

Bookshelf

Summer Bookshelf

Summer is the season of conferences for physicists with holidays squeezed in where possible. For those with time for reading something other than drafts of their latest papers and preprints with new results, this Bookshelf features a few books for more relaxed reading – or for recommending to family and friends while the hard work continues.

The Particle at the End of the Universe

By Sean Carroll

Oneworld

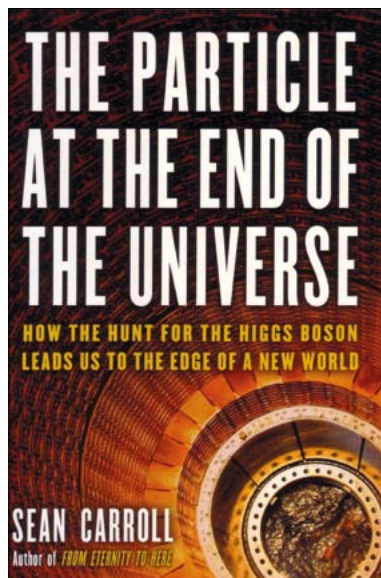
Hardback: £16.99

Paperback: £9.99

In his latest book, Sean Carroll, author of the brilliant *From Eternity to Here*, has produced an accessible read aimed at the layperson interested in an up-to-date account of the state of particle physics and, in particular, the discovery of the Higgs boson. Carroll is well placed to offer the reader an in-depth view of the world of particle physics, being close enough to give a personal account yet maintaining the perspective of an onlooker. As a result he is a superb advocate of the case for “Big Science”, which he demonstrates to full effect in both the opening and closing chapters of the book, beginning with several snapshots of physicists celebrating the milestones that led up to the announcement of the major discovery at CERN on 4 July 2012.

By interweaving the scientific concepts with chapters on historical, social and political aspects of particle physics, Carroll dilutes the hard bits with human interest, appealing to the widest possible audience. He conveys the central importance of the Higgs discovery before going into the theory in any detail, so that we get an idea of what the fuss is about. He explains that the particle at the end of the universe is not a reference to the Higgs boson's location in space or time but rather its location in our understanding, as the final piece of the Standard Model. This marks the end of the journey to describe our everyday surroundings and the beginning of a new era of full discovery. The theme is developed further when Carroll gets into his stride with dark matter, supersymmetry and string theory, demonstrating how the Higgs particle can act as a portal for exploring as yet unreachable phenomena.

True to the headline-grabbing comments of intrigue and drama in high-energy physics on the cover, the book recounts

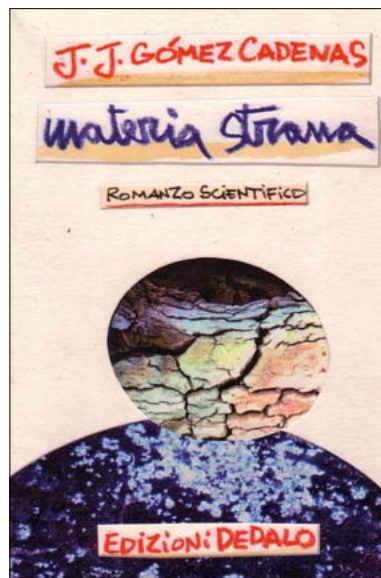


the chequered history of accelerators: the engineering challenges and the agonies of having your machine switched off when a major discovery could be just around the corner; or the frustrations of not getting the machine built at all, as with the Superconducting Super Collider. In this way, the account does justice to the magnitude and achievements of the LHC and its experiments.

What is meant by the “discovery” of a particle is also explained clearly, together with the issues concerning the timing and control of such announcements, especially given the high level of public interest. Concerning the difficulties of apportioning credit, Carroll proposes that scientific collaborations should be allowed to win the Nobel prize and that “Whoever gets that rule change implemented might deserve the Nobel Peace Prize”.

A couple of errors should be mentioned: the Higgs boson is repeatedly credited with distinguishing the electron from the neutrino and the up quark from the down, etc. The important qualification that this statement holds true only for the left-handed components of these particles is mentioned only latterly. Also, there is an unfortunate sign error in the diagram of Fleming's left-hand rule – not a big deal in itself but enough to undermine confidence in the book for some readers, perhaps giving the impression that it has been rushed into print.

With this book Carroll consolidates



his position as an exceptionally talented writer of difficult physics concepts for the layperson. He weaves together fascinating facts, amusing anecdotes and insightful analogies. In storyteller style, with colourful characters and thrilling plots, he propels the reader along the journey that particle physics has made in our lifetime. The layperson can empathize with the emotional highs and lows of research, the patience and tenacity required to bring a project like the LHC to completion and the laudable level of co-operation that the particle-physics community demonstrates to other large and complex organizations – to quote: “If only the United Nations could work like CERN, the world would be a better place.”

● Theresa Harrison, Ilmington.

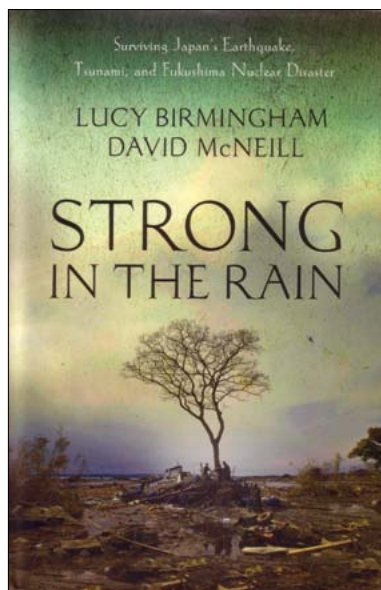
Materia Strana (Strange Matter)

By J.J. Gómez Cadenas, translated from the original *Materia Extraña*, published by Espasa Calpe

Edizioni Dedalo

Paperback: €16

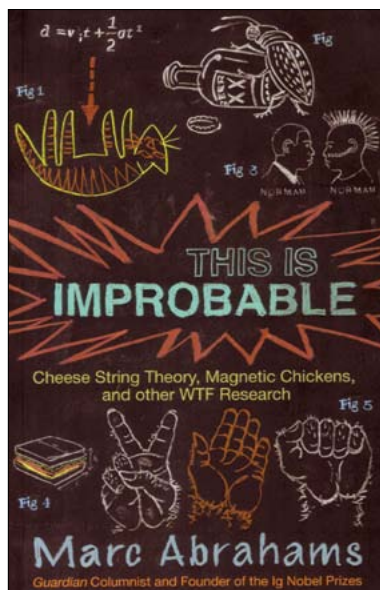
CERN has attracted the attention of a number of writers as a stage for their thrillers and in most cases they have been assisted on the scientific background by friends or by interviews with key CERN scientists. In Dan Brown's *Angels & Demons*, CERN's science portfolio was an excuse for writing a science-fiction novel in which special effects overshadow reality to create shocking situations. Bruno Arpaia's *L'Energia del Vuoto* (*Vacuum's Energy*)



was more respectful of CERN's science, providing detailed scientific descriptions but with the risk of breaking the rhythm of the novel (*CERN Courier* December 2011 p59). By contrast, JJ Gómez Cadenas has been gifted with a rare combination of talents: he is a good writer and a professional particle physicist (*CERN Courier* March 2013 p23). As a result, *Materia Strana* is a powerful thriller based on an almost realistic scientific case that fits well with an engaging narration.

The possible existence of stable strange matter in the universe was put forward by Edward Witten and independently by Álvaro De Rújula and Sheldon Glashow in 1984. Some neutron stars could, indeed, be strange stars. The possibility that high-energy ion-ion collisions could create chunks of strange matter that would have a tendency to grow exponentially in size was debated when the Relativistic Heavy-Ion Collider started operating in the US. The probability of this happening has been calculated to be negligibly low but in *Materia Strana* it is assumed to be much higher – dangerously high for a high-luminosity, ion-ion LHC at CERN.

This is the main theme around which a truly international thriller develops involving Irene, the gifted young theoretician with Iranian roots and Héctor, an amazing experimental physicist from the US with multiple backgrounds as a boxer, soldier and scientist, who becomes involved in a highly dangerous mission in Iran – as well as with Irene. There is also Friedrich,



the powerful but unscrupulous head of the large experiment that is likely to bring him the Nobel prize; Helena, the hyper-efficient, fighting and bright director-general of CERN; and Boiko, a natural-born killer, who escaped to Geneva from the horrors of Chernobyl and Grozny. The deadly fight between Hector and Boiko has the intensity of the pages of Khaled Hosseini's *The Kite Runner*. Intermixed with dreams and ghosts crossing the border between life and death, these stories provide the texture for a decent thriller where good wins eventually over evil, although with a heavy toll.

● Roberto Battiston, University of Trento.

Strong in the Rain

By Lucy Birmingham and David McNeill

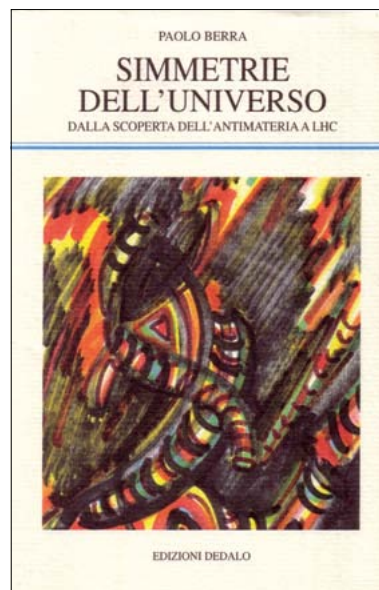
Palgrave Macmillan

Hardback: £17.99 \$27.00

E-book: \$12.99

Some dates will remain in the public consciousness forever, given their cultural impact. Personally, these would include 11 September 2001 (the attacks on the twin towers in New York), 7 July 2005 (the London Underground bombings) and 11 November (Armistice Day, commemorating the end of the First World War).

On 11 March 2011 the Tōhoku earthquake occurred approximately 70 km off the coast of Japan. It was the most powerful earthquake ever to hit Japan and the fifth most powerful to be recorded since records began in 1900. The earthquake triggered powerful tsunami waves that reached heights of up to 40 m. The Japanese National



Police Agency subsequently confirmed 15,883 deaths, ensuring that this date will live long in the Japanese cultural memory.

Strong in the Rain brings together six stories from people affected by the tragic events associated with the earthquake/tsunami on 11 March. The book is described as “part history, part science” and the authors use the experiences of the six people in the book, in addition to their own, to paint a tale of heroes and villains.

The book gets off to a slow start but the reading becomes gripping once the stories move on to the tales of the six central protagonists. It delves into the Japanese cultural strengths and weaknesses in equal measure, from the lack of information provided regarding the nuclear meltdown at the Fukushima Daiichi to the best qualities of the Japanese spirit and character, which are embodied in the town mayor who changes press coverage of the nuclear meltdown with a heartfelt plea uploaded to YouTube.

Living somewhere like the UK it is hard to picture the epic scale of this disaster but the authors weave between the stories of the protagonists to make you feel like you were there. The book manages to be both heart-breaking and uplifting in equal measure and the title *Strong in the Rain* – taken from a famous Japanese poem – becomes an apt description of the events that unfold.

Some books portraying historical events have the potential to become dated but I believe that *Strong in the Rain* will stand

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up well to the test of time. This is mainly because of the human stories within the book that leave you questioning how you might have behaved under similar stress. What would you leave and who would you save? What does it take to be a hero? It also leaves you thinking how important learning from the past is to save us all in the future. I would heartily recommend this book and will be lending it to all of my friends.

● Steve Pritchard, *University of the West of England*.

This is Improbable: Cheese String Theory, Magnetic Chickens and other WTF Research

By Marc Abrahams

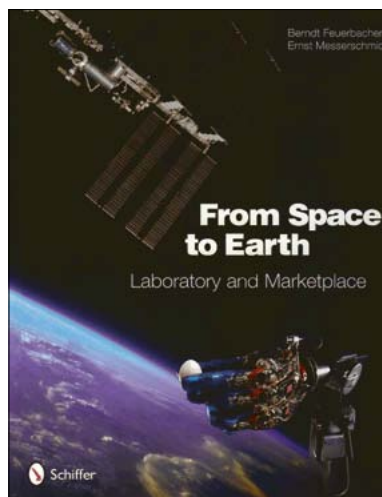
Oneworld

Paperback: £8.99

Anyone from CERN who attended the *Ig Nobel* show in Geneva in May, or goes to the real Ig Nobel Awards ceremony in Cambridge, Massachusetts, every autumn will know why they should acquire this book. For those who did not and do not, Marc Abrahams is the editor of the *Annals of Improbable Research* and the founder of the Ig Nobel Awards. He is also a columnist for the *Guardian* and here I declare an interest: he is a friend and this book is a collection of his *Guardian* columns. But even if I did not have an interest to declare, I would say the same thing about this rich assembly of risible research.

If you want to know more about the air-conditioning capacity of the human nose (a paper published in the *Annals of Biomedical Engineering*) or why European washing machines tend to walk across the room (*Journal of Sound and Vibration*) or why an 18th century Bishop of Durham is survived by his rectum (no longer attached to the bishop, it is pickled in a jar at the Hunterian Museum of the Royal College of Surgeons in London), then this is the book for you. You can also learn about the effect of mobile phones on sexual behaviour in rabbits; medical uses for tea bags; and the effect of garlic bread on family interaction.

In 2002 doctors in Bristol warned in the *BMJ* that just watching sport could be a health hazard: "Risk of admission for acute myocardial infarction increased by 25% on 30 June 1998 [the day England lost to Argentina in a penalty shoot-out] and the following two days." A team in Lausanne reported in the *International Journal of Cardiology* that sudden cardiac deaths were up 63% during the World Cup, compared with an equivalent period a year earlier when there was no World Cup. These things balance out: in the journal *Heart*, two French doctors wrote a paper entitled "Lower Myocardial Infarction Mortality in French



Men the Day France Won the 1998 World Cup of Football." This is a healthy helping of scholarship served with a light heart.

● Tim Radford, *science editor of the Guardian until 2005*.

Simmetrie dell'universo: Dalla scoperta dell'antimateria a LHC

By Paolo Berra

Edizioni Dedalo

Paperback: €16

Paolo Berra is a nuclear engineer who worked for many years at CERN before going on to do an MBA at Harvard. His background and education are so diverse that it was difficult to know what to expect from his book for the general public about the symmetries of the universe. However, I think that the result of this "experiment" turns out to be a success.

The book starts with a general introduction to the physics of the 20th century: Paul Dirac, Erwin Schrödinger, Albert Einstein and the theories that revolutionized our vision of the universe. The author then goes on to talk about the Standard Model, Richard Feynman, symmetries, unification theories, black holes and other mysteries that the universe is still hiding from researchers. This journey through the history of science and its leading figures ends with part three of the book. The fourth and last part breaks with the narrative as the author focuses on the machines that are necessary to explore what he calls "Big Science".

I liked the first three parts a great deal. The language is clear and the logical links between various historical periods and scientific findings across the years are emphasized, making the reading

particularly interesting. In addition, the author presents difficult theoretical topics in an accessible way that I really appreciated.

The fourth part is where I was expecting the most from the author, as I knew he had worked at CERN to develop machines to be used for hadron-therapy, the medical technique that uses particle accelerators to treat tumours. However, although he is clearly at ease with the topics (there are fewer references to other publications) and the quality of the writing remains high, I thought that he would have had much more to say. My curiosity is therefore not entirely satisfied – which should be interpreted as an invitation to the author to write a second book soon.

● Antonella Del Rosso, *CERN*.

From Space to Earth: Laboratory and Marketplace

By Berndt Feuerbacher and Ernst Messerschmid

Schiffer

Hardback: £32.50 €39.90 \$39.99

If unlocking the subatomic world was a defining aspect of the first half of the 20th century, then the opening up of our neighbourhood in space took on a similar mantle during the second half. With the launch of Sputnik 1 in 1957, the space age began. More than 50 years on, "space" is now part of daily life – think of satellite broadcasting and GPS systems – but it continues to excite.

First published in German as *Vom All in den Alltag* (Motorbuch 2007), *From Space to Earth* charts the achievements of half a century of space flight. It does this not so much in chronological order but in sections on, for example, space in everyday life, exploration of the solar system and the work of astronauts in space. This brings back memories for older readers – from Sputnik-spotting through the first Moon landings to amazing views of Jupiter and Saturn relayed by the *Voyager* spacecraft and incredible landscapes seen through the eyes of Mars rovers.

However, it is the younger generation – the future astronauts, space engineers and scientists – who the authors have firmly in their sights. Highly experienced in space flight and space science, they started out as physics students – Messerschmid was a CERN fellow who became an astronaut (p28 of this issue). So they are well placed to include side texts that explain the physics behind the achievements. For those who want to join in, pages describe what it takes to be an astronaut, while the final chapter looks into the future and the possibility of space colonization – something that the authors see as inevitable, given the technology.

● Christine Sutton, *CERN*.

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WELCOME

CERN Courier – digital edition

Welcome to the digital edition of the July/August 2013 issue of *CERN Courier*.

This “double issue” provides plenty to read during what is for many people the holiday season. The feature articles illustrate well the breadth of modern particle physics – from the Standard Model, which is still being tested in the analysis of data from Fermilab’s Tevatron, to the tantalizing hints of extraterrestrial neutrinos from the IceCube Observatory at the South Pole. A connection of a different kind between space and particle physics emerges in the interview with the astronaut who started his postgraduate life at CERN, while connections between particle physics and everyday life come into focus in the application of particle detectors to the diagnosis of breast cancer. And if this is not enough, take a look at Summer Bookshelf, with its selection of suggestions for more relaxed reading.

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