

HK 15 Hauptvorträge

Zeit: Montag 10:15–12:15

Raum: TU MA001

Hauptvortrag

HK 15.1 Mo 10:15 TU MA001

Meson Production and Decay Studies at CELSIUS-WASA* —
 ●H. CLEMENT for the CELSIUS-WASA collaboration — Physikalisches
 Institut, Universität Tübingen

At the CELSIUS cooler ring pp and pd collisions with the emission of γ s, π s, η and ω have been measured using the WASA 4π detector with hydrogen and deuterium pellet targets. The WASA detector containing magnetic field, tracking detectors and calorimeters allows the detection of both charged and neutral particles.

One major aspect in the research program is the production and the decay of the η . The decay studies are being pursued in particular by use of the newly installed zero-degree spectrometer, which provides very clean η tagging in the production reaction $pd \rightarrow {}^3\text{He} \eta$. High-statistics runs are currently being carried out.

Another focal point are multi-pion production processes. Whereas close to threshold the data for the $pp\pi^+\pi^-$ channel exhibit features of Roper excitation and/or dynamic formation of the σ meson, at higher energies the formation of the $\Delta\Delta$ system becomes increasingly important. Surprisingly the $\pi^0\pi^0$ channel shows a systematic enhancement at small invariant masses, in ${}^3\text{He}\pi^0\pi^0$ this is even much larger than expected from Bose-Einstein correlations - pointing possibly to (dynamic) isospin breaking due to $\pi\pi$ rescattering. Also, in the invariant mass spectrum $M_{\gamma\gamma}$ a small, narrow line has been observed at $M_{\gamma\gamma} = 2m_\pi$. In search of the nature of this line we pursue a variety of scenarios.

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Hauptvortrag

HK 15.2 Mo 10:45 TU MA001

First Results from the CERN Axion Solar Telescope — ●F. H. HEINSIUS for the CAST collaboration — Physikalisches Institut, Albert-Ludwigs-Universität Freiburg

The axion has been postulated as a light pseudo-scalar particle to solve the problem of an absence of CP violation in strong interactions and could be a candidate for dark matter. Solar axions can be converted by the Primakoff process to X-rays in a magnetic field. A prototype LHC magnet has been set up for the CERN Axion Solar Telescope (CAST) to detect axions for masses below 0.02 eV through its coupling to photons. The magnet is mounted on a platform with $\pm 8^\circ$ vertical and $\pm 40^\circ$ horizontal movement to follow the sun track. At the ends of the 9.26 m long, 9 Tesla magnet three low noise X-ray detectors have been mounted. A micromesh gas chamber and a CCD measures 90 minutes during sunrise, a time projection chamber during sunset. New upper limits will be presented as well as future plans to extend the significance in the mass range up to 1 eV.

The project is supported by BMBF.

Hauptvortrag

HK 15.3 Mo 11:15 TU MA001

Exploring the QCD phase diagram — ●CHRISTOPH BLUME for the NA49 collaboration — Institut für Kernphysik, J.W.Goethe Universität Frankfurt am Main

In the recent years the NA49 experiment at the CERN SPS has collected data on heavy ion reactions in the beam energy range 20 - 158 AGeV. Together with data from the AGS and RHIC, this allows for a comprehensive study of the energy dependence of various hadronic observables. In my talk I would like to review results of this study and will discuss what we have learned about the QCD phase diagram. Of prime interest is the question whether a possible phase transition to a quark gluon plasma is reflected in these observables.

Hauptvortrag

HK 15.4 Mo 11:45 TU MA001

Exploring the “Island of Inversion”: Coulomb excitation of ${}^{30}\text{Mg}$ and ${}^{32}\text{Mg}$ with MINIBALL at REX-ISOLDE — ●HEIKO SCHEIT for the REX-MINIBALL collaboration — Max-Planck-Institut für Kernphysik, Heidelberg

Since the discovery in 1975 [1] that the neutron rich ${}^{31,32}\text{Na}$ isotopes are more tightly bound than expected, the unusual properties of the neutron-rich Na and Mg isotopes in this region (“island of inversion”) near the $N = 20$ shell closure are subject of intense theoretical and experimental investigations. Nevertheless, the knowledge on these nuclei is sparse and some of the existing experimental data are not consistent, e.g. the

$B(E2; 0_{gs}^+ \rightarrow 2_1^+)$ values for ${}^{30,32}\text{Mg}$ measured by different groups differ from each other by as much as a factor of two [2-4].

We therefore studied the collective properties of the neutron-rich isotopes ${}^{30,32}\text{Mg}$ at the energy-upgraded REX-ISOLDE facility using the MINIBALL array to detect the de-excitation γ rays after “safe” Coulomb excitation.

After a short introduction to REX and MINIBALL the present status of our knowledge of the structure of the nuclei in or near the “island of inversion” will be reviewed with special emphasis on the collectivity of the $0_{gs}^+ \rightarrow 2_1^+$ excitation in ${}^{30,32}\text{Mg}$.

[1] C. Thibault *et al.*, Phys. Rev. C **12**, 644 (1975)

[2] T. Motobayashi *et al.*, Phys. Lett. B **346**, 9 (1995)

[3] B.V. Pritychenko *et al.*, Phys. Lett. B **461**, 322 (1999)

[4] V. Chisté *et al.*, Phys. Lett. B **514**, 233 (2001)