

Bookshelf

Particle Accelerators: From Big Bang Physics to Hadron Therapy

By Ugo Amaldi

Springer

Paperback: £19.99 €36.01 \$34.99

E-book: £14.99 €29.74 \$19.99

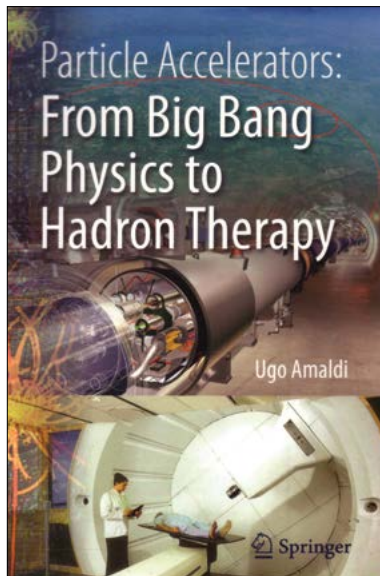
Also available at the CERN bookshop

There was a time when books on particle physics for the non-expert were a rarity; not quite as rare as Higgs bosons, but certainly as rare as heavy quarks. Then, rather as the “November revolution” of 1974 heralded in the new era of charm, beauty and top, so the construction of the LHC became the harbinger of a wealth of “popular” books on particle physics, and the quest to find the final piece of the Standard Model and what lies beyond. These books can be excellent in what they set out to do, but few venture where Ugo Amaldi goes – to look at the basic tools that have made this whole adventure possible, and in particular, the accelerators and their builders. Without the cyclotron and its descendants, there would be no Standard Model, no CERN, no LHC. Nor would there be the applications, particularly in medicine, which Amaldi himself has done so much to bring about.

As the son of Edoardo Amaldi, one of CERN’s “founding fathers”, Ugo Amaldi must have the history of particle physics in his bones, and he writes with feeling about the development of particle accelerators, introducing each chapter with personal touches – photos of roads at CERN named after important protagonists, anecdotes of his personal experience, quotes from people he admires. There is a passion here that makes the book interesting even for those who already know the basic story. Indeed, while particle physicists may not be the main audience the author had in mind, they can still learn from many chapters, “speed-reading” the parts they are familiar with, then dwelling on some of the historical gems – such as the rather sad story of the co-inventor of strong focusing, Nick Christofilos, about whom I had previously known little beyond his being Greek and a lift engineer.

For the non-expert, the book has much to absorb, the result of containing quite a thorough mini-introduction to the Standard Model and beyond – the author’s inner particle physicist could clearly not resist. Yet it is worth persevering and reaching the chapters on “accelerators that care”, to use Amaldi’s phrase, to discover the medical applications of the 21st century.

So, this is a book for everyone, and in



particular, I believe, for young people. Books like this inspired my studies, and I would like to think that Amaldi will inspire others with his passion for physics.

● Christine Sutton, CERN.

Birds and Frogs: Selected Papers, 1990–2014

By Freeman J Dyson

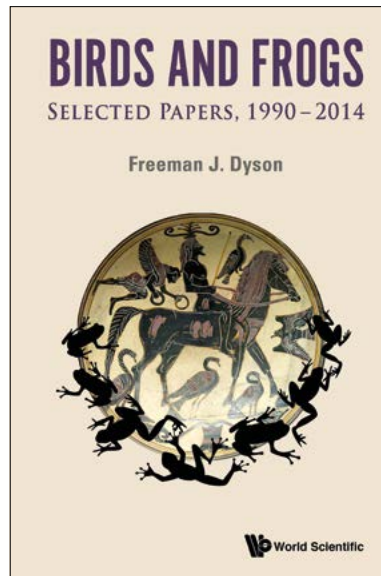
World Scientific

Hardback: £38

Paperback: £18

Birds and Frogs is a wonderful collection of essays and papers by Freeman Dyson from 1990 to 2014, and a sequel to a volume of earlier papers. It consists of a short introductory section followed by four more: “Talks about Science”, “Memoirs”, “Politics and History” and “Technical Papers”.

The book takes its title from one of the “Talks about Science”, in which Dyson classifies mathematicians – and, I would add, physicists – as either “birds” or “frogs”. He writes: “Birds fly high in the air and survey broad vistas of mathematics out to the far horizon. They delight in concepts that unify our thinking and bring together diverse problems from different parts of the landscape. Frogs live in the mud below and see only the flowers that grow nearby. They delight in the details of particular objects, and they solve problems one at a time. I happen to be a frog, but many of my best friends are birds.” This section contains a wealth of fascinating thoughts on,



for example, the origins of life, resistance to new ideas in physics, and the nature of computation in the human brain.

Despite his claim to be a frog, much of the book is written with a bird’s-eye view. Dyson is perhaps uniquely placed among living scientists in having been privy to much that went on in the early days of quantum field theory, and to have met and be able to write about personal experiences with many of our modern-day heroes. In the “Memoirs” section, and elsewhere, he offers insights not only into their work, but also their lives and beliefs.

“Politics and History” ranges from science and religion to ethics, and education from the points of view of Tolstoy and Napoleon. His recollections and observations about the Second World War are as unique as they are fascinating. Ultimately, he shares spectacular and optimistic visions for our future as a species that can spread life throughout the universe.

It is the section on “Technical Papers” that shows Dyson the frog. Here, number theory, bounds on variation of the fine structure constant, detectability of gravitons and game theory all appear.

Whether you’re a frog or a bird or neither – Dyson has a penchant for classifying things into a small number of categories, often just two – you are certain to find much to delight you in this eclectic and yet somehow unified collection.

● John Swain, Northeastern University.

Bookshelf

Books received

Cosmic Ray Origin: Beyond the Standard Models

By Omar Tibolla et al. (eds)

Elsevier

Nuclear Physics B (Proc. Suppl.) 256–257 (2014)

Where do cosmic rays, discovered more than a century ago, come from? The standard model of their origin points to natural particle accelerators in the form of shock waves in supernova remnants, but there is mounting experimental evidence that there are other sources. This conference brought together a range of experts to examine the evidence and to consider some of the key questions. What other sources might there be in the Galaxy? What causes the knee? Where (in energy) is the transition to an extragalactic component? What extragalactic sources are conceivable?

International Seminars on Nuclear War and Planetary Emergencies 46th Session: The Role of Science in the Third Millennium

By A Zichichi and R Ragani (eds)

World Scientific

Hardback: £98

E-book: £74



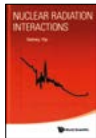
The 46th Session of the International Seminars on Nuclear War and Planetary Emergencies, held in Erice, Sicily, gathered again, in 2013, more than 100 scientists from 43 countries. This is the latest output from an interdisciplinary effort that has been going on for the past 32 years, to examine and analyse planetary problems that are followed up, throughout the year, by the World Federation of Scientists' Permanent Monitoring Panels.

Nuclear Radiation Interactions

By Sidney Yip

World Scientific

Hardback: £49



Based on a first-year graduate-level course that the author taught in the Department of Nuclear Science and Engineering at MIT, this book differs from traditional nuclear-physics texts for a nuclear-engineering curriculum by emphasizing the understanding of nuclear radiations and their interactions with

matter. In generating nuclear radiations and using them for beneficial purposes, scientists and engineers must understand the properties of the radiations and how they interact with their surroundings. Hence, radiation interaction is the essence of this book.

High Gradient Accelerating Structure

By W Gai (ed.)

World Scientific

Hardback: £65

E-book: £49



This proceedings volume, for the symposium in honour of Juwen Wang's 70th anniversary, is dedicated to his many important achievements in the field of accelerator physics. Wang has been a key member of SLAC for many years, working on accelerating structures for linear colliders, up to and including the CLIC project at CERN, as well as the Linac Coherent Light Source at SLAC. The book includes discussions of recent advances and challenging problems by experts in the field of high-gradient accelerating structures.

Progress of Theoretical and Experimental Physics

Progress of Theoretical and Experimental Physics (PTEP) is a fully open access online journal.

Formerly entitled *Progress of Theoretical Physics*, the journal has now received its 2014 Impact Factor:

- Impact Factor 2.485*
- Ranked 16 out of 78 journals in Physics, Multidisciplinary

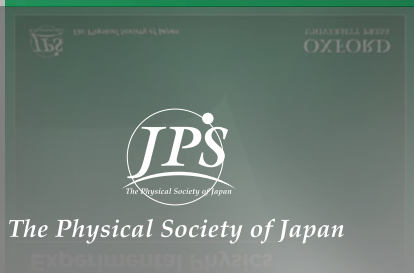
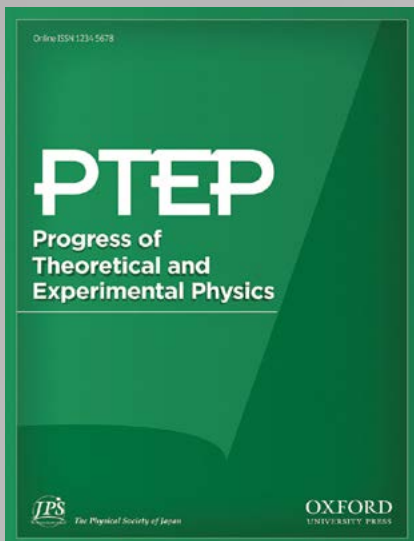
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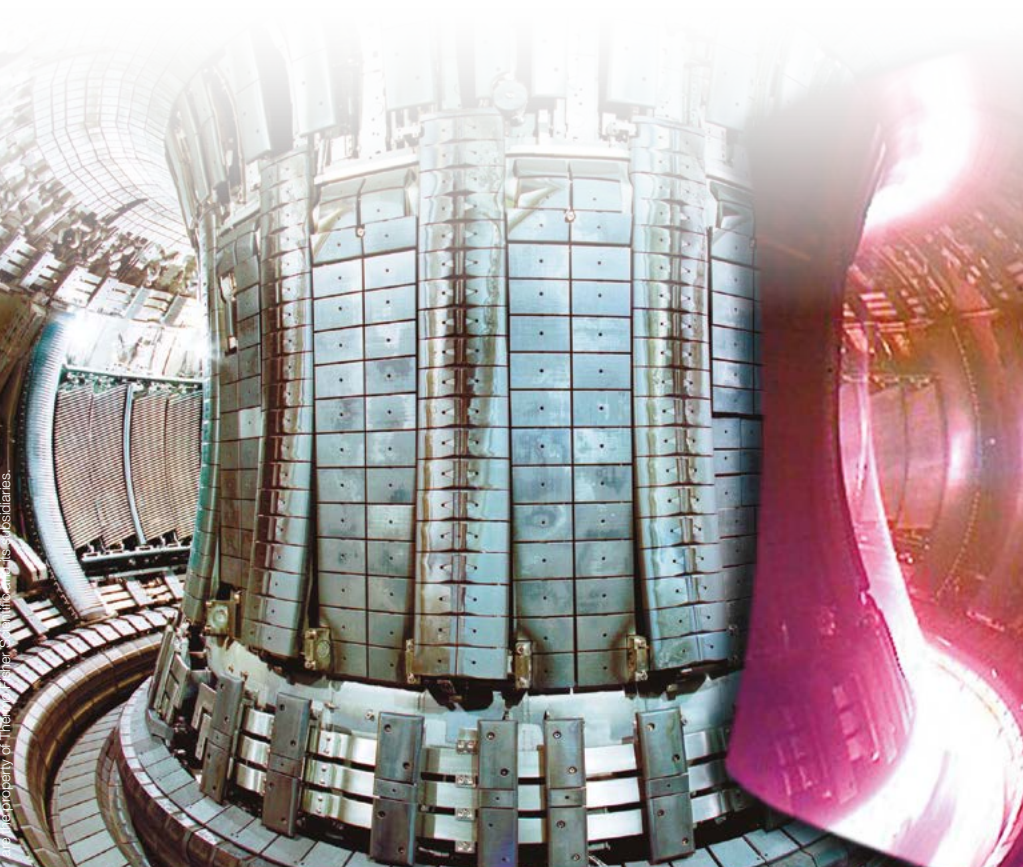
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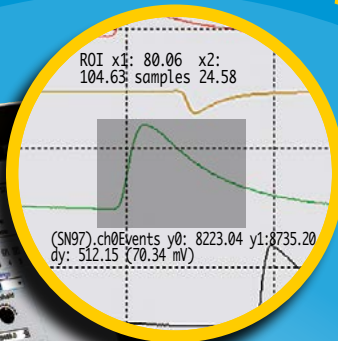
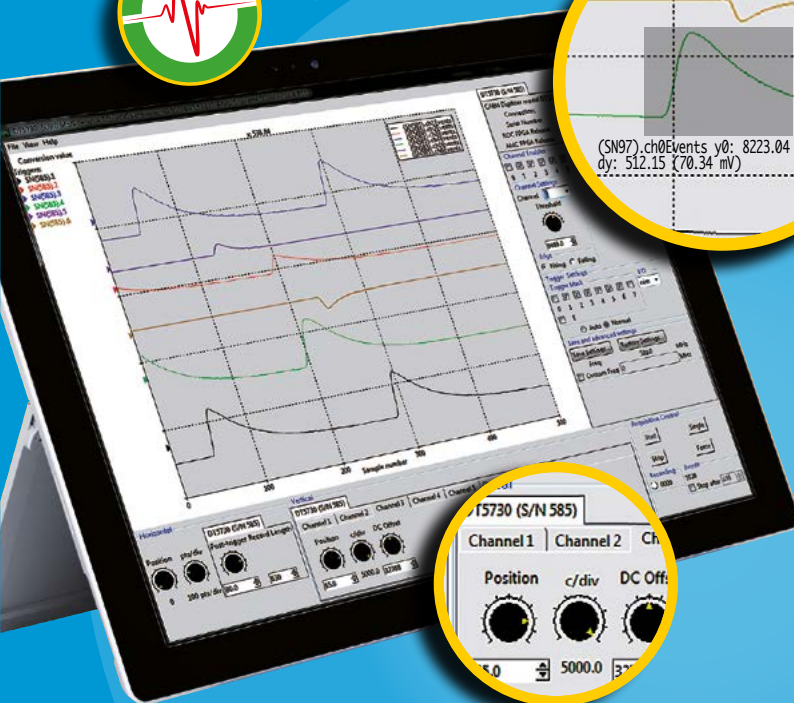
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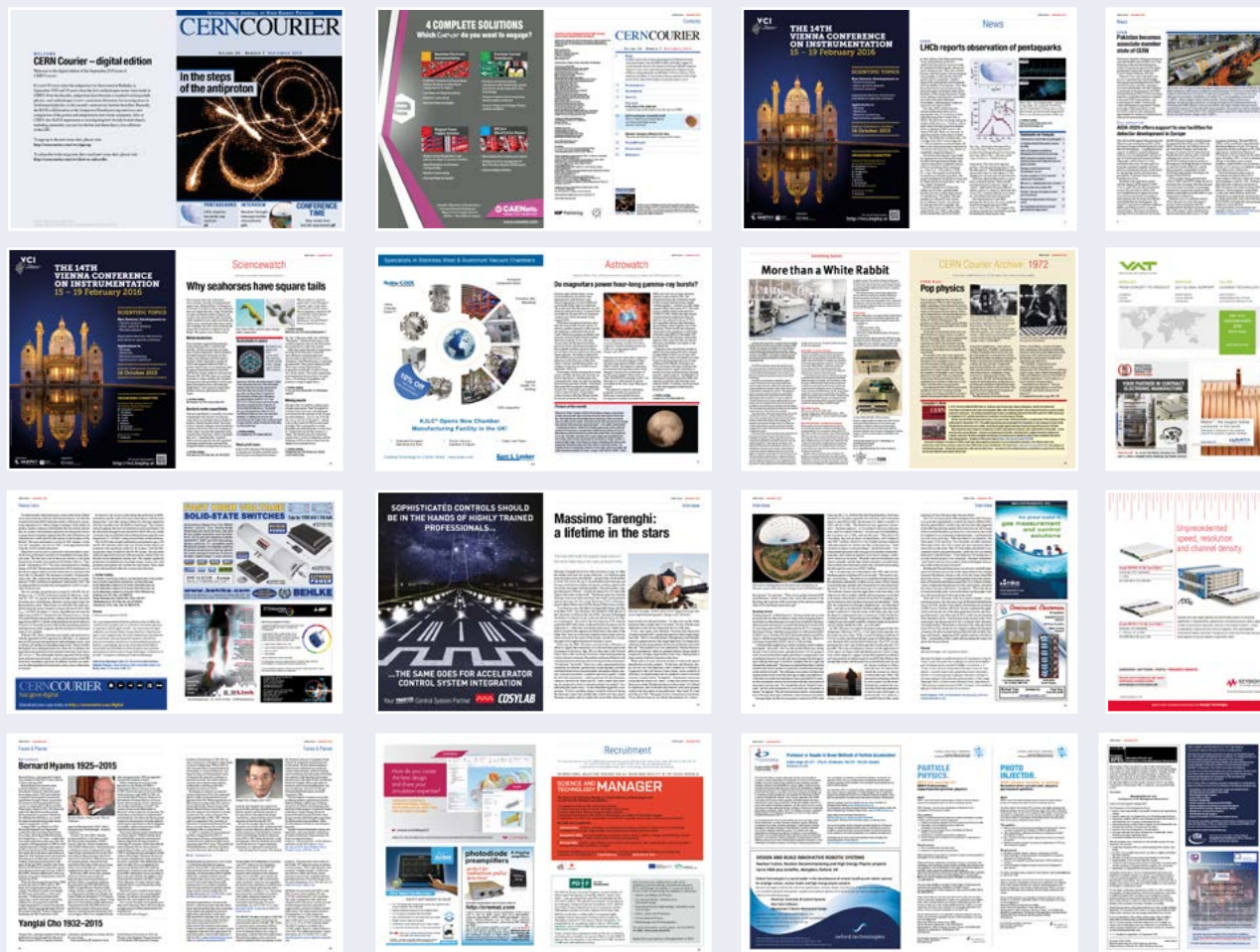
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Digitizer products are sold separately.





CERN COURIER

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WELCOME

CERN Courier – digital edition

Welcome to the digital edition of the September 2015 issue of *CERN Courier*.

It is now 60 years since the antiproton was discovered at Berkeley in September 1955 and 20 years since the first antihydrogen atoms were made at CERN. Over the decades, antiprotons have become a standard tool in particle physics, and antihydrogen is now a miniature laboratory for investigations in fundamental physics, as this month's anniversary feature describes. Recently, the BASE collaboration at the Antiproton Decelerator reported on a new comparison of the proton and antiproton to test a basic symmetry. Also at CERN, the ALICE experiment is investigating how loosely bound objects, including antinuclei, can survive the hot and dense heavy-ion collisions at the LHC.

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