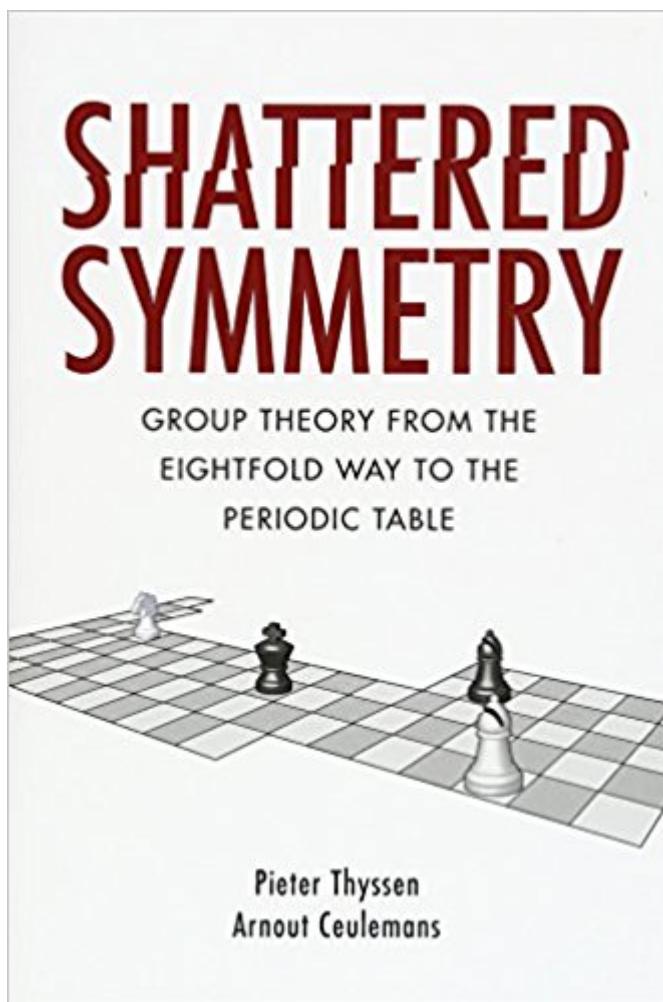


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Shattered Symmetry: Group Theory From The Eightfold Way To The Periodic Table



Synopsis

Symmetry is at the heart of our understanding of matter. This book tells the fascinating story of the constituents of matter from a common symmetry perspective. The standard model of elementary particles and the periodic table of chemical elements have the common goal to bring order in the bewildering chaos of the constituents of matter. Their success relies on the presence of fundamental symmetries in their core. The purpose of *Shattered Symmetry* is to share the admiration for the power and the beauty of these symmetries. The reader is taken on a journey from the basic geometric symmetry group of a circle to the sublime dynamic symmetries that govern the motions of the particles. Along the way the theory of symmetry groups is gradually introduced with special emphasis on its use as a classification tool and its graphical representations. This is applied to the unitary symmetry of the eightfold way of quarks, and to the four-dimensional symmetry of the hydrogen atom. The final challenge is to open up the structure of Mendeleev's table which goes beyond the symmetry of the hydrogen atom. Breaking this symmetry to accommodate the multi-electron atoms requires us to leave the common ground of linear algebras and explore the potential of non-linearity.

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Customer Reviews

Pieter Thyssen is a Postdoctoral Researcher at the Catholic University of Leuven. He completed his PhD in Theoretical Chemistry in 2013, and is currently working on a second PhD in the Philosophy and Foundations of Physics. Arnout Ceulemans is Professor of Theoretical Chemistry at the Catholic

University of Leuven. His research is devoted to the development and application of group theory and topology to chemistry.

Excellent introduction to the topic. Gradual build up from basics to a more profound elaboration.

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