



Critical Reviews

Spacecraft Dancing Lesson

Here is a wonderfully informative book from the Princeton University Press. Its title is Fly Me to the Moon, but that is only part of

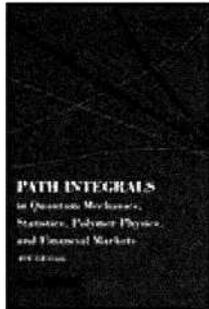
the story. More to the point is the book's subtitle An Insider's Guide to the New Science of Space Travel. But that is not the whole story either because it deals with a new approach to spacecraft trajectories that was ridiculed until recently when some spectacular successes were achieved.

The new methodology, presented by its principal originator Edward Belbruno, applies chaos theory to orbital mechanics, bypassing the notoriously unsolved three and four body problems. Belbruno presents the essential ideas without mathematics, at a level about that of a Scientific American article. He shows how it is possible to travel to the moon, or a planet, by using only a fraction of the fuel required for a normal trajectory provided there is enough time to carry out a series of delicate maneuvers.

Belbruno's first success was the rescue of Hiten a Japanese relay satellite whose lunar probe Hagoromo was lost. With no signals to relay, the mission could be saved if Hiten's small amount of leftover fuel could propel it to the moon, which it did. Other triumphs followed and the doubting voices were stilled. For manned missions direct high-speed trajectories are essential but for cargo the longer times needed for low-fuel trips are less important.

For anyone with an interest in this remarkable development in spaceflight the book is a must at US\$ 19.95 in hardcover. It has a 53-item bibliography and a short but useful index. Order it through its ISBN-13: 978-0-691-12822-1.

Colin Keay
Reviews Editor



Path Integrals in Quantum Mechanics, Statistics, Polymer Physics, and Financial Markets (4th ed.) H Kleinert
World Scientific Publishing, Singapore
2006 xliii + 1547 pp.,

US \$38.00 (paperback)
ISBN: 981-270-009-9

With a frequency of possibly less than once in a generation, an absolute bible of a book comes out that is the definitive authoritative monograph on its subject matter. Kleinert's book on Path Integrals is precisely such a book. It belongs on a special shelf alongside books like Misner, Thome and Wheeler's Gravitation, or Courant's classics on Differential and Integral Calculus. If you get a copy of Kleinert's book you will know that you have the best single book on the subject: the depth of knowledge and exposition is representative of a true master scholar.

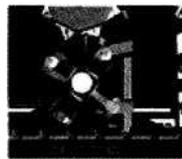
If you have a background in path integrals, and possibly use them already in your teaching or research, and this book is not already on your shelf, then it should be. Even more widely this is one of those books that every graduate student in theoretical physics should have.

This 4th edition includes a new chapter devoted to path integrals and financial markets. That chapter alone makes a significant contribution, in this case to the field of econophysics, and it is one of the finest examples of writing that I have come across that ports a proven technology to a new discipline area.

This is a book well worth having, even if it was at some of the monster prices that some book companies charge these days, but at less than US\$40, and with an excellent job on the typesetting and layout by World Scientific, this book is not only a genuine classic, it is a true bargain.

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Growth Market Nanotechnology



Growth Market Nanotechnology: An Analysis of Technology and Innovation

N Malanowski, T Heimer, W Luther and M Werner (eds)
Wiley-VCH, Weinheim
2006

xxiv + 270pp, €99.00 (hardcover)
ISBN3-527-3U57-1

While there are now a myriad of books on the nascent field of nanotechnology, there are very few that detail the economic potential of nanotechnology. This book attempts to fulfil this need by summarising global activities in nanotechnology, discussing nanotech-based markets and endeavouring to predict future directions that may unfold, through the perspectives of specialists in nanotechnology, marketing and finance. There is a rather comprehensive coverage of current trends in nanotech-oriented research activities and the need for changes to various scientific fields and standards (and where appropriate, a lack thereof). There also is extensive analysis of patent data in the fields of chemistry, optics, car manufacture, medicine and life sciences.

It is unfortunate that this book is highly oriented toward commercial markets and companies in Europe and Germany in particular (with three full chapters on these) and contains little by way of underlying science beyond the summary of activities. Hopefully its appearance will initiate several more likeminded books from across the globe.

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