# HK 4: Kernphysik/Spektroskopie

Zeit: Montag 18:00–19:15 Raum: D

HK 4.1 Mo 18:00 D

**Time-of-Flight wall design for HypHI project** — •Christophe Rappold[1,2], Myroslav Kavatsyuk[1], Olga Lepyoshkina[1], Shizu Minami[1], and Takehiko Saito[1] for the HypHI-Collaboration — [1]GSI, Darmstadt, Germany — [2]ULP Strasbourg University

HypHI project at GSI, which was recently started, aims to study hypernuclei by means of stable heavy ion and RI beams induced reactions. Thanks to this production mechanism, hypernuclei are produced around at the projectile rapidity with a projectile fragmentation and a coalescence of a Λ-hyperon in the fragment, thus giving an opportunity to investigate hypernuclei at extreme isospins and to measure directly hypernuclear magnetic moments.

The project is divided in four phases, and the first one, phase 0, aims to demonstrate the feasibility of the hypernuclei spectroscopy with a stable $^{6}$Li projectile at 2 $A$ GeV on a $^{12}$C target for $^{3}_{\Lambda}$H, $^{4}_{\Lambda}$H and $^{5}_{\Lambda}$He.

The spectrometer consists of the ALADIN dipole magnet, a diamond detector, three scintillating fiber detector arrays, two Time-of-Flight (TOF) walls, a K$^{+}$ detector and three layers of drift chambers.

In this presentation, the design study and expected performance of TOF walls will be discussed.

HK 4.2 Mo 18:15 D

**A mass-data-based description of nuclear ground states** — Genevieve Mouze and •Christian Ythier — Faculte des Sciences,Université de Nice, France

In all nuclei and in each valence shell, the separation energies S(x,i) with x= n, 2n, p, 2p are the sum of a detachment energy s(x,i) from the last core and of the neutron-proton energies e (x, x') of the shell [1]; the energies e(x,x') can be calculated as differences between binding energies [2]; and a well- defined rank i within the shells can be assigned to the dinucleons and unpaired nucleon. Due to the linear decrease of the detachment energies with increasing i, the binding energy of a nucleus in its ground state, which is the sum of the s and e terms, can be expressed by an equation generalizing Talmi's quadratic equation [3].In the 4He valence shells, the negative detachment energies of neutrons, protons and diprotons of all ranks and of dineutrons of rank greater than 2 induce antibounding effects; this situation explains the small abundance of the elements Li, Be, and B in the cosmos; the tendency of dineutrons to form alpha- quasi-clusters with antibound diprotons explains various anomalies in the organisation of these shells. This communication is dedicated to the memory of Aaldert Wapstra.1. C.Ythier and G. Mouze, J. Nucl. Mat.166, 1989,74; 2.G. Mouze and C. Ythier, Nuovo Cimento A 103 (1990)105;3.I. Talmi, Rev. Mod.Phys. 34 (1962) 704.

HK 4.3 Mo 18:30 D

**Small-angle proton elastic scattering on Be and B nuclei** — •A. Inglessi[1], F. Aksouh[1], G.D. Alkhazov[2], K.-H. Behr[1], A. Bleile[1], A. Bruenle[1], L. Chulkov[3], A.V. Dobrovolsky[2], P. Egelhof[1], H. Geissel[1], G. Ickert[1], S. Ilieva[1], R. Kanungo[1], A.V. Khanzadeev[2], O. Kiselev[1], G.A. Korolev[2], X.C. Le[1], Y. Litvinov[1], W. Niebur[1], C. Nociforo[1], D.M. Seliverstov[2], L.O. Sergeev[2], V.A. Volkov[3], A.A. Vorobyov[2], H. Weick[1], V.I. Yatsoura[2], and A.A. Zhdanov[2] — [1]Gesellschaft für Schwerionenforschung (GSI), 64291 Darmstadt, Germany — [2]Petersburg Nuclear Physics Institute (PNPI), 188300 Gatchina, Russia — [3]Kurchatov Institute, 123182 Moscow, Russia

Small-angle proton elastic scattering on the $^{7,9,10,11,12,14}$Be and $^{8}$B nuclei at energies near 700 MeV/u was studied in inverse kinematics using secondary beams from the fragment separator FRS at GSI, Darmstadt. The hydrogen-filled ionization chamber IKAR served simultaneously as target and recoil proton detector. Projectile tracks measured with multiwire proportional chambers and the ALADIN magnet with a scintillator wall behind served for the separation of elastic scattering events. The obtained differential cross sections will allow to test various theoretical model calculations on the structure of the neutron- and proton-rich (halo) nuclei investigated.

In this presentation the experimental setup will be described and the procedure of the data analysis will be displayed. The data analysis is presently in progress. Preliminary results will be presented.

HK 4.4 Mo 18:45 D

**Line shape of the first excited state in $^{9}$Be from high-resolution electron scattering*** — •O. Burda, A. Byelikov, M. Chernykh, Y. Kalmykov, P. von Neumann-Cosel, I. Poltoratska, I. Pysmenetska, S. Rathi, A. Richter, N. Ryezayeva, A. Shevchenko, and O. Yevetska — Institut für Kernphysik, Technische Universität Darmstadt

The light odd-even nucleus $^{9}$Be has the lowest neutron threshold ($S_n$ = 1.665 MeV) of all stable nuclei. Already the first excited $J^{\pi} = 1/2^{+}$ state lies at an excitation energy of several tens of keV above the $^{8}$Be + $n$ threshold. Parameters of this resonance are of great astrophysical importance. The description of this unbound level is long-standing problem. Due to its closeness to the neutron threshold the resonance has a strongly asymmetric line shape but despite a large number of different experiments there still exist discrepancies between the various deduced resonance parameters [1]. We present high-resolution $^{9}$Be(e,e$'$) experiments performed at the S-DALINAC and a reanalysis of our old electron scattering data [2].

[1] F.C. Barker, Aust. J. Phys. 53 (2000) 247.
[2] G. Küchler et al., Z. Phys. A 326 (1987) 447.

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HK 4.5 Mo 19:00 D

**The band structure of $^{10}$Be.** — •Hans-Gerhard Bohlen[1], Tatiana Dorsch[1], Tzanka Kokalova[1], Wolfram von Oertzen[1,2], Christian Schulz[1], and Carl Wheldon[1] — [1]Hahn-Meitner-Institut, Berlin — [2]FU Berlin, Fachbereich Physik

The band structure of $^{10}$Be has been studied using the $^{12}$C($^{12}$C, $^{14}$O)$^{10}$Be two-proton pickup reaction at 211 MeV. Spin-parity assignments have been obtained from the shapes of observed angular distributions. The phase and first maximum of the oscillatory structure is very characteristic for the spin and parity, and new assignments could be made. The state at 11.78 MeV excitation energy is identified as the $4^{+}$ member of the ground state band, and the state at 10.56 MeV is assigned $J^{\pi} = 3^{-}$. The angular distribution of a peak at 9.50 MeV, which consists of several unresolved states, has been unfolded using contributions from known states at 9.56 MeV, $2^{+}$, and 9.27 MeV, $4^{-}$, and from a tentatively assigned $3^{+}$ state at 9.4 MeV reported by Daito *et al.*, (Phys. Lett. B418 (1998) 7). The latter state is considered as the second member of a K=$2^{+}$ band based on the second $2^{+}$ state of $^{10}$Be. The characteristics of the different bands existing in $^{10}$Be will be discussed.