HK 27 Instrumentation und Anwendungen

Zeit: Dienstag 17:00–18:30 Raum: H

HK 27.1 Di 17:00 H

Pulse shape analysis for germanium detectors operated under magnetic fields — •A. Sanchez Lorente[1], P. Achenbach[1], M. Agnello[2], T. Bressani[2], D. Calvo[2], A. Feliciello[2], F. Ferro[2], J. Gerl[3], P. Gianotti[4], O.N. Hartman[4], F. Iazzi[2], M. Kavatsyuk[1], I. Kojouhavorv[3], J. Pochodzalla[1], G. Raciti[5], N. Saito[3], T.R. Saito[3], C. Schwarz[3], H. Schaffner[3], and C. Sfienti[3] for the Panda collaboration — [1]U Mainz — [2]Politecnico+INFN Torino — [3]GSI — [4]INFN Frascati — [5]U+INFN Catania

Future experiments on hypernuclei γ-spectroscopy at FINUDA@DAFNE and PANDA@FAIR require the operation of germanium detectors in high magnetic fields ($B \approx 1\,\mathrm{T}$) and under high particle and γ fluxes.
The performance of germanium detectors in such an environment has not been well investigated.
To verify that germanium detectors can be safely and efficiently operated in a high magnetic field two different kind of detectors have been investigated: the EUROBALL cluster detector and the VEGA detector.
Result on the energy resolution from a pulse shape analysis using a moving window deconvolution algorithm will be presented.
The energy resolution as a function of the magnetic field strength will be discussed and compared to the resolution obtained without pulse shape information.

This research is part of the EU integrated infrastructure initiative Hadronphysics project under contract number RII3-CT-2004-506078 and 06MZ176.

HK 27.2 Di 17:15 H

NEPTUN — Der Niederenergie-Photonentagger am S-DALINAC * — •K. Lindenberg, J. Endres, J. Hasper und A. Zilges — Institut für Kernphysik, TU Darmstadt, *D-64289 Darmstadt

Der Niederenergie-Photonentagger NEPTUN am Darmstädter S-DALINAC wird ein Werkzeug zur hochauflösenden Untersuchung der Photoresponse von Atomkernen in der Region der Teilchenseparationsenergien. Unter anderem erlaubt es in diesem Bereich die Pygmydipolresonanz (PDR) zu untersuchen. Die Möglichkeit der Messung astrophysikalischer (γ,n)-Reaktionsraten kurz oberhalb der Neutronenseparationsenergie erweitert unsere bislang verwendete Aktivierungsmethode. NEPTUN liefert 10^4 Photonen/(s keV) in einem Energiebereich von 8 MeV bis 20 MeV mit einer Energieschärfe von 25 keV.

* Gefördert durch die DFG (SFB 634)

HK 27.3 Di 17:30 H

Anwendung von 12-fach segmentierten Miniball Detektoren zur Korrektur von Kristalldiffraktion. — •J. Jolie[1], T. Materna[1], B. Bruyneel[1], A. Linnemann[1], D. Martin[1], N. Warr[1], M. Jentschel[2], G. Simpson[2] und P. Mutti[2] — [1]Institut für Kernphysik, Universität zu Köln, Zülpicher Str 77, 50937 Köln — [2]Institut Laue Langevin, 38044 Grenoble, France

Bei Kristalldiffraktionsmessungen von Gammastrahlen werden oft gebogene Kristalle verwendet, um die Effizienz der Spektrometer zu erhöhen. Da es schwierig ist, eine perfekte Biegung zu realisieren, erreichen gebogene Kristalle nicht die beste Auflösung. Mittels ortsauflösender Ge-Detektoren lassen sich die Wechselwirkungen eines Gammaquants im Detektor lokalisieren, und durch Rückprojektion der Ort auf dem gebogenen Kristall, an dem die Diffraktion stattgefunden hat. Dies erlaubt dann eine Korrektur, wobei der Detektor in viele Pixel geteilt wird und die Ergebnisse jedes Pixels aufeinander geschoben werden. Erste Experimente mit der GAMS-5 Spektrometer am ILL in Grenoble haben gezeigt, dass mittels dieses korrektiven Verfahrens eine wesentliche Verbesserung der Auflösung erreicht wird.

HK 27.4 Di 17:45 H

Pulse shape analysis of segmented large volume HPGe detectors — •Bart Bruyneel, Peter Reiter, and Gheorghe Pascovici — IKP, Universität zu Köln

γ-ray tracking in future HPGe arrays like AGATA will rely on pulse shape analysis (PSA) of multiple γ-interactions. A simple and fast procedure was developed which enabled the first full characterization of a segmented large volume HPGe detector. Preamplified signals from a 12-fold segmented MINIBALL detector [1] were processed using digital electronics. The crystal orientation, detector geometry, changing field strength, space charge, crosstalk and the anisotropic behavior of electron and hole mobility are taken into account. The high accuracy in simulation enabled very high position resolution using PSA. We report on the first application of this technique in a real experiment [2] aiming at the reconstruction of the line width of γ-rays using adaptive optics for the diffraction of γ-rays. A position resolution of $\sigma = 1.4\,\mathrm{mm}$ was achieved with 184 keV γ-rays employing the same detector setup.

∗ Supported by the German BMBF(06 K-167).

[1] J. Eberth *et al.*, Prog. Part. Nucl. Phys. **46** 389 (2001)
[2] T. Materna *et al.*, Submitted to Nature

HK 27.5 Di 18:00 H

2nd Level Trigger Performance in HADES. — •Camilla Gilardi for the HADES collaboration — II. Physikalisches Institut, Universität Gießen, Gießen, Germany.

The main purpose of the HADES spectrometer at GSI Darmstadt is the measurements of dilepton decays of light vector mesons. Since the branching ratio of these decays is of the order of 10^{-5}, in order to collect sufficient statistics an online selective mechanism (trigger) is needed to minimize the amount of collected data.
The trigger of HADES is composed of two levels. The first level trigger (LVL1) selects the most central collisions, while the second level trigger (LVL2) searches for signatures of dilepton decays as lepton candidates in the RICH, TOF and Pre-shower detector. In order to select events with lepton pairs, the LVL2 trigger performs pattern recognition to find lepton signatures, and combines the position and angle information for each of these signatures into tracks.
To understand the performance of LVL2, the emulation of the behaviour of every board has to be performed as well as the evaluation of fundamental parameters like efficiency, event reduction and enhancement factor. Results of this analysis for the reaction 1.8 AGeV Ar + KCl will be shown.

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HK 27.6 Di 18:15 H

First test results of the ALICE TRD Track Matching Unit — •Jan de Cuveland for the ALICE TRD collaboration — Kirchhoff-Institut für Physik, Universität Heidelberg

The Transition Radiation Detector (TRD) is one of the main detectors of the ALICE experiment at the LHC. One of its primary objectives is to trigger on high momentum electrons.

The trigger complexity is considerable and requires fast event reconstruction. Based on data from 1.2 million analog channels, the reconstruction must be performed within 6 μs to contribute to the Level-1 trigger decision. After preprocessing the analog data and applying pattern-matching algorithms, the resulting track segments of different chambers must be reassembled three-dimensionally. From the curvature of the reconstructed tracks, the momentum of the originating particle is calculated to finally make the trigger decision. This part of the online processing must be completed in less than 2 μs.

A hardware architecture has been developed which is able to perform the processing of up to 20 000 track segments in the required time by means of massive parallelism. The track-matching unit presented here is one of its main building blocks. It is an FPGA-based system utilizing PCI and 12 fibre-optical SFP transceiver interfaces, realized as a CompactPCI plug-in card. The main FPGA is a Xilinx Virtex-4 FX chip which includes integrated multi-gigabit serializer/deserializer and PowerPC processor blocks. This presentation focuses on results from first tests with a prototype version of the track-matching unit.

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