

Neutron Scattering with a Triple-Axis Spectrometer. Gen Shirane, Stephen M. Shapiro and John M. Tranquada. Cambridge University Press, Cambridge, UK. 2002. 271 pp. Price not mentioned.

At first sight, judging by the title, this book gives the impression of a narrowly specialized technical monograph, dealing with a single experimental method in studies of neutron scattering. In point of fact, this remarkable achievement by three well-known scientists from the Brookhaven National Laboratory represents almost a comprehensive course on the study of condensed matter, using neutrons.

After an introduction describing the well-known advantages of neutron beams from reactors in the study of condensed matter, such as their depth of penetration, the energy distribution controllable as a function of temperature, the magnetic moment which makes the neutron a probe for magnetic properties, and a brief comparison of the intensities available from modern neutron sources, both steady state reactors and spallation sources, the less common instruments used in such studies, such as those based on time of flight, neutron spin echo, and backscattering are mentioned.

The physics of neutron scattering is then developed in considerable detail, and the formulae for coherent and incoherent processes, in nuclear and magnetic scattering are explained, with examples. The determination of magnetic structures and the measurement of phonons and magnons are discussed.

Next, the detailed description of the essential elements of a triple-axis spectrometer follows. Suitable monochromator crystals for obtaining intense beams, within a narrow range of energy, well-collimated, and filtered free of higher energy neutrons, and their treatment to improve the reflectivity are important. The experimental alignment of the three axes is carefully described, and more recent improvements are mentioned.

The finite beam divergences and the mosaic widths of the monochromator analyser crystals lead to a distribution of the scattered intensities around the average values of momentum and energy transfer, Q_0 and ω_0 under measurement in the form of nested ellipsoids in constant energy contours in (ω, Q) space. The peak width is narrow in the focused

condition when the axes of the resolution ellipsoid are suitably aligned with respect to the dispersion surface. The authors describe the determination of the best conditions, in terms of the alignment of the spectrometer, and other factors. Focusing can often make the difference between a measurable peak and a broad background, and the authors describe the calculation of the resolution function, as well as its estimation for different alignments, absolutely essential to optimize peak widths.

As examples, the measurement of the phonons and magnons in copper, iron and antiferromagnetic MnF_2 is described with care, practically *ab initio*. The presence of spurious peaks, unrelated to intrinsic scattering phenomena, is an occupational hazard of triple-axis spectrometry. For years, the legendary notebooks at Brookhaven were reported to contain information concerning the identification and avoidance of these 'spurious', and these considerations are now available in the next chapter. They may be due to accidental Bragg scattering, sample environment, and other factors. Their detection and elimination are described with care.

The advantages of the triple-axis spectrometer in the study of elastic scattering are detailed in the next chapter. A reduction of the signal-to-noise ratio, and the elimination of double Bragg scattering, crucial to an understanding of the structural phase transitions associated with a soft-mode in strontium titanate and Nb_3Sn , as well as in the magnetic transitions in ilmenite and magnetite are discussed in this context.

The last chapter deals with the use of polarized neutrons in triple-axis spectrometry. After a short discussion of the flipping method for the determination of the magnetic form factor and spin density in ferromagnetic materials, an outline of the pioneering experiments on polarization analysis using a TAS, by Moon, Riste and Koehler is described, as well as later experiments on paramagnetic scattering. The small moments induced in paramagnetic metals by an external field can often be measured, using a double-axis spectrometer¹. A useful appendix on cross-sections and one on the resolution function are included.

The monograph is well-produced with a large, agreeable font, and is likely to become a book of constant reference to

condensed matter physicists, especially when a lower-priced, paper-back edition becomes available.

1. (a) Radhakrishna, P. and Brown, P., *J. Phys. F.*, 1980, **10**, 489; (b) *Physica B*, 1983, **120**, 216.

RADHA KRISHNA

225, Mt. Hamilton Avenue,
Los Altos, CA 94022, USA
e-mail: drradhak@vsnl.com

Tourism, Biodiversity and Information. F. di Castri and V. Balaji (eds). Backhuys Publishers, PO Box 321, A. H. Leiden, The Netherlands. 2002. 501 pp. Price: not mentioned.

Among the various services that nature offers human society, its rich splendour, that can only be watched and felt, has for ages drawn people closer to it. Human beings seem compelled from within to seek this one of nature's services. While this service is available almost free and at the doorstep to the native, most people have to spend time and money travelling far and wide to experience it. Tourism, be it nature trails, nature walks or ecotourism, has capitalized the inner drive in every human being to experience nature and its biodiversity. It is thus emerging as a major industry, holding promises for the uplift of many a natural and biodiversity-rich country's economy.

Close on the heels of tourism is information technology (IT), promising a lot of avenues for the improvement of human society. IT is often being projected as the prime tool in the conservation of biodiversity – an agent that promotes amongst other things, 'knowledge-based tourism'. The book under review discusses exactly this and in its words 'attempts to analyse, and put in perspective, the adaptation of tourism – as the economic sector most dependent on and largely affecting biological and cultural diversity – to the new conditions characterizing post-industrial transition. This transition has been predominantly marked by a new upsurge of globalization – the most widespread one in the history of

humankind – and by the rapid emergence of a new society, the *information society*'. What is thus central to the book is that in the post-industrial transition (characterized by free-markets, private investments and high mobility), human resources, culture and knowledge as well as ecological services should be the backbone of development, and that tourism needs to be mainstreamed into the development process. The book also premises that deprivation is largely a reflection of lack of access to information.

The book is an outcome of an international symposium organized in September 2000 at Port-Cros, a Mediterranean Island. The Port-Cros Symposium was launched by the TotalFinaElf – a Corporate Foundation for Biodiversity and the Sea. The papers presented and discussed during this symposium are edited under seven sections, including an epilogue, and 28 chapters. Additionally, the book has a Foreword, Prologue and Preface that very lucidly introduce the scope of the book.

Despite the broad title of the book, the contents largely reflect the status of biodiversity and how tourism might affect and be affected by it in coastal areas and islands. Throughout the book, the different authors repeatedly draw attention to the adverse side effects and dangers of tourism, including erosion of indigenous knowledge. Apprehensions about the negative impact that the tourism industry could specifically have on local communities are addressed in chapter 2. In elaborating guiding principles that would ensure sustainable tourism, the possibility of 'ill-planned' tourism causing further inequality of wealth and power, changing gender relations and conflicts within communities is also discussed. The positive aspects of 'well-planned' tourism discussed are merely possibilities with little hard evidence. Even chapter 21 titled 'Information technologies and grassroots tourism: Protecting native cultures and biodiversity in a global world' is largely theoretical.

A global education programme is suggested as one means of addressing the negative impact. And herein lies the inherent contradiction – if large, pristine areas have been preserved due to the conservation culture of local rural or tribal communities, what information or education programmes are we envisaging for them? Empowerment, decentraliza-

tion, involvement of all stakeholders in the planning processes are other strategies that are proposed as possible means to minimize negative impacts. But as it emerges in all the case studies, ecological systems seem far less complex to manage than social systems!

Tourism can provide for biodiversity conservation. IT can enhance the quality of tourism. Yet how exactly the three can be integrated has not been brought out with even one concrete example. Whereas we are not qualified to analyse the situation in nature preserves in other parts of the world where tourism is popular, we can discuss the Gulf of Mannar scenario discussed in the book. Linking eco-tourism and biodiversity conservation in the Biosphere Reserve with pilgrimage is adding just another murky dimension. The case of extensive habitat loss due to the annual pilgrimage to Sabarimala and the selective removal of macaques in Tirumala – Tirupati to make the area 'conducive' to visitors, for instance, do not readily encourage adding one more dimension to the already complex issue that is discussed in the book.

Ethnic strife in Sri Lanka, had, at least for a while, heavily interfered with pilgrimage (and tourism) in the Gulf of Mannar area. Here, the role that information played has proved negative to the tourism industry. Moreover, much before the Gulf was declared a National Park and Biosphere Reserve, many were aware of its rich biodiversity – the much-cited 3600 species! This attracted tourists of a different kind – students of biology, on specimen collection tours, who swarmed the area year after year. These students were all 'well informed' and they kept the information alive over the years! Is there any information on the impact these study tours had on the 3600 species that might be used to educate the future generations?

And although not in the main body of the text, the prologue does try to drive in the oft-cited dictum of Mahatma Gandhi: 'Nature provides for everybody's needs, but not for everyone's greed'. The line between need and greed is relative. In strict ecological terms, need could mean something like migration in birds and other animals. Tourism, however, unduly imposes one more dimension of human pressure on the earth's resources.

The complexities of ecosystems and biodiversity are far less understood for us to suggest avenues that lead to their con-

servation, particularly when there is little hard evidence. While the many approaches, statements and results developed and shown in this book seem to sound a positive note, at least in principle, tourism per se, as the closing section of the book admits, should be a driving force behind cultural exchange and understanding among different cultures and identities. This book is a good beginning. But there is still a long way to go.

R. J. RANJIT DANIELS*
JAYSHREE VENCATESAN

'Care Earth',
No. 5, 21st Street,
Thillaiganganagar,
Chennai 600 061, India
*For correspondence.
e-mail: careearth@usa.net

Biophysics. Vasantha Pattabhi and N. Gautham. Narosa Publishing House, 22 Daryaganj, Delhi Medical Association Road, New Delhi 110 002. 2002. 253 pp. Price: Rs 295.

Writing a text book is an onerous job which if done well can mould the professional characters of budding students for whom a good teacher in the classroom and a good text book outside can become captivating experiences. Such a milieu can nurture wholesome students who are creative, critical, methodical and decisive. This book written by Vasantha Pattabhi and N. Gautham is the distillate of the teaching experiences of two eminent professors of Biophysics. The book is meant to address the biophysical needs of students of biochemistry, molecular biology and medicine. Beginning with the laws of physics and chemistry, the book making a journey through separation techniques, physico-chemical techniques to study biomolecules, spectroscopy, Light and electron microscopy, X-ray crystallography, NMR spectroscopy, molecular modelling, Macromolecular structure, energy pathways in biology, Biomechanics and Neurobiophysics, concludes with a chapter on the origin and evolution of life.

My journey through the book has been a mixed experience. At first glance it appeared to be a pleasant book. I derived inspiration from a description of the