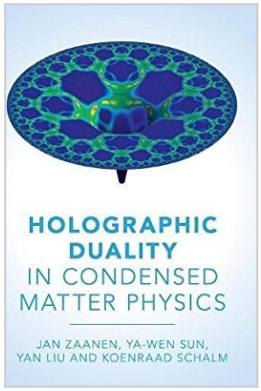

Holographic Duality in Condensed Matter Physics

By Jan Zaanen, Yan Liu, Ya-Wen Sun, Koenraad Schalm

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A pioneering treatise presenting how the new mathematical techniques of holographic duality unify seemingly unrelated fields of physics. This innovative development morphs quantum field theory, general relativity and the renormalisation group into a single computational framework and this book is the first to bring together a wide range of research in this rapidly developing field. Set within the context of condensed matter physics and using boxes highlighting the specific techniques required, it examines the holographic description of thermal properties of matter, Fermi liquids and superconductors, and hitherto unknown forms of macroscopically entangled quantum matter in terms of general relativity, stars and black holes. Showing that holographic duality can succeed where classic mathematical approaches fail, this text provides a thorough overview of this major breakthrough at the heart of modern physics. The inclusion of extensive introductory material using non-technical language and online Mathematica notebooks ensures the appeal to students and researchers alike.

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Review
"... an excellent introduction to the recently discovered "holographic duality" between gravity and condensed matter physics. It clearly explains the growing number of remarkable connections between very different areas of physics."
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"The book manages to convey big picture excitement while also providing computational details behind key results."
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"... this very readable book prepares theory graduate students and researchers to address the challenging problems posed by numerous experiments on modern quantum materials. The authors strike an excellent balance between extensive discussions of deep theoretical ideas and providing toolboxes for explicit computations."
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Jan Zaanen is Professor of Theoretical Physics at Instituut-Lorentz for Theoretical Physics, Leiden University, the Netherlands where he specialises in the physics of strongly interacting electrons. He is a recipient of the Dutch Spinoza Award and fellow of the Dutch Royal Academy of Sciences and the American Physical Society.

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