

# Émilie du Châtelet's *Institutions physiques*. Über die Rolle von Hypothesen und Prinzipien in der Physik.



by Andrea Reichenberger

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How do we comprehend the influence of a book which was, although well known and read at its time, ignored and forgotten for centuries in research on the history of philosophy and physics, only then to be rediscovered? We need to follow up on the letters, publications, events, correspondences, and disputes that belong to its editorial past. We need to investigate the inferences drawn from other important works, and vice versa. But we also need to position it within the scope and context of contemporary science. Andrea Reichenberger's scientific-historical work on Émilie du Châtelet's *Institutions physiques* (1740), her major work besides her posthumously published translation of the *Principia*, does just that, and thus repaints our picture of contemporary scientific debate, especially with regard to the foundations of mechanics. Madame du Châtelet's *Institutions physiques*, initially a textbook written for her only son (who probably never read it), was a major contribution to the development of physics and natural philosophy in the eighteenth century. Yet, written by a woman, its influential effects, although discussed and in turn adopted at its time, were largely discounted in the nineteenth and twentieth centuries.

By going into every detail of the editorial genesis and historical context of the *Institutions physiques*, Reichenberger's book, like no other book before it, locates du Châtelet in the scientific debates of her time. The author discusses nearly every comment made on the editorial context of du Châtelet's work up to the present day. She thus avoids common problems, such as neglecting Christian Wolff's (1679–1754) influence on the one hand, or describing du Châtelet's work as purely Wolffian on the other. She presents a complete picture of the editorial background to the *Institutions physiques* as well as interesting information on du Châtelet's other works. By recapitulating the current state of research, Reichenberger is also able to draw on missing pieces in our knowledge of the genesis of du Châtelet's oeuvre, such as comparisons between Newton's work and her translation, or on her

relationship to the materialist philosopher Julien Offray de la Mettrie (1709–1751).

Reichenberger's book is divided into six chapters and a conclusion. At the beginning of each chapter she summarizes the aim and theme of the chapter, which makes the book lucid and easy to work with. Every chapter ends with an extensive bibliography. In what follows, I will try to provide insight into the contents of the book by highlighting a few important themes in each chapter.

Chapter 1 gives the reader an overview of the main strands of research and discusses du Châtelet's position between Leibniz and Newton. Here, Reichenberger argues that Wolff's influence cannot, as has often been done, be subsumed under that of Leibniz's, even if he was a major influence on Wolff, since Wolff's ontology has its own distinctive features. She also insists that labeling Newtonian physics "empiricist" or Leibniz's philosophy "rationalist" is an oversimplification. Rather, she argues, it is important to recognize the rational traits in Newton's work and the rationalist perspective in which it was perceived, in order to assess Newton's influence on mechanics as a whole. Similarly, it is insufficient to label Leibniz a rationalist, let alone equate Leibniz with "Leibnizianism," especially since very few of his works were published during his lifetime.

Chapter 2 is dedicated to du Châtelet's life and oeuvre, in particular to the editorial background to and translations of her major work. Reichenberger points out that her relationship to Newton has never been adequately investigated. She draws on the surprising fact that at a major French conference to commemorate the three hundredth anniversary of the *Principia* in 1987, du Châtelet's translation was mentioned but once, and even then with the incorrect assumption that her lengthy commentary was a contribution by Alexis Claude Clairaut (1713–1765), her posthumous editor. This is all the more surprising given that du Châtelet was a highly competent critical reader of Newton's work who furthered his theory with a Leibnizian underpinning.

Chapter 3 deals with the editorial background and publication of the *Institutions physiques*. Reichenberger discusses Jean-Jacques Dortous de Mairan's (1678–1771) accusations directed at du Châtelet after du Châtelet had undertaken a critical exposition of his theory on the controversial *vis viva* issue of mechanics, which she published in the *Institutions physiques*. Mairan rebuked du Châtelet as having misinterpreted and misunderstood his theory, as well as not possessing adequate mathematical knowledge. Du Châtelet's defense resulted in a letter, thirty-seven pages long, in which she, aside from a sarcastic tone aimed at the *secrétaire perpétuel* of the Academy of Sciences, proved in detail the mistakes in his reasoning. Another important event in the context of the publication of the *Institutions physiques* was the accusation of plagiarism put forward by Johann Samuel König (1712–1757), a lesser mathematician, which is discussed in detail. Reichenberger also discusses in detail the light-hearted and rather insubstantial judgment that Wolff passed on the *Institutions physiques*, du Châtelet's correspondence with Frederick the Great, as well as the broader scope of the intellectual debates of her time.

Chapter 4 begins with a formal epitome of the *Institutions physiques* in line with each chapter. It continues by discussing the meaning of the word *physiques* in the title, since physics in the eighteenth century could stand for either mechanics or a general understanding of nature. The author interprets the title in a Wolffian sense as the question of the reasons for phenomena. Also treated is the “architecture” of du Châtelet’s program vs. the contemporary meaning of architecture. The chapter closes with a discussion on the foundations of science (such as principles and hypotheses) in du Châtelet’s work with regard to Newton and Leibniz.

Chapter 5 deals with a comparison between Newton’s and du Châtelet’s laws of motion, which are, interestingly, although at first glance similar, quite different in the sense that du Châtelet assumes the principle of sufficient reason to be the underlying axiom. Instead of defining rest and uniform motion as the state of a body on which no other body exerts an impressing force, du Châtelet defines the same concepts as the state in which the body remains if there is no *cause* for it to change. Du Châtelet’s supposition of causality and sufficient reason as the basis for the laws of motion enabled in turn her argumentation against the idea of an external force and of a loss of force. The chapter explains how she criticized Newton’s physics and thus enabled its further development.

Chapter 6 locates du Châtelet’s position in the *vis viva* debate. It aims to show how she contributed to the complex discussion surrounding the true measurement of force and the principles underlying the laws of motion. The chapter offers a detailed investigation into the reasons for that debate, both in view of the conflict between Leibniz’s and Descartes’s laws of motion and in the systems that followed.

Reichenberger’s extremely well researched book is an *omnium gatherum* of interesting historical and contextual facts on the *Institutions physiques* and its editorial background. It recovers and reinstates Émilie du Châtelet’s position in the philosophical and physical debates of her time and locates her in the historical development of an understanding of mechanics and the search for a basis for the laws of motion. The book makes easily accessible reading even for those without detailed knowledge of physics and mechanics.

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