

BOOKSHELF

Astroparticle Physics by Claus Grupen, Springer. Hardback ISBN 3540253122, €37.40, (£27, \$59.95).

Claus Grupen provides a comprehensive and up-to-date introduction to the main ideas and terminology of the study of elementary particles originating from astrophysical objects. In fact, as is evident from the historical introduction, astroparticle physics reaches beyond elementary particles and includes gamma radiation, X-rays, gravitational waves, and extensions of the current Standard Model.

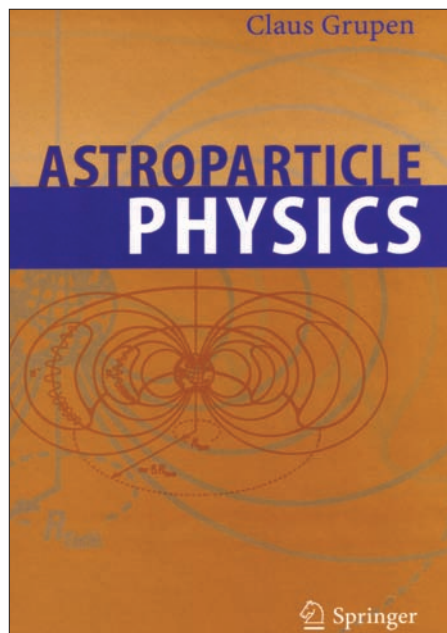
The style and presentation of the material make the book accessible to a broad audience with a basic knowledge of mathematics and physics. A good selection of simple exercises with solutions increases its pedagogical value and makes it suitable as a textbook for an undergraduate course. Non-specialists who want to follow the main issues of current research in the field or to have a general overview before more advanced readings can also benefit from Grupen's book.

A distinguishing feature of the book is the use of relatively simple models directly tied, where possible, to experimental data; these illustrate physical mechanisms or problems without unnecessary details. The main physical motivations for a theory are introduced, its experimental consequences discussed together with the current status of the key parameters and the expected future developments. Both the pedagogical nature and the emphasis on the experimental basis of models are signalled by a chapter dedicated to particle and radiation detectors and, especially, by the many instructive figures and diagrams that illustrate data and their theoretical interpretations.

A good third of the book deals with cosmic rays, our main experimental window on the universe. Grupen presents the astronomy of neutrinos, gammas and X-rays, and discusses and reviews the basic mechanisms for particle acceleration and production, and important topics such as extended atmospheric showers initiated by the highest-energy cosmic rays or gamma-ray bursts. This part constitutes the foundation of astroparticle physics.

The next largest part of the book, about one quarter, is devoted to the thermal history of the early universe, including an extensive description of Big Bang nucleosynthesis.

Introductions to standard cosmology and to basic statistical mechanics are included. In addition there is a concise description of the important information carried by the cosmic



microwave background radiation – in particular, the bearings of the latest measurements of the radiation's angular anisotropy on key cosmological parameters, such as the total energy density, the baryon-to-photon ratio and the Hubble constant.

Before the stimulating overview of some of the open problems and perspectives of the field the author reserves two chapters for inflation and dark matter. These fundamental concepts in modern astrophysics not only answer specific experimental and theoretical questions (rotational curves of galaxies, monopoles, flatness, etc), but raise new ones and stimulate experimental tests.

Marcello Lissia, INFN/Cagliari and University of Cagliari.

A Physicist's Labour in War and Peace: Memoirs 1933–1999 by E Walter Kellermann, Stamford House Publishing. Paperback ISBN 1904985092, £8.99.

The story of the flight of Jewish physicists from the Nazis and their allies in the 1930s is well known, told usually in the context of major players, such as Albert Einstein, or Enrico Fermi. So it is interesting to read of how the events of that time touched someone less well known, but who nevertheless went on to a full and rewarding career in physics. In 1937 Walter Kellermann fled to the UK, where he was to establish his career in physics, in particular in cosmic rays. This book is his story.

After completing his schooling in Berlin,

Kellermann left his native Germany in 1933, as the Nazis were making it impossible for Jews to enter university there. To continue his studies, he went to Austria – not the best choice – where he had relatives in Vienna. University regulations there were flexible and after only four semesters he was accepted as a physics-research student with Karl Przibram. Then with German occupation imminent and a DPhil to his credit, he fled to Britain in October 1937, and with some ingenuity secured work at Edinburgh University under Max Born. It was there that he made an important contribution to solid-state physics, calculating for the first time the phonon spectrum.

With the outbreak of war in 1939, Kellermann found himself interned, like many others, despite his refugee status, and was even sent to Canada on a dangerous voyage, during which the internees were kept in a barbed-wire enclosure. Fortunately, he was soon released, and joined the teaching staff at Southampton University.

After the war, Kellermann moved to join Patrick Blackett's group at Manchester, to work on cosmic rays. This was to become his field for the rest of his academic life, in particular from 1949 onwards at Leeds University. At Leeds, he was one of the main instigators of the extensive air-shower detector array at Haverah Park, the forerunner of major modern projects such as the Pierre Auger Observatory. In the early 1970s his "15 minutes of fame" came when Kellermann's group observed a bump in the hadron energy spectrum in cosmic rays, detected in an innovative hadron calorimeter. This could have been due to a new particle, which the researchers dubbed the Mandela. Sadly, the bump was eventually found to be due to a burned-out connection in the detector's custom-built computer. Soon afterwards, Kellermann reached retirement age, but went on to a second career in science policy in Britain, the subject of the final chapter.

Kellermann's account makes fascinating reading, describing the aspirations and frustrations of a physicist who was not centre stage, but moved among a cast of famous names. These included not only Born and Blackett, but also Klaus Fuchs, best known as a spy. The book also presents a revealing view of the British university system, with some alarming examples of racism, in particular in the 1930s and 1940s when departments were keen to keep down the number of refugees. *Christine Sutton, CERN.*

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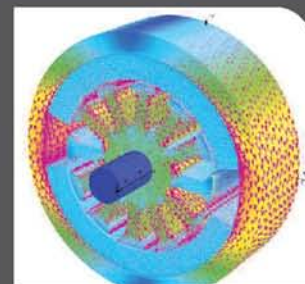
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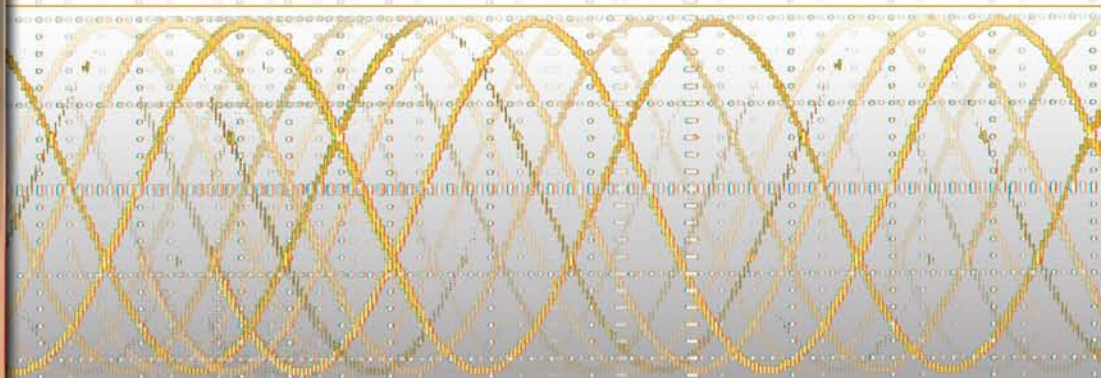
**Overview**

The N1728 is a new NIM four-channel digital pulse processor and waveform digitizer.

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**Highlights**

- 4 channel 14 bit 100 MHz FADC
- "Oscilloscope" mode/transient recorder with 10 ms wide waveforms buffer with pre-trigger capability
- "Energy" mode with real time trapezoidal shaping and energy determination
- Excellent integral linearity
- Digital trigger and CFD
- Trigger time stamping and counting information
- Base Line Restoration and pile-up rejection
- Programmable coincidence/veto time windows on all channels

Applications

- High resolution spectroscopy with germanium, silicon, CdTe, GaAs, HgI2 detectors in high counting rate environments
- Gamma ray tracking and Depth Of Interaction measurements in large volume segmented semiconductor detectors or PET systems
- Particle identification and n/γ discrimination in scintillation, semiconductor or gas filled detectors via Pulse Shape Analysis techniques