

# Bookshelf

## Innovative Applications and Developments of Micro-Pattern Gaseous Detectors

By Tom Francke and Vladimir Peskov

IGI Global

Hardback: \$215

E-book: \$215

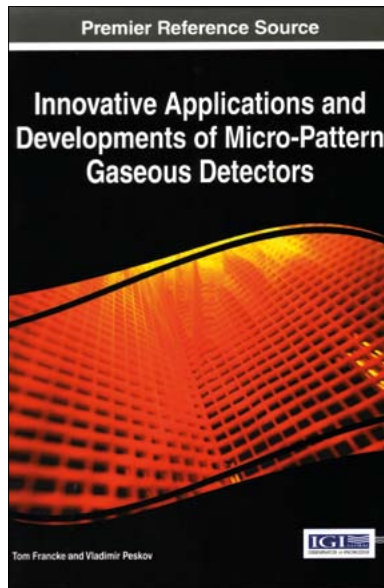
Research in nuclear physics is inconceivable without the Geiger counter. This gas-filled instrument allows both the presence and the energy of ionizing particles and radiation to be measured. It is now 100 years since Hans Geiger designed the arrangement of its electrodes, but this construction is still used in most current gaseous detectors. In this arrangement, the electrons produced by collision and ionization of the gas atoms are multiplied in the electric field around a thin wire, and the resulting avalanche of electrons delivers an easily detectable signal.

It is only recently that other electrode arrangements for gas counters have been proposed and tested. Besides offering improved properties such as higher counting rates, a certain number of prior conceptions of the electron amplification process had to be revised. These new counters are called “micro-pattern gaseous detectors” because the same lithographic technique is used for their production as is employed in the semiconductor industry.

In their book, Francke and Peskov describe the complete historical development of these counters and discuss the properties and special features of each type. Smaller detectors with a sensitive window of up to  $30 \times 30 \text{ cm}^2$  can be built using the lithographic technique exclusively. These are mainly detectors in a hermetically sealed housing filled with high-pressure gas. Detectors of this type are very stable for many years. For example, the detector of the two-axis diffractometer D20 at the Institut Laue–Langevin has been operating for 14 years. Detectors with larger sized windows work at normal gas pressure and with constant gas current. Their electrodes still have to be assembled precisely by hand.

This handbook should allow every research scientist to choose and produce the best detector possible for a specific application. Numerous pictures with descriptions and many diagrams assist in making a good choice, while the detailed bibliography is particularly helpful.

● Anton Oed, who introduced the concept of the micro-strip gas chamber in 1988 – at the Institut Laue–Langevin.



## Portrait of Gunnar Källén: A Physics Shooting Star and Poet of Early Quantum Field Theory

By Cecilia Jarlskog (ed.)

Springer

Hardback: £62.99 €74.89

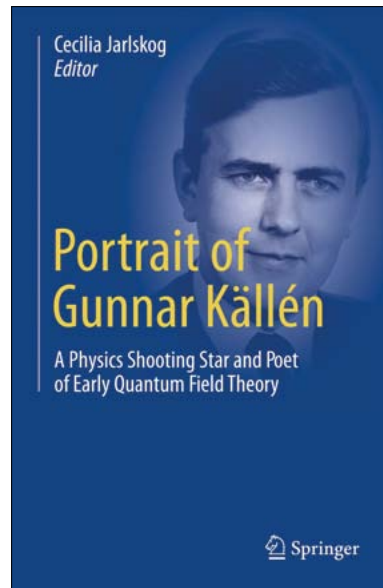
E-book: £49.99 €59.49

This book is extremely interesting. Mainly a collection of testimonies, it helps in understanding the special personality of Gunnar Källén – his kindness and aggressiveness. Cecilia Jarlskog is named as “editor”, but she is more than an editor in having written an informative biography.

Källén worked in the “Group of Theoretical Studies” – one of three groups that were set up as part of the “provisional CERN” in 1952 – which was based in Copenhagen until it was officially closed in 1957. He later became professor at Lund University, and tragically died in 1968 when his plane crashed while he was flying it from Malmö to CERN.

I was impressed by Steve Weinberg’s admiration for Källén – he considers himself a student of Källén, although he was Sam Treiman’s student – as well as by that of James Bjorken and Wolfgang Pauli, who wanted Källén as professor at ETH Zurich. I cannot comment on the fact that it was finally Res Jost who was appointed, because I have the highest esteem for him also.

It is interesting that Pauli disapproved of Källén’s work on the n-point function. It was only long after Pauli’s death that Källén quit



this subject, and took a 90° turn with the writing of his book on elementary particles. It is true that Källén failed, while being critical of Jacques Bros, Henri Epstein and Vladimir Glaser because they were not using invariants. However, Bros–Epstein–Glaser succeeded and proved crossing symmetry, allowing proof of the Froissart bound without dispersion relations, and providing a starting point for the Pomeranchuk theorem.

Because the book is based on testimonies, there is a certain redundancy, in particular about the accident, but this is unavoidable. Overall, Cecilia Jarlskog has done an excellent job. The plane crash was a tragedy, and if he had lived, Källén would certainly have made further important contributions. (His two passengers – his wife Gonella and Matti von Dardel – survived the crash. Matti has told me that her husband Guy von Dardel and Källén were planning a collaboration between a theoretician and an experimentalist. The accident put an end to that.)

● André Martin, CERN.

## Engines of Discovery: A Century of Particle Accelerators. Revised and Expanded Edition

By Andrew Sessler and Edmund Wilson

World Scientific

Hardback: £58

Paperback: £32

E-book: £24

Also available at the CERN bookshop



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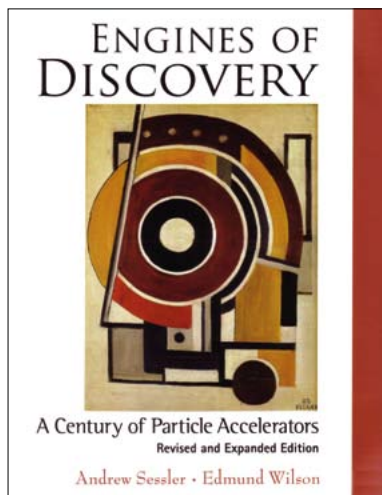
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## Bookshelf



The first edition of *Engines of Discovery* was published seven years ago to wide acclaim (*CERN Courier* September 2007 p63). Since then, particle physics has seen the dramatic start up of the LHC and the subsequent discovery of a Higgs boson – a long-awaited missing piece in the Standard Model of particles and their interactions. At the same time, the field of accelerators has seen further developments to push back frontiers in energy, intensity and brightness, together with growth in the use of accelerators in other areas of science, medicine and industry.

In the revised and expanded edition of their book, Sessler and Wilson have aimed to match this growth, in particular through a number of essentially new chapters. These naturally cover the work that is going into developing new machines for fundamental physics, from high-intensity super-beams and factories for neutrino physics, to future high-energy linear colliders, and back to the low energies of rare-isotope facilities and, lowest of all, the production of antihydrogen. However, most of the new chapters focus on applications beyond the confines of particle and nuclear physics, with dedicated chapters on the use of accelerators in isotope production and cancer therapy, industry, national security, energy and the environment. Here, for example, spallation

neutron sources have been promoted to merit a chapter of their own.

Last, the authors have brought the future and the young more into focus by directing all of the final chapter, rather than only the last paragraph, “mainly to the young”. Sadly, Andrew Sessler – a visionary leader in the field of accelerator science – died earlier this year (see p63 of this issue), but this book will stand as part of his legacy to future generations. It would have appealed greatly to me when I was young, and the hope is that it will inspire budding young scientists and engineers today, for they are the future of the field.

• Christine Sutton, CERN.

### Books received

#### Dark Matter and Cosmic Web Story

By Jaan Einasto

World Scientific

Hardback: £82

E-book: £61



This book describes the contributions that led to a paradigm shift from the point of view of a scientist from behind the “Iron Curtain”.

It describes the problems with the classical view, the attempts to solve them, the difficulties encountered by those solutions, and the conferences where the merits of the new concepts were debated. Amid the science, the story of scientific work in a small country – Estonia – occupied by the Soviet Union, and the tumultuous events that led to its break up, are detailed as well.

#### Strong Coupling Gauge Theories in the LHC Perspective (SCGT12)

By Yasumichi Aoki, Toshihide Maskawa and Koichi Yamawaki (eds)

World Scientific

Hardback: £109

E-book: £82



The proceedings of the KMI-GCOE Workshop held in Nagoya in December 2012 contain contributions that are focused mainly on strong coupling gauge theories and the search for theories beyond the

Standard Model, as well as new aspects in hot and dense QCD. These include many of the latest, important reports on walking technicolour and related subjects in the general context of conformality, discussions of phenomenological implications with the LHC, as well as theoretical implications of lattice studies.

#### Proceedings of the Sixth Meeting on CPT and Lorentz Symmetry

By V Alan Kostelecký (ed.)

World Scientific

Hardback: £76

E-book: £57



The Sixth Meeting on CPT and Lorentz Symmetry held in 2013 focused on tests of these fundamental symmetries and on related theoretical issues, including scenarios for possible violations. Topics covered at the meeting include searches for CPT and Lorentz violations in a range of experiments from atomic, nuclear, and particle decays to high-energy astrophysical observations. Theoretical discussions included physical effects at the level of the Standard Model, general relativity, and beyond, as well as the possible origins and mechanisms for Lorentz and CPT violations.

#### Physics With Trapped Charged Particles

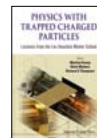
By Martina Knoop, Niels Madsen and Richard C Thompson (eds)

World Scientific

Hardback: £78

Paperback: £36

E-book: £27



This is a collection of articles on physics with trapped charged particles, by speakers at the Les Houches Winter School in January 2012. They cover all types of physics with charged particles, and are aimed at introducing the basic issues as well as the latest developments in the field. Topics range from detection and cooling techniques for trapped ions to antihydrogen formation and quantum information processing with trapped ions. The level is appropriate for PhD students and early career researchers, or interested parties new to the subject.

## Origins Project Postdoctoral Prize Lectureship

This annual \$10,000 international prize will be awarded, beginning in 2015, to an outstanding junior scholar chosen from any field of study relevant to the broad mission of the Origins Project at ASU. Selection will be made among candidates nominated by faculty or senior researchers at their institution, and will be based both on past accomplishment, and future promise, as well as an ability to convey the excitement of their research to a broad audience. The winner will be hosted for one week in the ASU unit closest to their field of study, and will present 3 lectures on their research and one public lecture. In addition to the cash prize, all travel and accommodation expenses will be covered by the Origins Project.

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NOMINATIONS DEADLINE DEC 1, 2014

# LHC

Large Hadron Collider - CERN  
The mission of the most powerful particle accelerator in the world is to uncover some of the mysteries that still shroud the origin, creation and future of the universe, reproducing in the laboratory conditions close to those occurring during the Big Bang.

# RENEWABLE ENERGY

Thermonuclear fusion is one of the few truly sustainable forms of energy for the planet that will probably be available in the mid to long term.

It is a technology that offers the prospect of safe, environment-friendly operation, combined with excellent fuel availability and procurement security.

# MAGNETIC RESONANCE

An imaging technique used mainly in the field of medical diagnosis, based on the physical principle of nuclear magnetic resonance.



# HIGH ENERGY PHYSICS

Conventional and super-conducting magnets are key components in the particle accelerators and detectors that allow us to study collisions and better understand what matter is made of.

# FUSION

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# HADRON THERAPY

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