



Understanding Solid State Physics

By Sharon Ann Holgate

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Enables students to easily grasp basic solid state physics principles

Keeping the mathematics to a minimum yet losing none of the required rigor, **Understanding Solid State Physics** clearly explains basic physics principles to provide a firm grounding in the subject. The author underscores the technological applications of the physics discussed and emphasizes the multidisciplinary nature of scientific research.

After introducing students to solid state physics, the text examines the various ways in which atoms bond together to form crystalline and amorphous solids. It also describes the measurement of mechanical properties and the means by which the mechanical properties of solids can be altered or supplemented for particular applications. The author discusses how electromagnetic radiation interacts with the periodic array of atoms that make up a crystal and how solids react to heat on both atomic and macroscopic scales. She then focuses on conductors, insulators, semiconductors, and superconductors, including some basic semiconductor devices. The final chapter addresses the magnetic properties of solids as well as applications of magnets and magnetism.

This accessible textbook provides a useful introduction to solid state physics for undergraduates who feel daunted by a highly mathematical approach. By relating the theories and concepts to practical applications, it shows how physics is used in the real world.

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Editorial Review

Review

Where Sharon Ann Holgate has succeeded in this book is in packing it with examples of the application of solid state physics to technology. ... All the basic elements of solid state physics are covered The range of materials is good, including as it does polymers and glasses as well as crystalline solids. In general, the style makes for easy reading. ... Overall this book succeeds in showing the relevance of solid state physics to the modern world

?*Contemporary Physics*, Vol. 52, No. 2, 2011

I was indeed amused and inspired by the wonderful images throughout the book, carefully selected by the author. These images and corresponding contexts, together with the thoughtful considerations of the difficulties of the freshmen to solid state physics, who may find it hard to follow the maths in the classics like Kittel's or Mermin's, fulfills very well the goal of the author ... this book is fun, at least for me! Why not have a copy together with Kittel's and Mermin's for the visiting undergraduate or even postgraduate students who are becoming frustrated with classics.

?Yang Gan, *Reviews*, Volume 11, Issue 1, 2010

I enjoyed reading the book and it is a refreshing approach ? it is very up to date and pitched at a good level to engage undergraduates new to the subject. I am happy to recommend this book to my students.

?Dr. Robert H. Hadfield, Heriot-Watt University, Scotland

The book is written in a very user-friendly and engaging style, as one might expect from a science writer/journalist. This way, the author succeeds in making the material approachable and interesting. The presentation is not as formal as most treatments. The emphasis is less on the theoretical and mathematical basis of the subject and more on the intuitive understanding of ideas and concepts, but the approach is fresh and the explanations are clear. What I like most of all is that it brings solid-state physics up-to-date, introducing modern topics and showing how the core ideas in condensed matter physics underpin so much of the technology we use today.

?Professor Andrew Boothroyd, Oxford University, UK

About the Author

Sharon Ann Holgate is a freelance science writer and broadcaster. She has presented on BBC Radio 4 and the BBC World Service, presented video podcasts for medical research charity the Myrovlytis Trust, and competed in a "Boffins Special" on *The Weakest Link*. She earned a Ph.D. in physics from the University of Sussex, where she was a Visiting Fellow in Physics and Astronomy for nine years. Her articles have appeared in *New Scientist*, *The Times Higher Education Supplement*, *Science Careers*, *Flipside*, *E&T*, *Focus*, *Physics World*, *Interactions*, *Modern Astronomer*, and *Astronomy Now*. Her first book *The Way Science Works* (co-authored with Robin Kerrod) was shortlisted for the Royal Society Junior Books Prize. She was also shortlisted for the broadcasting category of the Association of British Science Writers' Awards in 2005. Dr. Holgate has been a recipient of the Institute of Physics Young Professional Physicist of the Year and the Merit Award of the Daily Telegraph Young Science Writer of the Year competition. Further information can be found at www.sharonannholgate.com.

Users Review

From reader reviews:

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Raymond Guajardo:

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