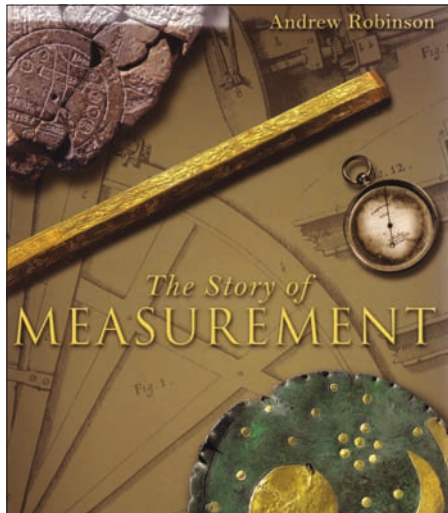


BOOKSHELF



The story of measurement by Andrew Robinson, Thames & Hudson. Hardback ISBN 9780500513675, £13.97 (\$25.51).

Try to imagine civilization without measurement. In addition to length, weight, height, or any of the other obvious scalar quantities that we use in our daily lives, time and language also require standards to make sense. Current quantification includes concepts inconceivable to the earliest humans – gigabytes, body-mass index, radioactivity, and even beam intensity ... Without accurate measurements our society would become chaos. On the other hand, some measurements are far from accurate, but still give a very clear idea of the described quantity: “a scourge of mosquitoes”, “a run of salmon,” or “a handful of children” are all something we can easily visualize.

The story of measurement by Andrew Robinson, former literary editor of *The Times Higher Education Supplement* and the author of the bestselling *The Story of Writing*, consists of a series of chapters that can be read independently; it can also be read from cover to cover. However, by simply leaving the book on your coffee table you can enjoy it in silent moments in small doses every evening – and, I’m willing to wager, most of your guests will do the same, as they wait while coffee is being brewed.

Most people, perhaps with the exception of particle physicists who are used to aiming for “ 5σ detection” while doing their measurements, do not necessarily think about how measurements are going to be interpreted. Or maybe more subtle: who else is clear as to what accuracy means versus

Summer Bookshelf

This year many of the world’s particle physicists will be spending the summer months hard at work on preparations for the LHC’s first collisions. Undoubtedly there will be little time for holidays, but to provide some ideas for more relaxed reading, this Bookshelf reviews a selection of books away from mainstream particle physics.

precision and error versus uncertainty? One chapter has been devoted to this interesting issue, and having originally trained as a survey engineer, this discussion brings back a lot of good memories for me.

The book has received mixed reviews, but it is not obvious which scale has been used for measuring the quality – after all it remains a coffee-table book and should be judged as such. I found it entertaining. Its potential popularity is also well reflected in that it exists in several language editions. *Das Abenteuer der Vermessung* and *La storia della misurazione* are already available in the bookshops. Read it yourself and make your own judgment, while, of course, applying all the rules that have to be taken into account for making a good measurement.

Jens Vigen, CERN.

Il fisico che visse due volte by Fabio Toscano, Sironi Editore. Paperback ISBN 9788851800963, €18.

Il fisico che visse due volte – the physicist who lived twice – is Lev Davidovich Landau, the iconoclastic physicist and 1962 Nobel Laureate. One of the greatest theorists of the Soviet Union, he made significant contributions to almost all fields in physics, from superfluidity to the properties of ferromagnetic bodies, from the absorption of sound in solids to the theory of phase transitions. This biography by Fabio Toscano, an Italian theorist with a broad experience in communicating science, nicely guides the reader through all aspects of this rich scientific production, never neglecting to present it primarily as a human adventure.

The main focus, as I expected, is on Landau’s attitude to physicists and people in general, and thanks to this book I discovered his rather peculiar personality. Unpleasant to most of the people with whom he interacted, he was loved



by some of his colleagues and friends who had a great admiration for his broad knowledge and his courage always to say what he thought, regardless of constraints from politics, society or academic authority. His straight-talking attitude caused serious problems to both his career and his private life (he spent one year in prison) at a time when the Soviet Union was under Stalin’s dictatorship.

In addition to his written contributions and original articles, one of Landau’s main legacies for Russian science is the “Landau school”. To be admitted to the school, students had to pass a comprehensive exam, the “Theoretical Minimum”, designed personally by Landau. As Toscano explains, Landau kept personal contact with all his students until he died in 1968, six years after a car accident that brought him close to death. In the accident “not even the eggs Vera [the driver’s wife] had in her hands broke”, but Landau’s brain suffered from serious injuries that left him in a coma for three months. He never fully recovered, and was afterwards much less creative.

This book certainly shows Landau with all his humanity, even emphasizing some of the scientific traps into which he fell. However, the details about Russia’s history and social situation that the author likes so much sometimes make the reading hard and the focus too distant. When “stuck” in such pages, I was eager to come back to Landau’s real life in Moscow or Baku or Karkhov and

follow him, for example in meeting Bohr and quantum mechanics. Having studied some of the volumes of the *Course of Theoretical Physics* that Landau wrote with Evgeny Lifshitz and other colleagues, I appreciated this biography. Toscano's account is very accurate – even scientific – and describes well Landau's personality, the *raison-d'être* of the book. Antonella Del Rosso, CERN.

Nets, Puzzles and Postmen, an exploration of mathematical connections, by Peter M Higgins, Oxford University Press. Hardback ISBN 97801992184214, £15.99 (\$29.95).

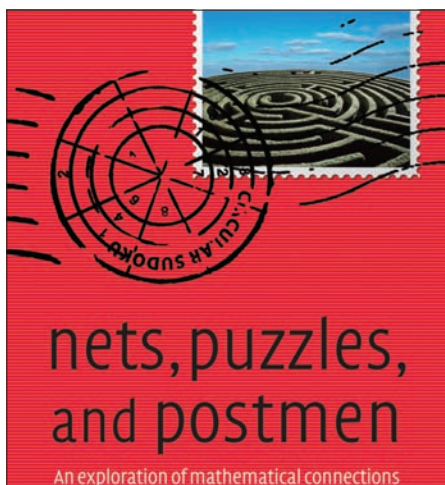
This book, written in "accessible" language, is not an easy read. The author, inventor of Circular Sudoku, purports that the first 200 pages are for readers who have no "familiarity with mathematical ideas and notation" (let's call one of them Hilary), followed by 40 pages for connoisseurs.

Well, Hilary had better be a fast learner. After an introduction to the basic properties of networks, namely nodes and edges, by page seven there are already paths, walks, cycles, circuits, multiple edges, isolated nodes, and more besides. Hilary has no idea why, whether or how much of this has to be absorbed, nor how to fast-forward safely. And so it is throughout the book.

The real show stopper comes on page 150. "One of the greatest unsolved problems in all of mathematics is whether or not $P=NP$. Some say yes, some no, some say they have no idea (Hilary is probably one of these), while still others suspect that the question can never be answered at all". Gosh! After two pages of suspense Hilary is told that P is a class of algorithms operating in polynomial time and two more pages pass before it is revealed that NP does not, as you might expect, mean Not Polynomial but Nondeterministic Polynomial. Oh dear! Is our novice supposed to be familiar with this MIT Clay Institute Millennium Problem carrying its million-dollar prize? I wasn't. Should I really be reviewing this book?

The book flips between "he" and "she", randomly attributing gender to the reader. Or is it random? I began to wonder why the reader, female several pages ago, is now male? This irritating and distracting political correctness is almost always avoidable. What gender is Hilary?

Having said all of that, the book treats a fascinating variety of puzzles and



applications: museum guards, automata, cryptography, instant insanity cubes, one-way traffic systems, dancing partners, critical paths, and more. It is an excellent introductory textbook for would-be pure(ish) mathematicians. I wish it had been available when I was contemplating my choice of career. I shall enjoy it much more the second time around – the book, that is. *Peggie Rimmer, Satigny.*

ATLAS : Le nouveau défi des particules élémentaires par François Vannucci, Éditions Ellipses. Broché ISBN 9782729834432, €7.50.

Ce livre se présente délibérément comme un ouvrage de vulgarisation. Il incarne effectivement un effort réel pour présenter au non-initié une des expériences du LHC, ATLAS. Tout son intérêt est de replacer l'expérience dans plusieurs perspectives, pour certaines assez inhabituelles. Perspective historique, scientifique, mais aussi économique, politique et humaine surtout. ATLAS est notamment présenté comme un outil, certes colossal, unique au monde, mais qui reste une étape dans la quête de connaissance de l'Homme.

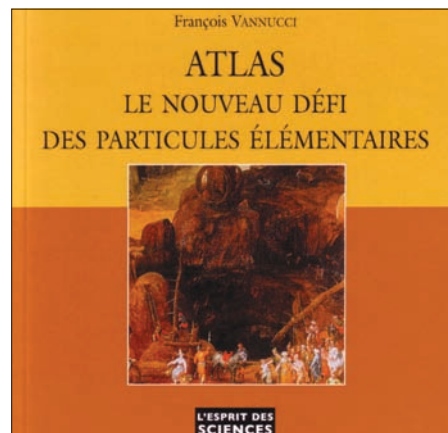
La première partie permet d'embrasser le projet ATLAS dans sa globalité tout en portant un regard original sur lui. L'auteur file une métaphore assez savante tout au long de sa description. Il compare les physiciens travaillant dans la caverne d'ATLAS aux hommes du mythe de la caverne de Platon. Cachés au fond de celle-ci, ils sont aveugles ou presque à la lumière de la connaissance, et ne perçoivent que les ombres de la réalité, ombres qui constituent néanmoins toute

leur réalité, puisqu'ils n'en connaissent pas d'autre! Métaphore savante et habile, qui rejoint élégamment une des tensions propres à la physique des particules; comment, en construisant des machines et en analysant ses résultats avec des programmes élaborés pour trouver un objet attendu, peut-on s'attendre à découvrir quelque chose d'inconnu?

Les analogies sont nombreuses, tant pour parler de la machine elle-même que des physiciens, qui sont par exemple comparés aux compagnons des chantiers de construction des cathédrales médiévales. Des citations de philosophes et d'écrivains, Pascal, Rabelais, Thomas Mann, Céline..., ponctuent régulièrement les propos de François Vannucci et donnent à la physique un éclairage inhabituel. Ces ouvertures vers la philosophie, l'histoire et la littérature sont autant d'appréciables confrontations de la physique avec d'autres sciences, humaines cette fois-ci!

Autre intérêt pour le novice: la collaboration est présentée de l'intérieur, anecdotes à la clef. Elles rendent la physique des particules plus vivante, plus humaine, plus amusante. L'auteur nous donne l'impression d'être dans le secret d'ATLAS, avec entre autres l'évocation du colloque de Stockholm, primordial dans l'histoire d'ATLAS, raconté par le menu. Il évoque aussi la culture de la démocratie présente dans la collaboration.

Si la première partie est très accessible au non-physicien, la deuxième l'est moins. Du point de vue de la vulgarisation, il est dommage que l'effort mené s'essouffle quelque peu dans l'explication de la physique du LHC. On regrette également le peu d'illustration et de schémas qui auraient pu venir en renfort. La richesse de l'écriture



permet quoi qu'il en soit de se frotter au monde de la physique même si un bon niveau de culture générale est requis pour se sentir à l'aise avec ces jeux intellectuels.

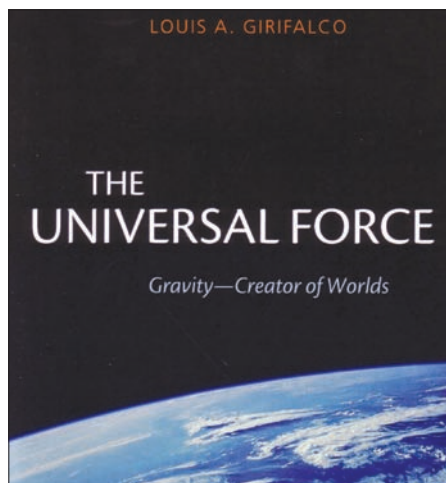
Enfin, l'effort de recul de l'auteur sur ATLAS est appréciable, même s'il ne parle en son propre nom qu'une seule fois à la fin de l'ouvrage, dans une conclusion brillante où l'on comprend indirectement pourquoi une expérience de physique peut évoquer la Tour de Babel (d'ailleurs en couverture) de par sa complexité, les multitudes de compétences nécessaires, la nécessité de trouver un langage commun pour tenter, en construisant un édifice unique et immense, d'approcher les secrets de la création de l'Univers. Pourtant là où la Tour de Babel symbolise l'échec, la prétention et la désorganisation humaines, l'expérience ATLAS et celles du LHC en général peuvent et doivent faire mentir cette vision en montrant ce dont l'humanité est parfois capable.

Juliette Davenne, CERN.

The Universal Force: Gravity – Creator of Worlds by Louis A Girifalco, Oxford University Press. Hardback ISBN 9780199228966, £19.99 (\$49.95).

Four hundred years after Galileo's pioneer measurements on falling bodies, gravity – the “predominant presence of daily existence” – remains enigmatic, according to author Louis Girifalco. The question: “Which falls faster – a kilo of lead or a kilo of feathers?” can still be problematic. He cites personal experience.

Gravity is the mighty brush that painted the landscape of our universe. Girifalco is passionate about science, and it shows. However, his spirited description omits important aspects only recently uncovered. But first the history. The emergence of gravity from the fog of ignorance parallels that of physical science itself. Newton changed our picture of the world, but stood “on the shoulders of giants”. Girifalco explains well how these giants transformed science from abstract philosophy to experimental study, and how gravity brought mathematics, previously the domain of astronomers, down to Earth. He is effusive about the other gravitational heavyweight, Einstein. However, while special relativity is easy to grasp, it is only an overture to gravity. General relativity is more elusive, especially without equations, and some readers might emerge from the book with their relativities confused.



It is in the latter half of the 20th century that Girifalco loses focus. There is no mention of the startling mismatch between the observed motion of galaxies and the amount of visible matter – stars – that they contain. To make everything come out right, galaxies have also to contain invisible “dark matter”. In fact there has to be more of this than anything else; the ultimate gravitational enigma is that we now know how much we do not know.

Classically, gravity is always attractive; it pulls the different parts of the universe together and slows down the Big Bang expansion. However new measurements of supernovae have shown that distant parts of the universe are accelerating away from us. This gravity that pushes rather than pulls – the mysterious “dark energy” – is only mentioned in passing.

If gravity is indeed the “Creator of worlds”, there is little on how this happens. Cosmological inflation and the continual quest to synthesize gravity with quantum field theory are unvisited. Otherwise, Girifalco's passionate book is a good introduction to the ancient history of cosmology, the personalities involved, and the experimental method. There are just two equations. *Gordon Fraser, is author of Cosmic Anger: Abdus Salam, the first Muslim Nobel Scientist (Oxford University Press).*

Das Miniatom-Projekt: Ein Wissenschafts- und Kriminalroman by Richard M Weiner, Verlag Literaturwissenschaft.de. Paperback ISBN 3936134146, €14.90.

“A genius sees what others do not see. So does a madman.” This quote at the beginning of the book sets the scene. Trevor McCallum

is a physicist who discovers that changes in the values of certain natural “constants” could lead to smaller atoms. This evokes not only the interest of fellow scientists but also of various intelligence agencies, who want to keep a close eye on this development. To test his theory, he needs powerful computers – with which he develops an almost schizophrenic love-hate-relationship. One day he is found dead in front of a computer terminal. Is it murder or suicide?

Going back, the reader gets to know the young Trevor: how he grew up, how he became fascinated by physics and especially how from an early age he skirted between genius and madness. Other people are introduced as well – a physicist who visits an institute in Russia, a colleague there who comes to see her several years later in Paris, a German physicist who testifies before a US committee – all of whose tales are interwoven with McCallum's story, directly or indirectly.

The crime story is injected with science and science fiction, love and envy, secrets and secret agents. The author, a well known physicist, knows the locations and the scientific community first-hand and this authenticity can be felt throughout the book. On the other hand, you can tell that this is his first novel and that he is not a linguist. The text sometimes appears convoluted, and the chronology is sometimes not clear.

Nevertheless it is an interesting read, where you learn about chain reactions and chaos along the way. And not only in theory; maybe the detectives would have come to different conclusions if they had initially had other information.

Hannelore Hämmerle, Munich.

