculty of Science was not able to provide courses in philosophy. But Thomas G. Masaryk, the president of the Czechoslovakian Republic, was himself a philosopher who "believed strongly in the educational value of philosophy. He insisted that the Faculty of Science should have a philosopher of their own." On Frank's suggestion, Carnap was appointed to the position in 1931.[23]

Frank and Carnap worked closely. They had a regular Thursday-evening colloquium (*Donnerstagabendzirkel*) that one might compare to the Vienna Circle, which was attended by local scientists, philosophers, and important figures in Prague's cultural life.[24] While they discussed classic philosophical papers, including Carnap's infamously provocative "The Elimination of Metaphysics Through the Analysis of Language" (Carnap 1932/1959), this group's *Kolloquium für philosophische Grundlagen der Naturwissenschaft* (Colloquium on the philosophical foundations of the natural sciences) focused more broadly on biology, physics, and their interrelations. In time, these issues became quite important for Frank. He gave a talk on the relation of physics to biology at the First International Congress for the Unity of Science in Paris in 1935 (Frank 1936a) (see figure I.4). A year later at the Second Congress in Copenhagen, the topic was "The Problem of Causality—with Special Consideration of Physics and Biology."[25]

23. Frank additionally served as Dean and Vice-Dean of the Faculty of Natural Sciences of the German part of the University from 1925–1927, as well as in the academic year 1930/31. This office may have helped Frank bring Carnap to the University (Hofer 2020).

24. These included students of Brentano, Georg Katkov and Walter Engel; the Russian educationalist Sergius Hessen; Kafka's close friend Felix Weltsch; the mathematician Karl Löwner (later known as Charles Loewner); the biologist Joseph Gicklhorn; the zoologist Paul Fortner; the mathematician Ludwig Berwal; the economist (and Rosa Luxemburg's lover) Kostja Zetkin, the biologist Felix Mainx, and the painter Trude Schmidl-Waehner (see Tuboly 2021c).

25. On the congress see Stadler (2001/2015, 178–182). Frank's philosophy of biology is taken up in Hofer (2002), (2003) and Wolters (1999), (2018).

Frank and Carnap also became personally close. Frank officially witnessed Carnap's marriage to his wife, Ina (nee Stöger), and—because Carnap did not speak Czech—acted as a translator so that Carnap could answer the ceremony's official questions. Perhaps not surprisingly, Carnap had questions of his own:

> When the procedure began, Carnap, the meticulous logician and philosopher of language, asked Frank to clarify the meaning of the verbal formulas required. As the procedure continued, Carnap kept interjecting questions as to the logical status of the particular statements he was expected to supply at each juncture. Frank finally interrupted him, saying, in effect, "Do you want to get married or not? If so, just answer and don't ask questions!" (Scheffler 2004, 66)

Though their friendship was a success, and Carnap would later help bring Frank to the United States, the Carnap-Frank Circle did not achieve the philosophical importance of its Viennese and Berliner counterparts. Neither through large numbers of participants, nor by formulating a unified or at least recognizable view, did these scientists and philosophers in Prague create an internationally respected style. Though these failings should be explained by detailed philosophical and sociological study that we cannot offer here, one obvious difference between the circles in Prague and Vienna was Otto Neurath, the "big locomotive" who prodded, organized, and often provoked his philosophical colleagues in Vienna toward continuous and productive collaboration. It is probably not a coincidence that Carnap later remarked, "My life in Prague, without the [Vienna] Circle, was more solitary than it had been in Vienna. I used most of my time for concentrated work, especially on the book on logical syntax" (1963, 33). Though Carnap's syntactical project had a great influence on Frank, Reinhold Fürth recalled that in Prague Frank "preferred to work on his own and never had a 'research school'" (1965, xiv).

During his years in Prague, Frank often visited his hometown to participate in the meetings of the Vienna Circle, which by the mid-1920s had become an evolving group of philosophers, sociologists, economists, jurists, historians, mathematicians, and physicists. The core members consisted in Schlick, Carnap, Neurath, Hahn, and Friedrich Waismann. But Kurt Gödel, Karl Menger, Herbert Feigl, Felix Kaufmann,

Figure I.4. From right to left, Frank, Carnap, Susan Stebbing, Heinrich Neider, Carl G. Hempel, Eva Hempel, Jørgen Jørgensen, and Finnish logician Uuno Saarnio. The photograph was likely taken when the group traveled to a village in the Belgian Ardennes after the First Congress for the Unity of Science in Paris, 1935, a trip described in correspondence between Stebbing and Ernest Nagel (October 18, 1935, ASP ENP). Image courtesy of Harvard University Archives.

Edgar Zilsel, and others participated as well.[26] Though it was led by the physicist-turned-philosopher Moritz Schlick, it was a self-consciously cooperative enterprise devoted to discussing philosophical and scientific questions in exact terms. Though Frank is often described as a regular visitor and not as an inner member, the correspondence among Carnap, Neurath, Schlick, Reichenbach and others shows otherwise. Frank was an honored and important member whose opinion always

26. The best and most detailed introduction and documentation of the Circle's activities is Stadler (2001/2015).

mattered and who regularly played the role of final judge in controversial matters.[27]

1.3. Harvard, Massachusetts, and Boston: The Promise of a Better Future

Amidst the rise of fascism and radical-right voices in Europe, Carnap moved to Chicago in 1935. A year later, Carnap reported to Neurath that according to Frank, "Antisemitism in Prague is again flourishing."[28] Frank was Jewish, but he remained in Prague for two more years. Only late in 1938 did he and Hania come to America to lecture at universities and colleges under the auspices of the Institute of International Education (See figure I.5; Holton 2006, 198). Frank and Hania had planned to return to Prague, but that became impossible after the Munich Agreement (which they learned about as they sailed toward the United States) and Germany's invasion of Czechoslovakia (Hofer 2020, 63, 64, 65). Frank now needed a job on American soil. Frank would eventually obtain a position at Harvard University, but this came only after he failed to get a job at the University of Chicago. The reasons for this failure are worth exploring, for they introduce some of the ongoing cultural battles manifest in *The Humanistic Background*.

1.3.1. A Refugee between Nazism and Thomism

For Frank, returning to Prague would have been foolhardy because the university had fallen under Nazi control. Besides being a Jew, Frank had once lectured in the Soviet Union, a nation that Hitler feared and loathed.[29] Frank had a temporary visa that was soon to expire. In order to obtain a permanent visa, he had to be employed for at least one year as a university professor. Frank's first hope was a temporary, one-year posi-

27. When he was in Prague, Frank edited a book series together with Schlick, called the *Schriften zur wissenschaftliche Weltauffassung* (*Writings on the Scientific World-Conception*). It featured, among others, Carnap's *Logical Syntax*, Frank's book on causality, von Mises' book on statistics and probability, and Karl Popper's famous *Logik der Forschung* (*Logic of Scientific Discovery*, as it was translated into English).

28. Carnap to Neurath, June 11, 1936 (ASP RC 102-52-26).

29. Frank to E. C. Kemble, Feb. 9, 1939 and Feb. 25, 1939. Frank to Harlow Shapley, April 7, 1939, all in HUA-HSP.

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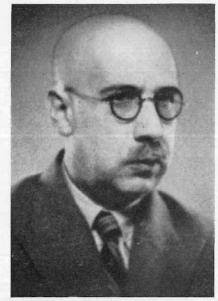

PHILIPP FRANK, Ph. D.

Professor of Theoretical Physics, German University of Prague

Lecturing under its auspices October and November, 1938

Dr. Frank became Professor of Theoretical Physics at the German University of Prague in 1912, appointed as successor to Dr. Albert Einstein upon his recommendation. After receiving the degree of doctor of philosophy from the University of Vienna in 1906, Dr. Frank became a lecturer in Mathematical Physics at that University in 1910. He is one of the founders of the movement towards logical empiricism in science and of the "Unity of Science Movement."

Dr. Frank is regarded as one of the leading authorities on geometric optics and dynamics as well as on aerodynamic theory. He is a member of the Committee of Organization of the new "Encyclopedia of Unified Science" published by the Chicago University Press.

In 1928 he lectured in Soviet Russia at the invitation of the scientific congress. We are told that his lectures will be most stimulating as he is considered to have one of the keenest critical minds at present in his field. He speaks English well.

In 1925 Dr. Frank collaborated in the publication of a volume entitled "Die Differentialgleichungen der Mechanik und Physik" which is considered the most circumstantial and extensive treatise on the differential equations of physics that exists. A book in English entitled "Interpretations and Misinterpretations of Modern Physics" was published in April of this year by Herman of Paris. He has also written many papers on scientific subjects, both in French and in German.

LECTURE SUBJECTS

Popular Lectures

1. The Rôle of Metaphysics in the Physics of the Twentieth Century
2. Modern Physics and Common Sense

Lectures for Graduates

1. Philosophical Interpretations and Misinterpretations of the Theory of Relativity
2. Philosophical Interpretations and Misinterpretations of the Quantum Theory
3. How to Eliminate all non-scientific Elements from the Quantum Theory

Technical Lectures

1. Recent Generalizations of Geometrical Optics
2. Bohr's Principle of Complementarity and Modern Logic

Figure I.5. Brochure advertising Frank's American lecture series, October–November, 1938. Courtesy of ASP-ENP.

tion at the University of Chicago with Carnap and Charles Morris, the American philosopher who had befriended the unity of science movement years before and had helped Frank to organize his American lecture tour.

A position at Chicago may have seemed ideal to Frank, for the university was becoming a center of the Unity of Science Movement. The first pamphlets comprising Otto Neurath's new *International Encyclopedia of Unified Science* were published by the university press the year before, and the university's philosophy department was friendly to philosophical pragmatism and a science-friendly naturalism. John Dewey and George Herbert Mead refined their philosophies there, while Morris, a student of Mead, dedicated himself to reconciling and joining logical empiricism and pragmatism. When Frank arrived in the United States, New York City was another important outpost of pragmatism, with Dewey and Ernest Nagel teaching at Columbia; Sidney Hook, Dewey's student, teaching at New York University; and Horace Kallen, a former student of William James, at the New School for Social Research.

Yet pragmatism in the United States was not without intellectual enemies. The nation had always been deeply religious and apprehensive of intellectuals and scientists who seemed to challenge religious and metaphysical orthodoxies (Hofstadter 1963). As the University of Chicago deliberated over whether or not to offer Frank a position, two powerful critics of scientific philosophy were close by: university president Robert Maynard Hutchins and his colleague and sometimes right-hand-man Mortimer Adler. With Hutchins and Adler leading one side, and Dewey and his fellow New Yorkers leading the other, debate raged about the nature of science and philosophy, their proper place in the modern world, and—amidst widespread unemployment and the rise of fascism in Europe—their roles in education and the future of democracy.

As a candidate for a job at the University of Chicago, therefore, Frank had walked into a battle royale. Hutchins had first joined the debate in 1936 with his book *The Higher Learning in America* (Hutchins 1936). Placing blame for the nation's problems on the failure of higher education and the nation's intellectual life, he blasted the rigid professionalism and departmentalization of the modern university (Hutchins 1936, 54). It had come to offer students, he wrote, a smorgasbord of disconnected fields of study—"an enormous miscellany, composed principally of current or historical investigations in a terrifying multiplicity of fields" (Hutchins 1936, 92). "The modern university," Hutchins wrote, "may be compared with an encyclopedia," albeit one without any internal, unifying structure: