Condensed Matter Physics, 2026, Vol. 29, No. 2, 28001: 1–2
DOI: 10.5488/CMP.29.28001
ISSN: 1607-324X https://cmpj2.icmp.lviv.ua

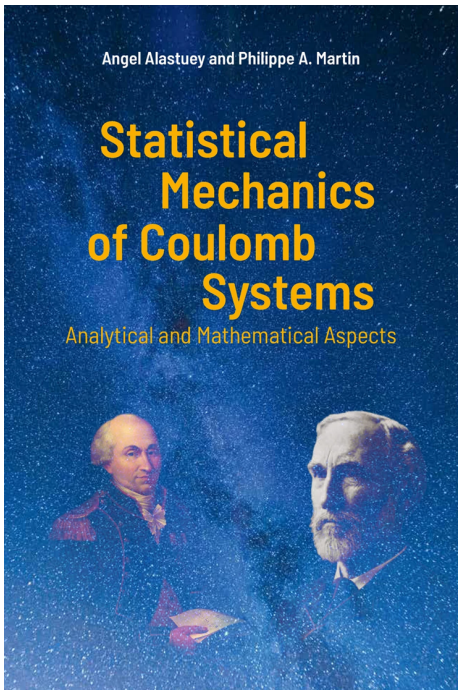
Book review

Statistical Mechanics of Coulomb Systems by Angel Alastuey and Philippe A. Martin

W. Ebeling *

Institute of Physics, Humboldt University, Berlin, Germany

Received 15 April, 2026; accepted 17 June 2026; published 29 June 2026



EPFL Press, Lausanne, 717 pages. ISBN-978-88915–442-5

The basic role of Coulomb systems in the understanding of our world became clear at least in 1911, when Rutherford found out by experiments, that matter basically consists of tiny nuclei and electrons moving around them, held together by Coulombic forces. The roots of quantum mechanics are connected with the physics of Coulomb particles and radiation and the names of Planck, Rutherford and Bohr. The same is true for the roots of quantum statistics. These founders detected already, that the foundation of the quantum statistics of Coulomb systems is connected with quite specific problems; so that a simple extension of the existing statistics of gases to plasmas was not possible. Despite of these facts and fundamental insights, e.g., by Lenard and Dyson, that the overall stability of matter is deeply connected with quantum statistics, there are not so many books on Coulomb systems. Here we have a new one in our hands, which develops the statistical theory in a fundamental way. First, the authors develop the theory of

*Email:ebeling@physik.hu-berlin.de.

macroscopic systems of point charges as the basis of an understanding of the properties of macroscopic matter. One can say, that there is at present no other book on these topics, which is so exhaustive and covering nearly all relevant aspects. The book begins with the basics of electrostatics up to screening concepts and includes modern aspects as the charge sum rules.

One of the most original Chapters in the book is about quantum correlations at large distances. Here several pioneering results of the authors are represented which demonstrate fundamental results about the existence of an algebraic long-range tail of correlations. The following Chapters about atoms, molecules and van der Waals interactions are more of integrating character and prepare the ground for the Chapters about the classical and the quantum thermodynamics. In particular, the latter Chapter about the quantum case contains important new results of the authors. The concluding Chapter is devoted to the Kosterlitz-Thouless transitions. Several appendices represent the necessary technical tools in a very concise and elegant way, which for students may be of an unvaluable help to acquire the absolute minimum of needed mathematical-theoretical apparatus. In conclusion: potential readers, from the new generation of students to the scientists being already a longer time in the field of statistical physics welcome this appearance of an outstanding book. The book has some bias, nobody is perfect. Publications in French play a great role. This is understandable, since Charles Augustin de Coulomb (born in 1736 in Angoulême, died in 1806 in Paris) was one of the greatest physicists ever, and because the French school has contributed substantially to the field after Coulomb. Many of the cited French works, which are quite relevant were not yet known to me, on the other hand there are similar works from the others side of Europe, also worth to be discussed. Last but not least, a special value of the book is that it gives also a survey of the own quite relevant original achievements of its authors in the field and is so to say written first hand from the source. Finally, it is worth to students to study at least carefully the first Chapters and the appendices.