

Публикации ЛМФ 2015 год.

1. The BGO Calorimeter of BGO-OD Experiment

B. Bantes, D. Bayadilov, R. Beck, M. Becker, A. Bella, P. Bielefeldt, J. Bieling, M. Bleckwenn, S. Boese, A. Braghieri, K.-Th Brinkmann, D. Burdeynyi, F. Curciarello, V. De Leo, R. Di Salvo, H. Dutz, D. Elsner, A. Fantini, O. Freyermuth, S. Friedrich, F. Frommberger, V. Ganenko, D. Geffers, G. Gervino, F. Ghio, G. Giardina, B. Girolami, D. Glazier, S. Goertz, A. Gridnev, E. Gutz, D. Hammann, J. Hannappel, P.F. Hartmann, W. Hillert, A. Ignatov, R. Jahn, R. Joosten, T.C. Jude, F. Klein, K. Koop, B. Krusche, A. Lapik, P. Levi Sandri, I. Lopatin, G. Mandaglio, P. Mei, F. Messi, R. Messi, V. Metag, D. Moricciani, M. Nanova, V. Nedorezov, D. Novinskiy, P. Pedroni, M. Romaniuk, T. Rostomyan, N. Rudnev, C. Schaerf, G. Scheluchin, H. Schmieden, V. Sumachev, V. Tarakanov, V. Vegna, D. Walther, D. Watts, H.G. Zaunick, T. Zimmermann.

J.Phys.Conf.Ser. 587 (2015) 012042 (2015-02-13) DOI: 10.1088/1742-6596/587/1/012042

Conference: C14-04-06.1 Proceedings

Abstract.

The BGO Rugby Ball is a large solid angle electromagnetic calorimeter now installed in the ELSA Facility in Bonn. The BGO is operating in the BGO-OD experiment aiming to study meson photoproduction off proton and neutron induced by a Bremsstrahlung polarized gamma beam of energies from 0.2 to 3.2 GeV and an intensity of 5×10^7 photons per second. The scintillating material characteristics and the photomultiplier read-out make this detector particularly suited for the detection of medium energy photons and electrons with very good energy resolution. The detector has been equipped with a new electronics read-out system, consisting of 30 sampling ADC Wie-Ne-R modules which perform the off-line reconstruction of the signal start-time allowing for a good timing resolution. Performances in linearity, resolution and time response have been carefully tested at the Beam Test Facility of the INFN National Laboratories in Frascati by using a matrix of 7 BGO crystals coupled to photomultipliers and equipped with the Wie-Ne-R sampling ADCs.

2. Photoproduction of ω mesons off protons and neutrons

CBELSA/TAPS Collaboration (F. Dietz, V. Metag, A.V. Anisovich, J.C.S. Bacelar, B. Bantes, O. Bartholomy, D.E. Bayadilov, R. Beck, Y.A. Belogazov, R. Castelijns, V. Crede, H. Dutz, D. Elsner, R. Ewald, F. Frommberger, C. Funke, R. Gothe, R. Gregor, A.B. Gridnev, E. Gutz, W. Hillert, S. Hoeffgren, P. Hoffmeister, I. Horn, I. Jaegle, J. Junkersfeld, H. Kalinowsky, S. Kammer, V. Kleber, Frank Klein, Friedrich Klein, E. Klempt, M. Konrad, M. Kotulla, B. Krusche, M. Lang, H. Loehner, I.V. Lopatin, S. Lugert, D. Menze, T. Mertens, J.G. Messchendorp, V.A. Nikonov, M. Nanova, D.V. Novinski, R. Novotny, M. Ostrick, L.M. Pant, H. Pee, M. Pfeiffer, T. Rostomyan, A. Roy, S. Schadmand, C. Schmidt, H. Schmieden, B. Schoch, S.V. Shende, V. Shklyar, A. Suele, V.V. Sumachev, T. Szczepanek, U. Thoma, D. Trnka, R. Varma, D. Walter, C. Wendel, A. Wilson.)

2015 - 16 pages

Eur.Phys.J. A51 (2015) 6 (2015-01-27) DOI: 10.1140/epja/i2015-15006-3

Abstract.

ω photoproduction off hydrogen and deuterium has been studied with the tagged photon beam of the ELSA accelerator in Bonn for photon energies up to 2.0 GeV. The ω meson has been identified via the $\omega \rightarrow \pi^0 \gamma \rightarrow \gamma\gamma\gamma$ decay mode, using the combined setup of the Crystal Barrel/TAPS detector systems. Both inclusive and exclusive analyses have been carried out.

Differential and total cross-sections have been derived for ω mesons produced off free protons and off protons and neutrons bound in deuterium. The cross-section for the production off the bound neutron is found to be a factor of ≈ 1.3 larger than the one off the bound proton in the incident beam energy region $1.2 \text{ GeV} < E_{\gamma} < 1.6 \text{ GeV}$. For higher incident beam energies this factor goes down to ≈ 1.1 at 2.0 GeV . The cross-sections of this work have been used as normalization for transparency ratio measurements.

3. Evidence for Narrow Resonant Structures at $\sqrt{s} \sim 1.68$ and $\sqrt{s} \sim 1.72$ GeV in Real Compton Scattering off the Proton.

V. Kuznetsov, F. Mammoliti, V. Bellini, G. Gervino, F. Ghio, G. Giardina, W. Kim, G. Mandaglio, M.L. Sperduto, C. Sutura.

Jan 18, 2015. 4 pp. e-Print: arXiv:1501.04333v1 [nucl-ex] | PDF

Physical Review C , 002200(R) (2015). Received 18 January 2015

Abstract.

First measurement of the beam asymmetry Σ for Compton scattering off the proton in the energy range $E_{\gamma} = 0.85 - 1.25 \text{ GeV}$ is presented. The data reveals two narrow structures at $E_{\gamma} = 1.036$ and $E_{\gamma} = 1.119 \text{ GeV}$. They may signal either narrow resonances with the masses near 1.86 and 1.72 GeV , or can be generated by the sub-threshold $K\Lambda$ and ωp production. Their decisive identification requires additional theoretical and experimental efforts.

4. High-precision measurements of πp elastic differential cross sections in the second resonance region.

I.G.Alekseev, V.A.Andreev, I.G.Bordyugin, W.J.Briscoe, E.A.Filimonov, V.V.Golubev, A.B.-Gridnev, D.V.Kalinkin, L.I.Koroleva, G. Kozlenko, V. S. Kozlov, A. G. Krivshich, B.V.Morozov, V. M. Nesterov, D. V. Novinsky, V. V. Ryltsov, M. Sadler, B. M. Shurygin, I. I. Strakovsky, A. D. Sulimov, V. V. Sumachev, D. N. Svirida, V. I. Tarakanov, V. Yu.Trautman and R. L. Workman.

PHYSICAL REVIEW C **91**, 025205 (2015)

Abstract.

Cross sections for $\pi \pm p$ elastic scattering have been measured to high precision by the EPECUR Collaboration for beam momenta between 800 and $1240 \text{ MeV}/c$ using the ITEP proton synchrotron. The data precision allows comparisons of the existing partial-wave analyses on a level not possible previously. These comparisons imply that over the covered energy range, the Carnegie-Mellon-Berkeley analysis is significantly more predictive when compared to versions of the Karlsruhe-Helsinki analyses.

5. Three-Body Nature of N^* and Δ^* Resonances from Sequential Decay Chains.

A. Thiel, V. Sokhoyan, E. Gutz, H. van Pee, A. V. Anisovich, J. C. S. Bacelar, B. Bantes, O. Bartholomy, D. Bayadilov, R. Beck, Yu. Beloglazov, R. Castelijns, V. Crede, H. Dutz, D. Elsner, R. Ewald, F. Frommberger, M. Fuchs, Ch. Funke, R. Gregor, A. Gridnev, W. Hillert, Ph. Hoffmeister, I. Horn, I. Jaegle, J.Junkersfeld, H. Kalinowsky, S. Kammer, V. Kleber, Frank Klein, Friedrich Klein, E. Klempt, M. Kotulla, B. Krusche, M. Lang, H. Löhner, I. Lopatin, S. Lugert, T. Mertens, J. G. Messchendorp, V. Metag, B. Metsch, M. Nanova, V. Nikonov,

D. Novinski, R. Novotny, M. Ostrick, L. Pant, M. Pfeiffer, D. Piontek, A. Roy, A. V. Sarantsev, Ch. Schmidt, H. Schmieden, S. Shende, A. Süle, V. V. Sumachev, T. Szczepanek, U. Thoma, D. Trnka, R. Varma, D. Walther, Ch. Wendel, A. Wilson.

Phys.Rev.Lett. 114 (2015) 091803 (2015-03-04), 2015 - 5 pages

Abstract.

The $N\pi^0\pi^0$ decays of positive-parity N^* and Δ^* resonances at about 2 GeV are studied at ELSA by photoproduction of two neutral pions off protons. The data reveal clear evidence for several intermediate resonances: $\Delta(1232)$, $N(1520)3/2^-$, and $N(1680)5/2^+$, with spin parities $JP=3/2^+$, $3/2^-$, and $5/2^+$. The partial wave analysis (within the Bonn-Gatchina approach) identifies $N(1440)1/2^+$ and the $N(\pi\pi)S$ wave (abbreviated as $N\sigma$ here) as further isobars and assigns the final states to the formation of nucleon and Δ resonances and to non resonant contributions. We observe the known $\Delta(1232)\pi$ decays of $\Delta(1910)1/2^+$, $\Delta(1920)3/2^+$, $\Delta(1905)5/2^+$, $\Delta(1950)7/2^+$, and of the corresponding spin-parity series in the nucleon sector, $N(1880)1/2^+$, $N(1900)3/2^+$, $N(2000)5/2^+$, and $N(1990)7/2^+$.

For the nucleon resonances, these decay modes are reported here for the first time. Further new decay modes proceed via $N(1440)1/2^+\pi$, $N(1520)3/2^-\pi$, $N(1680)5/2^+\pi$, and $N\sigma$. The latter decay modes are observed in the decay of N^* resonances and at most weakly in Δ^* decays. It is argued that these decay modes provide evidence for a 3-quark nature of N^* resonances rather than quark-diquark structure.

6. Measurement of double polarization asymmetries in ω -photoproduction.

Eberhardt, H.; Jude, T. C.; Schmieden, H.; Anisovich, A. V.; Bantes, B.; Bayadilov, D.; Beck, R.; Beloglazov, Yu.; Bichow, M.; Boese, S.; Brinkmann, K.-Th.; Challand, Th.; Crede, V.; Diez, F.; Drexler, P.; Dutz, H.; Elsner, D.; Ewald, R.; Fernet-Ponse, K.; Friedrich, St.; Frommberger, F.; Funke, Ch.; Gottschall, M.; Gridnev, A.; Gruener, M.; Gutz, E.; Hammann, Ch.; Hannappel, J.; Hartmann, J.; Hillert, W.; Hoffmeister, Ph.; Honisch, Ch.; Jaegle, I.; Kaiser, D.; Kalinowsky, H.; Kalischewski, F.; Kammer, S.; Keshelashvili, I.; Kleber, V.; Klein, F.; Klempt, E.; Koop, K.; Krusche, B.; Kube, M.; Lang, M.; Lopatin, I.; Maghrbi, Y.; Makonyi, K.; Metag, V.; Meyer, W.; Mueller, J.; Nanova, M.; Nikonov, V.; Novotny, R.; Piontek, D.; Reeve, S.; Reicherz, G.; Rostomyan, T.; Runkel, S.; Sarantsev, A.; Schaepe, St.; Schmidt, Ch.; Schmitz, R.; Seifen, T.; Sokhoyan, V.; Sumachev, V.; Thiel, A.; Thoma, U.; Urban, M.; van Pee, H.; Walther, D.; Wendel, Ch.; Wiedner, U.; Wilson, A.; Winnebeck, A.

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Publication: eprint arXiv:1504.02221 Publication Date: 04/2015 Origin: ARXIV

Abstract.

The first measurements of the beam-target-helicity-asymmetries SE and SG in the photoproduction of ω -mesons off protons at the CBELSA/TAPS experiment are reported. SE (SG) was measured using circularly (linearly) polarised photons and a longitudinally polarised target. SE was measured over the photon energy range from close to threshold ($E_\gamma = 1108$ MeV) to $E_\gamma = 2300$ MeV and SG at a single energy interval of $1108 < E_\gamma < 1300$ MeV. Both measurements cover the full solid angle. The observables SE and SG are highly sensitive to the contribution of baryon resonances, with SE acting as a helicity filter in the ss -channel. The new results indicate significant ss -channel resonance contributions together with contributions from st -channel exchange processes. A partial wave analysis reveals strong contributions from the partial waves with spin-parity $J^P=3/2^+$, $5/2^+$, and $3/2^-$.

7. Photoproduction of the omega meson off the proton near threshold.

Strakovsky, I. I.; Prakhov, S.; Azimov, Ya. I.; Aguar-Bartolome, P.; Annand, J. R. M.; Arends, H. J.; Bantawa, K.; Beck, R.; Bekrenev, V.; Berghaeuser, H.; Braghieri, A.; Briscoe, W. J.; Brudvik, J.; Cherepnaya, S.; Codling, R. F. B.; Collicott, C.; Costanza, S.; Demissie, B. T.; Downie, E. J.; Drexler, P.; Fil'kov, L. V.; Glazier, D. I.; Gregor, R.; Hamilton, D. J.; Heid, E.; Hornidge, D.; Jaegle, I.; Jahn, O.; Jude, T. C.; Kashevarov, V. L.; Keshelashvili, I.; Kondratiev, R.; Korolija, M.; Kotulla, M.; Koulbardis, A.; Kruglov, S.; Krusche, B.; Lisin, V.; Livingston, K.; MacGregor, I. J. D.; Maghrbi, Y.; Manley, D. M.; Marinides, Z.; McGeorge, J. C.; McNicoll, E. F.; Mekterovic, D.; Metag, V.; Middleton, D. G.; Mushkarenkov, A.; Nefkens, B. M. K.; Nikolaev, A.; Novotny, R.; Ortega, H.; Ostrick, M.; Otte, P. B.; Oussena, B.; Pedroni, P.; Pheron, F.; Polonski, A.; Robinson, J.; Rosner, G.; Rostomyan, T.; Schumann, S.; Sikora, M. H.; Starostin, A.; Supek, I.; Taragin, M. F.; Tarbert, C. M.; Thiel, M.; Thomas, A.; Unverzagt, M.; Watts, D. P.; Werthmueller, D.; Zehr, F.
Phys. Rev. C 91, 045207 (2015), 5 pages, 3 figures.

Abstract.

An experimental study of omega photoproduction off the proton has been conducted by using the Crystal Ball and TAPS multiphoton spectrometers together with the photon tagging facility at the Mainz Microtron MAMI. The $gp \rightarrow \omega p$ differential cross sections are measured from threshold to the incident-photon energy $E_\gamma = 1.4$ GeV with ~ 15 MeV binning and full production-angle coverage. The quality of the present data near threshold gives access to a variety of interesting physics, including an estimation of the omega-N scattering length $\alpha_{\omega p}$.

8. Data on $\$I^s\$$ and $\$I^c\$$ in $\$ \overrightarrow{\gamma} p \rightarrow p \pi^0 \pi^0 \$$ reveal cascade decays of N(1900) via N(1520) π .

V. Sokhoyan, E. Gutz, H. van Pee, A.V. Anisovich, J.C.S. Bacelar, B. Bantes, O. Bartholomy, D. Bayadilov, R. Beck, Y. Beloglazov, R. Castelijns, V. Crede, H. Dutz, D. Elsner, R. Ewald, F. Frommberger, M. Fuchs, Ch. Funke, R. Gregor, A. Gridnev, W. Hillert, Ph. Hoffmeister, I. Horn, I. Jaegle, J. Junkersfeld, H. Kalinowsky, S. Kammer, V. Kleber, Frank Klein, Friedrich Klein, E. Klempt, M. Kotulla, B. Krusche, M. Lang, H. Löhner, I. Lopatin, S. Lugert, T. Mertens, J.G. Messchendorp, V. Metag, M. Nanova, V.A. Nikonov, D. Novinski, R. Novotny, M. Ostrick, L. Pant, M. Pfeiffer, D. Piontek, A. Roy, A.V. Sarantsev, Ch. Schmidt, H. Schmieden, S. Shende, A. Süle, V.V. Sumachev, T. Szczepanek, A. Thiel, U. Thoma, D. Trnka, R. Varma, D. Walther, Ch. Wendel, A. Wilson.
Phys.Lett. B746 (2015) 127-131 (2015-04-30).

Abstract.

Photoproduction of two neutral pions off the proton is studied using linearly polarized photons, and the polarization observables I_s and I_c are measured for the first time. These two observables are unique to multi-meson final states; they characterize correlations between the linear photon polarization and the direction of outgoing single particles in photoproduction of three-body final states. The I_s and I_c distributions suggest that, in the 1.8 to 2.0 GeV mass region, the $N(1520)_{3/2^-}$ intermediate state is reached with reaction dynamics consistent with a dominant $JP=3/2^+$ wave. These data are included in the Bonn-Gatchina (BnGa) partial wave analysis which is based on a large variety of data; the analysis confirms a significant contribution from the reaction chain $\gamma p \rightarrow N(1900)_{3/2^+} \rightarrow N(1520)_{3/2^-} \pi^0 \rightarrow p \pi^0 \pi^0$.

9. High statistics study of the reaction $\gamma p \rightarrow p; 2\pi^0$.

V. Sokhoyan, E. Gutz, V. Crede, H. van Pee, A.V. Anisovich, J.C.S. Bacelar, B. Bantes, O. Bartholomy, D. Bayadilov, R. Beck Y.A. Beloglazov, R. Castelijns, H. Dutz, D. Elsner, R. Ewald, F. Frommberger, M. Fuchs, Ch. Funke, R. Gregor, A.B. Gridnev, W. Hillert, Ph. Hoffmeister, I. Horn, I. Jaegle, J. Junkersfeld, H. Kalinowsky, S. Kammer, V. Kleber, Frank Klein, Friedrich Klein, E. Klempt, M.Kotulla, B. Krusche, M. Lang, H. Löhner, I.V. Lopatin, S. Lugert, T. Mertens, J.G. Messchendorp, V. Metag, B. Metsch, M. Nanova, V.A. Nikonov, D. Novinsky, R. Novotny, M. Ostrick, L. Pant, M. Pfeiffer, D. Piontek, A. Roy, A.V. Sarantsev, Ch. Schmidt, H. Schmieden, T. Seifen, S. Shende, A. Süle, V.V. Sumachev, T. Szczepanek, A. Thiel, U. Thoma, D. Trnka, R. Varma, D. Walther, Ch. Wendel, A. Wilson
Eur.Phys.J. A51 (2015) 95 (2015-08-06) Jul 9, 2015 - 28 pages

Abstract.

The photoproduction of $2\pi^0$ mesons off protons was studied with the Crystal Barrel/TAPS experiment at the electron accelerator ELSA in Bonn. The energy of photons produced in a radiator was tagged in the energy range from 600 MeV to 2.5 GeV. Differential and total cross sections and $p\pi^0\pi^0$ Dalitz plots are presented. Part of the data was taken with a diamond radiator producing linearly polarized photons, and beam asymmetries were derived. Properties of nucleon and Δ resonances contributing to the $p\pi^0\pi^0$ final state were determined within the BnGa partial wave analysis. The data presented here allow us to determine branching ratios of nucleon and Δ resonances for their decays into $p\pi^0\pi^0$ via several intermediate states.

Most prominent are decays proceeding via $\Delta(1232)\pi$, $N(1440)1/2^+\pi$, $N(1520)3/2^-\pi$, $N(1680)5/2^+\pi$, but also $\rho(500)$, $\rho(980)$, and $\rho(1270)$ contribute to the reaction.

10. Photoproduction of ω mesons off the proton.

A. Wilson, V. Crede, A.V. Anisovich, J.C.S. Bacelar, B. Bantes, O. Bartholomy, D. Bayadilov, R. Beck, Y.A. Beloglazov, K.T.Brikman, R. Castelijns, H. Dutz, D. Elsner, R. Ewald, F. Frommberger, M. Fuchs, Chr. Funke, R. Gregor, A.B. Gridnev, E.Gutz, J.Hannapel, W. Hillert, P. Hoffmeister, I. Horn, I. Jaegle, T.Gude, J. Junkersfeld, H. Kalinowsky, V. Kleber, Frank Klein, Friedrich Klein, E. Klempt, M.Kotulla, B. Krusche, M. Lang, H. Löhner, I.V. Lopatin, S. Lugert, T. Mertens, J.G. Messchendorp, V. Metag, M. Nanova, V.A. Nikonov, D. Novinsky, R. Novotny, M. Ostrick, L.M.Pant, H.van Pee, M. Pfeiffer, A. Roy, A.V.Sarantsev, C. Schmidt, H. Schmieden, S. Shende, V.Sokhoyan, N.Spaks, A. Süle, V.V. Sumachev, T. Szczepanek, U. Thoma, D. Trnka, R. Varma, D. Walther, Ch. Wendel, U.Wiedner.

Published in Phys.Lett. B749 (2015) 407-413, Aug 6, 2015. 7 pp.

Abstract.

The differential cross sections and unpolarized spin-density matrix elements for the reaction $\gamma p \rightarrow p\omega$ were measured using the CBELSA/TAPS experiment for initial photon energies ranging from the reaction threshold to 2.5 GeV. These observables were measured from the radiative decay of the ω meson, $\omega \rightarrow \pi^0\gamma$. The cross sections cover the full angular range and show the full extent of the t -channel forward rise. The overall shape of the angular distributions in the differential cross sections and unpolarized spin-density matrix elements are in fair agreement with previous data. In addition, for the first time, a beam of linearly-polarized tagged photons in the energy range from 1150 MeV to 1650 MeV was used to extract polarized spin-density matrix elements. These data were included in the Bonn-Gatchina partial wave analysis (PWA). The dominant contribution to ω photoproduction near

threshold was found to be the $3/2^+$ partial wave, which is primarily due to the sub-threshold $N(1720), 3/2^+$ resonance. At higher energies, pomeron-exchange was found to dominate whereas π -exchange remained small. These t -channel contributions as well as further contributions from nucleon resonances were necessary to describe the entire dataset: the $1/2^-$, $3/2^-$, and $5/2^+$ partial waves were also found to contribute significantly.

11. The polarization observables T , P , and H and their impact on $\gamma p \rightarrow p \pi^0$ multipoles .

J. Hartmann, H.Dutz, A.V. Anisovich, D. Bayadilov, R. Beck, M.Becker, Y.A. Beloglazov, A.Berlin, M.Bichow, S.Bose, K.-Th.Brinkmann, V.Crede, M.Dieterle, H.Eberhardt, D. Elsner, K. Fornet-Ponse, St. Friedrich, F.Frommberger, Ch.Funke, M.Gottschall, A.Gridnev, M.Grüner, St.Gortz, E.Gutz, Ch.Hammann, J.Hannappel, V.Hannen, J.Herick, W. Hillert, Ph.Hofmeister, Ch.Honisch, O.Jahn, T.Jude, A.Kaser, D.Kaiser, H. Kalinowsky, F.Kalischewski, P.Klassen, I.Keschelashvili, F.Klein, E. Klempt, K.Koop, B.Krusche, M.Kube, M.Lang, I.Lopatin, K.Makonyi, F.Messi, V. Metag, W.Meyer, J.Muller, M. Nanova, V.Nikonov, D.Novinsky, R. Novotny, D.Piontek, S.Reeve, Ch.Rosenbaum, B.Roth, G.Reicherz, T.Rostomyan, St.Runkel, A.Sarantsev, Ch.Schmidt, H. Schmieden, R.Schmitz, T.Seifen, V.Sokhoyan, Ph.Thamer, A.Thiel, U. Thoma, M.Urban, H.van Pee, D.Walther, Ch.Wendel, U.Wiedner, A.Wilson, A.Winnebeck, L.Witthauer.

Phys.Lett. B748 (2015) 212-220, Jun 20, 2015. 9 pp

Abstract.

Data on the polarization observables T , P , and H for the reaction $\gamma p \rightarrow p \pi^0$ are reported. Compared to earlier data from other experiments, our data are more precise and extend the covered range in energy and angle substantially. The results were extracted from azimuthal asymmetries measured using a transversely polarized target and linearly polarized photons. The data were taken at the Bonn electron stretcher accelerator ELSA with the CBELSA/TAPS detector. Within the Bonn-Gatchina partial wave analysis, the new polarization data lead to a significant narrowing of the error band for the multipoles for neutral-pion photoproduction.

12. The isospin structure of photoproduction of $\pi\eta$ pairs from the nucleon in the threshold region.

A. Käser, J. Ahrens, J.R.M. Annand, H.J. Arends, K. Bantawa, P.A. Bartolome, R. Beck, V. Bekrenev, H. Berghäuser, A. Braghieri, D. Branford, W.J. Briscoe, J. Brudvik, S. Cherepnaya, S. Costanza, B. Demissie, M. Dieterle, E.J. Downie, P. Drexler, L.V. Fil'kov, A. Fix, D.I. Glazier, D. Hamilton, E. Heid, D. Hornidge, D. Howdle, G.M. Huber, O. Jahn, I. Jaegle, T.C. Jude, V.L. Kashevarov, I. Keshelashvili, R. Kondratiev, M. Korolija, S.P. Kruglov, B. Krusche, V. Lisin, K. Livingston, I.J.D. MacGregor, Y. Maghrbi, J. Mancell, D.M. Manley, Z. Marinides, J.C. McGeorge, E. McNicoll, D. Mekterovic, V. Metag, S. Micanovic, D.G. Middleton, A. Mushkarenkov, A. Nikolaev, R. Novotny, M. Oberle, M. Ostrick, P. Otte, B. Oussena, P. Pedroni, F. Pheron, A. Polonski, S.N. Prakhov, J. Robinson, G. Rosner, T. Rostomyan, S. Schumann, M.H. Sikora, D.I. Sober, A. Starostin, I. Supek, M. Thiel, A. Thomas, M. Unverzagt, D.P. Watts, D. Werthmuller, L. Witthauer.

Phys.Lett. B748 (2015) 244-250, Jul 7, 2015 - 7 pages

Abstract.

Photoproduction of $\pi\eta$ -pairs from nucleons has been investigated from threshold up to incident photon energies of ≈ 1.4 GeV. The quasi-free reactions $\gamma p \rightarrow p \pi^0 \eta$, $\gamma n \rightarrow n \pi^0 \eta$,

$\gamma p \rightarrow n\pi^+\eta$, and $\gamma n \rightarrow p\pi^-\eta$ were for the first time measured from nucleons bound in the deuteron. The corresponding reactions from a free-proton target were also studied to investigate final-state interaction effects (for neutral pions the free-proton results could be compared to previous measurements; the $\gamma p \rightarrow n\pi^+\eta$ reaction was measured for the first time). For the $\pi^0\eta$ final state coherent production via the $\gamma d \rightarrow d\pi^0\eta$ reaction was also investigated. The experiments were performed at the tagged photon beam of the Mainz MAMI accelerator using an almost 4 π coverage electromagnetic calorimeter composed of the Crystal Ball and TAPS detectors. The total cross sections for the four different final states obey the relation $\sigma(p\pi^0\eta) \approx \sigma(n\pi^0\eta) \approx 2\sigma(p\pi^-\eta) \approx 2\sigma(n\pi^+\eta)$ as expected for a dominant contribution from a $\Delta^* \rightarrow \eta\Delta(1232) \rightarrow \pi\eta N$ reaction chain, which is also supported by the shapes of the invariant-mass distributions of nucleon-meson and $\pi - \eta$ pairs. The experimental results are compared to the predictions from an isobar reaction model.

13. Strangeness Photoproduction at the BGO-OD Experiment.

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Abstract

BGO-OD is a newly commissioned experiment to investigate the internal structure of the nucleon, using an energy tagged bremsstrahlung photon beam at the ELSA electron facility. The setup consists of a highly segmented BGO calorimeter surrounding the target, with a particle tracking magnetic spectrometer at forward angles. BGO-OD is ideal for investigating meson photoproduction.

The extensive physics programme for open strangeness photoproduction is introduced, and preliminary analysis presented.

14. The BGO Calorimeter of BGO-OD Experiment

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Abstract.

The BGO Rugby Ball is a large solid angle electromagnetic calorimeter now installed in the ELSA Facility in Bonn. The BGO is operating in the BGO-OD experiment aiming to study meson photoproduction off proton and neutron induced by a radiation polarized gamma beam of energies from 0.2 to 3.2 GeV and an intensity of 5×10^7 photons per second. The scintillating material characteristics and the photomultiplier read-out make this detector particularly suited for the detection of medium energy photons and electrons with very good energy resolution. The detector has been equipped with a new electronics read-out system, consisting of 30 sampling ADC Wie-Ne-R modules which perform the off-line reconstruction of the signal start-time allowing for a good timing resolution. Performances in linearity, resolution and time response have been carefully tested at the Beam Test Facility of the INFN National Laboratories in Frascati by using a matrix of 7 BGO crystals coupled to photomultipliers and equipped with the Wie-Ne-R sampling ADCs.