entropy

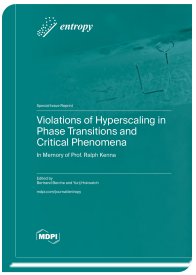
IMPACT FACTOR 2.0

Indexed in: PubMed

CITESCORE 5.2

Special Issue Reprint

Violations of Hyperscaling in Phase Transitions and Critical Phenomena



www.mdpi.com/books/reprint/11530

Edited by
Bertrand Berche
Yurij Holovatch

ISBN 978-3-7258-5147-8 (Hardback)
ISBN 978-3-7258-5148-5 (PDF)

This Special Issue was initiated by Prof. Ralph Kenna (August 27, 1964–October 26, 2023), who, at the time, was a member of the *Entropy* Editorial Board and it is dedicated to his memory. Universality is a striking feature of critical phenomena, and its origin is largely illuminated by the renormalization group. Universality allows for the essential aspects of critical behaviour in complex physical systems to be captured through highly simplified models, where only key components such as spatial dimensionality, symmetry, and interaction range are retained. Both theoretical models and real systems are thus grouped into universality classes, which are characterised by sets of critical exponents connected through scaling relations. When these relations explicitly involve dimensionality, they are referred to as hyperscaling. In many systems with a high degree of connectivity, mean-field theory provides accurate predictions independently of spatial dimension, leading to the common assertion that hyperscaling breaks down in such cases. However, this conventional view has been reconsidered in light of recent renormalization group developments, which suggest mechanisms by which hyperscaling might be preserved in an extended version even above the upper critical dimension. The contributions collected in this reprint address these issues, focusing on scaling properties beyond the upper critical dimensionality as well as related challenges in the broader theory of phase transitions and critical phenomena.

MDPI

Order Your Print Copy
You can order print copies at
www.mdpi.com/books/reprint/11530

MDPI Books

Publishing Open Access Books & Series

MDPI Books offers quality open access book publishing to promote the exchange of ideas and knowledge in a globalized world. MDPI Books encompasses all the benefits of open access – high availability and visibility, as well as wide and rapid dissemination. With MDPI Books, you can complement the digital version of your work with a high quality printed counterpart.

Open Access

Your scholarly work is accessible worldwide without any restrictions. All authors retain the copyright for their work distributed under the terms of the Creative Commons Attribution License.

Author Focus

Authors and editors profit from MDPI's over two decades of experience in open access publishing, our customized personal support throughout the entire publication process, and competitive processing charges as well as unique contributor discounts on book purchases.

High Quality & Rapid Publication

MDPI ensures a thorough review for all published items and provides a fast publication procedure. State-of-the-art research and time-sensitive topics are released with a minimum amount of delay.

High Visibility

Due to our global network and well-known channel partners, we ensure maximum visibility and broad dissemination. Title information of books is sent to international indexing databases and archives, such as the Directory of Open Access Books (DOAB), and the Verzeichnis Lieferbarer Bücher (VLB).

Print on Demand and Multiple Formats

MDPI Books are available for purchase and to read online at any time. Our print-on-demand service offers a sustainable, cost-effective and fast way to publish MDPI Books printed versions.

MDPI AG
Grosspeteranlage 5
4052 Basel
Switzerland
Tel: +41 61 683 77 34
www.mdpi.com/books
books@mdpi.com