Introduction

Over the course of his career, Anne Kox has developed a wide range of professional interests, in the Netherlands as well as abroad. It is no surprise that the varied circle of colleagues that Anne Kox has gathered around himself over the years reflects his own varied professional interests. This is definitely the case for the group of close colleagues who have contributed to this volume. As a result, Albert Einstein and Hendrik Antoon Lorentz, the two towering figures in the history of theoretical physics to whom Kox has devoted a large part of his career, inevitably play a prominent role in several chapters in this volume.

Indeed, they are both among the main protagonists in Michel Janssen's chapter about Fresnel's ether drag coefficient. Fresnel introduced the ether drag coefficient to explain why the earth's motion through the luminiferous ether, the medium that was thought to carry light waves, is not detected in experiments on the refraction of light. Attempts to provide a dynamical model for Fresnel's ether drag failed until Lorentz finally created such a model in the context of his microscopic elaboration of Maxwell's electromagnetic theory. Eventually, Laue derived the Fresnel drag coefficient from Einstein's special theory of relativity. He showed that it is a direct consequence of the relativity of simultaneity. With this purely kinematical account, the Fresnel drag coefficient became detached from any dynamical model rooted in the physics of light in transparent media.

In the study by Van Besouw and Van Dongen about the perception of the theory of relativity in the Netherlands, Einstein and Lorentz are also prominent. The authors identify several reasons why relativity generated a primarily positive response in the Netherlands. One of these was the great reputation and influence of Lorentz and other Leiden physicists, who were instrumental both in the genesis and in the popularization of the theory of general relativity. Another reason was Einstein's internationalist and pacifistic attitude, which resonated well with Holland's self-image as a country with an internationalist outlook and as a promoter of international peace. Van Besouw and Van Dongen show, most of all, that social or personal interests that lay outside the field of physics often determined the perception of relativity among the theory's proponents as well as its modest number of adversaries. The theory of relativity even played an important role in debates concerning the epistemological foundations of the Dutch educational system.

In their elegant chapter, Diana Buchwald, Jürgen Renn, and Robert Schlögl discuss the scratch notebook Einstein used between 1910 and 1913, during the

fascinating period in which he laid the foundations for his theory of general relativity. The notebook offers a revealing insight into the daily life of Albert Einstein in those years. He appears to have been a far cry from a scholar working single-mindedly and in isolation on his magnum opus. On the contrary, he engaged in experimentation and in physical chemistry, travelled, visited fellow scientists, and apparently developed his cutting edge ideas in a lively interaction with his scientific contacts. And what does the scratch notebook reveal about the unknown fate of Einstein's daughter Lieserl?

Albert Einstein and Hendrik Antoon Lorentz shared a similar attitude towards their scientific activities. First and foremost they worked as 'fundamental' physicists, for whom nothing else counted than to unravel the secrets of nature. Indeed, their research was their ruling passion. As a colleague stated, Lorentz conducted his research 'as a bird sings his song';[1] it was 'the great fulfilment of his life'.[2] Yet, Lorentz also fulfilled his social duties and applied his skills in mathematics and physics for the well-being of his countrymen. The clearest example of this commitment is his extensive work on the calculations for the *Afsluitdijk*, the dike that transformed the Zuiderzee into a lake.[3] Einstein was even more involved in practical matters, as historians in recent years have increasingly realized. Even though he was not always successful, throughout his life he engaged enthusiastically in experimentation, engineering and inventing.[4] For these great scientists physics was their calling, but they realized that their intellectual skills should also serve society on a more practical level.

The contributions in this volume, however diverse in topic and approach, cover more or less the same period, roughly between 1850 and 1950, and focus for the most part on Dutch science. This is the period in which the research university, where research is a full-fledged activity side by side with education, became an established phenomenon. In the first half of the twentieth century the fundamental sciences and their practitioners had acquired an almost inviolable position, both within the universities and in society at large. Yet, the contributions in this volume show that even during this heyday of ivory tower-science, scientists could not escape the outside world – even if they wished to do so.

A case in point is presented in Dirk van Delft's chapter about the remarkably stubborn resistance of Kamerlingh Onnes and his successor Willem Keesom to the International Temperature Scale of 1927. This convention replaced the obsolete temperature scale introduced in 1887, and it ended the use of different temperature scales, a practice that everybody agreed was undesirable. The Leiden objections were apparently of a purely technical nature. Yet, as Van Delft points out, underneath the factual discussions was a principled difference between national calibration institutions, which increasingly kept an eye on industrial interests, and scientific institutions like the Leiden physics laboratory, where only fundamental scientific standards counted. To the regret of Keesom, scientific precision lost out to industrial pragmatism.

Keesom was not Kamerlingh Onnes' only successor. He shared the directorate of the Kamerlingh Onnes Laboratory with Wander de Haas. In his contribution, Maas describes the research of De Haas and his collaborators with the huge electromagnet that was installed in 1932. As in the case of Van Besouw and Van Dongen's study on relativity in the Netherlands, a gap can be observed between professional and public perceptions of science. With the large magnet and the cryogenic installation De Haas established spectacular cold records that made him a successful scientist in the eyes of his countrymen. In their scientific practice, however, De Haas and his collaborators missed the main discoveries in their field of research and gradually the Leiden laboratory lost the leading position in cryogenics it had acquired in the times of Kamerlingh Onnes. The story of De Haas is, above all, about how much of a burden the reputation of a great scientist like Kamerlingh Onnes can be for his successor.

Where did Kamerlingh Onnes' method of precision measurements, which according to Maas weighed heavily on the adventurous experimentalist De Haas, actually come from? Frans van Lunteren conjectures in his chapter that the discipline of physics as it emerged in the nineteenth century was strongly influenced by astronomical practices, methods and values. Scientists like Laplace in France, and later Gauss and Bessel in Germany, and in particular Kaiser, Bosscha, and Kamerlingh Onnes in the Netherlands transferred empirical and mathematical methods to physics that had first been developed and used by astronomers – such as the ethos of precision measurement. De Haas no doubt will have regretted this. Yet, in this case too, scientific developments did not unfold in complete isolation. Precision measurements were, for instance, introduced partly in response to the needs of modern industry and society.

The mathematician Korteweg, a key figure in Dutch science in the decades around 1900, took his social responsibilities more than seriously. As Bastiaan Willink reveals, Korteweg's manifold social engagements were an important reason why he and his student Gustav de Vries failed to digest the work of Boussinesq, who had already found a result identical to the one De Vries worked out in his dissertation, which is nevertheless known nowadays as the Korteweg-De Vries Equation. Willink offers us a penetrating insight into the personalities of Korteweg and De Vries and meticulously reconstructs the trials of writing the dissertation.

Between 1948 and 1954 some of the most reputable Dutch scientists became involved, somewhat against their will, in research on dowsing and earth rays. They became members of a committee formed by the Royal Netherlands Academy of Arts and Sciences, which had been alarmed by the growing belief in earth rays among parts of the population. Protection boxes to 'annihilate' these rays were sold widely. Jan Guichelaar's sometimes hilarious account of the investigations by this Committee for Investigation of the Dowsing Problem and Earth Rays, addresses a topic that has, until now, received very little attention in historiography.

However, not all scientists descended from the ivory tower only occasionally or reluctantly. Pim Huynen's main protagonist, Evert Cornelis van Leersum, convincingly dedicated himself to social needs. After World War One, during which the Dutch population had suffered food shortages despite the country remaining neutral, this Professor in the Pharmaceutical Sciences and the History of Medicine strongly felt an urge to 'inform the public on the truths and myths of healthy nutrition'. He resigned from his university chair to devote himself to establishing a private institute for nutrition research and education: the *Nederlands Instituut voor Volksvoeding* (Netherlands Institute for Public Nutrition). Although the initiative never became a success, the story of Van Leersum, who was one of the first Dutch scientists to explicitly turn to American scientific practices and values, provides a wonderful example of a Dutch scientist who deliberately chose to devote himself to practical science and the common good as early as the interwar period. In short, if during this period there was such a thing as a robust ivory tower in the metaphorical sense, it did have cracks and blowholes, as well as windows to look at the world outside, and a ladder to get out.

Just like Van Leersum, Ernst Laqueur also turned towards applied science, though perhaps more driven by personal ambitions than by idealistic motives. Peter Jan Knegtmans' biographical study of this entrepreneur-scientist reveals the ambivalence within the academic community towards cooperation with the world of industry and commerce. Laqueur, Professor of Pharmacology at the University of Amsterdam, joined forces with Saal van Zwanenberg, the owner of a meat factory in the city of Oss. Together they founded Organon, a company that specialized in producing insulin on a mass scale, by extracting it from offal. Later, this pharmaceutical company grew into a world player for the production of vitamin pills, hormone-based drugs, and contraceptives. In Laqueur's academic surroundings, however, his commercial interests were regarded with distrust. As Knegtmans penetratingly exposes, the leitmotiv in the professional career as well as the personal life of the German Jew Laqueur, was that of forever being an outsider.

The contribution by Roger H. Stuewer, who is one of Anne Kox' most esteemed colleagues, is the final one in this collection, ending the volume on a personal note. During October and November of 1998, Stuewer visited Amsterdam as Pieter Zeeman Professor of the History of Modern Physics, at the invitation of Anne Kox. In his account, Stuewer vividly describes his recollections of academic life at the University of Amsterdam, Amsterdam city-life, and his experience with Dutch hospitality.

We would like to conclude this introduction by expressing our gratitude to all the authors. Without their enthusiastic participation we would never have been able to publish this volume honouring Anne Kox on his retirement from the University of Amsterdam. We would further like to thank the Institute for Theoretical

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Notes

1. 'Rede van prof. dr. H. Kamerlingh Onnes' (1926), p. 32.
2. De Haas-Lorentz (1957), p. 22.
3. Kox (2007).
4. See in particular Illy (2012).

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