E122 12.0 T. Kishimoto

1. Journal

- Nabetani H, Ogaito T, Sato T, Kishimoto T, Spin observables in the pn→p Λ reaction, Physical Review C60 (1): Art. No. 017001 Jul 1999

2 Thesis

Doctor: S. Minami, Osaka University, June 2004

Master: K. Sugita, Osaka University, March 2004
T. Numata, Osaka University, March 2003
T Itahashi, Osaka University, March 2002
T Nagao, Osaka University, March 2002
T Kanie, Osaka University, March 2001
K Wakae, Osaka University, March 2001
T Mori, Osaka University, March 2000
S Minami, Osaka University, March 2000

3. Status or summary

In Japanese

E153 12.0 T. Shimoda

2. Thesis

Master: I. Wakabayashi, Osaka University, March 2005
Y. Arakawa, Osaka University, March 2004
M. Asai, Osaka University, March 2001
M. Nakamura, Osaka University, March 2001

3. Status or summary

The direct measurements of the mobilities of impurity ions in superfluid helium were carried out by means of the β-rays from the radioactive nucleus ^{12}B and ^{9}Li. The observed mobility, which is a clue to the structure of the snowball formed around the ion, of the ^{9}L -snowball was in conflicted with the quantum mechanical prediction. The data analysis is in the final stage.

E154 5.0 A. Tamii

1. Journal

- A. Tamii et al., Modern Physics Letters A 18 (2003) 440--443 .

2. Thesis

Master: N. Uchigashima, University of Tokyo, March 2002.

E169 3.0 Y. Sakemi

3. Status or summary

We developed the new detector based on GEM (Gas Electron Multiplier) technology for the pion detection to measure the coherent pion production. The prototype of the detector was constructed and successfully used in the test experiment. We established the pion detection with GEM in this experiment.

E180 10.0 K. Hatanaka

2. Thesis

Doctor: Y. Shimizu, Osaka University, March 2006

3. Status or summary

A paper was submitted to Phys. Rev. C. It is being reviewed now.

We measured the differential cross section and the spin correlation parameter Cyy of the p-^{3}He elastic backward scattering (EBS) at 200, 300 and 400~MeV at θ = 180 degrees in the c.m. frame in order to study the mechanism of the reaction and to examine the validity of the ^{3}He wave functions based on two different realistic two-body forces. This is the first measurement of the spin correlation parameter Cyy of the p-^{3}He EBS at intermediate energies. The experimental results were compared with few-body calculations including three reaction mechanisms; two nucleon pair exchange, pion exchange, and direct *pp* scattering. It was found that few-body calculations describe the differential cross section data reasonably well. The spin correlation parameter Cyy shows a clear evidence for the two nucleon pair exchange processes in the reaction demonstrating that the spin observables are helpful for deeper understanding of the reaction mechanism.

E185 5.0 P. von Neumann-Cosel

1. Journal

- Y. Kalmykov et al., Phys. Rev. Lett. 96, 012502 (2006)

2. Thesis

Doctor: Y. Kalmykov, Technical University Darmstadt, October 2004

3. Status or summary

The analysis of the experiment is completed. The most important results haven been published in PRL. A full paper is presently prepared.

E190 5.0 T. Yamagata

1. Journal

- T. Yamagata et al., Phys. Rev. C71 (2005) 064316.

E196 7.0 A. Tamii

1. Journal

- H. Kuboki et al., Phys. Rev. C 74 (2006) 035203.

2. Thesis

Master: H. Kuboki, University of Tokyo, March 2004

E202 3.0 T. Yamagata

2. Thesis

Master: M. Kinoshita, Konan University, May 2005

E205 6.0 T. Noro

2. Thesis

Doctor: T. Ishida, Kyushu University, May 2007

3. Status or summary

Analysis is completed.

E214 4.0 A. Tamii

3. Status or summary

The purpose of this experiment, development of high quality beams, has been successfully achieved. The achievements have been applied in many experiments especially E249.

A publication is under preparation for submission to Nuclear Instruments and Methods.

E217 6.0 Y. Yasuda

3. Status or summary

Analysis was almost finished. We are preparing publication now.

We have measured cross sections and analyzing powers for ^{40}Ca(p,2p) reaction to obtain spectroscopic factors and widths of deep orbital states in ^{40}Ca. We analyzed deep orbital states with the multipole decomposition analysis method. The deduced strength 1s1/2 state ranges around 50MeV in separation energy. Summed strength of $1s_{1/2}$ state from 20 to 74 MeV in separation energy is 0.97. It is 49% of 2J+1.

E218 8.0 H. Sakai

2. Thesis

Master: M. Sasano, University of Tokyo, March 2005

3. Status or summary

The Gamow-Teller unit cross sections of the (p,n) reaction at 200 and 300 MeV have been obtained for several medium-heavy nuclei, Ni-58, Zn-70, Cd-114, Sn-118, and Sn-120. Obtained unit cross sections are used to derive the mass-number (A) dependence of the GT unit cross section, which is extremely useful to estimate the absolute GT strengths for the nucleus on which the GT unit cross section is not known, for example 90Zr.

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E219 9.0 R. Zegers

1. Journal

- R.G.T. Zegers, H. Akimune, Sam M. Austin, D. Bazin, A.M. van den Berg, G.P.A. Berg, B.A. Brown, J. Brown, A.L. Cole, I. Daito, Y. Fujita, M. Fujiwara, S. Gales, M.N. Harakeh, H. Hashimoto, R. Hayami, G.W. Hitt, M.E. Howard, M. Itoh, J. Janecke, T. Kawabata, K. Kawase, M. Kinoshita, T. Nakamura, K. Nakanishi, S. Nakayama, S. Okamura, W.A. Richter, D.A. Roberts, B.M. Sherrill, Y. Shimbara, M. Steiner, M. Uchida, H. Ueno, T. Yamagata and M. Yosoi, Phys. Rev. C. 74, 024309 (2006).H. Kuboki et al., Phys. Rev. C 74 (2006) 035203.

3. Status or summary

A second publication is currently being written. More analyses based on this data are in progress.

E220 2.0 S. Rakers

3. Status or summary

Low-lying part of the anaysis has been done. Emphasis placed on double beta decay

matrix elements. A draft of the first paper is in preparation.

E221 1.0 P. von Neumann-Cosel

1. Journal

- A. Byelikov et al., Phys. Rev. Lett. 98, 082501 (2007)

3. Status or summary

The analysis of the experiment is completed. The most important results have been published. A Doctor thesis is in preparation (end of 2007)

E226 15.0 Y. Masuda

3. Status or summary

We have obtained a UCN density of 10 UCN/cm^3 at a UCN maximum energy of 90 neV. The UCN density is higher than the Grenoble UCN density in an experimental bottle with a UCN maximum energy of a 100 neV.

For further improvement in the UCN density, we are studying a horizontal UCN extraction from the He-II bottle. In this arrangement, we expect

1. larger effective volume of He-II for the UCN production,
2. higher E_c for extracted UCN,
3. more efficient UCN extraction and transport from the He-II bottle.

We will place the cryogenic window of thin aluminum. We will place a UCN valve before the cryogenic window in order to avoid the multiple transmission loss. The heat load from the H-II film flow will be reduced, and then He-II temperature will be lower. We will use ^{4}He gas with a negligibly small ^{3}He impurity, which was purified by using superfluid film flow. We expect the cold neutron flux will increase by factor 5 by using a 5 μA proton beam, effective He-II volume factor 2, extraction and transport efficiency factor 2 and storage time factor 5. As a result we will obtain a UCN density of 1000 UCN/cm^3 with the improved UCN source at RCNP.

E234 5.0 T. Yamagata

1. Journal

- T. Yamagata et al., Phys. Rev. C74 (2006) 014309

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2. Thesis

Master: N. Warashina, Konan University, May 2006

E236 14.0 T. Wakasa

1. Journal

- Nucl. Instrum. Methods Phys. Res. A 547, 569-582 (2005).
- Phys. Lett. B 645, 402-407 (2007).

2. Thesis

Master: Y. Hagihara, Kyushu University, March 2005

E237 3.0 Y. Fujita

3. Status or summary

Further analysis is still needed. Results of the artial analysis have been reported.

E240 8.0 U. Garg

E276 6.0 U. Garg

2. Thesis

. Masters :S. Okumura, thesis, Osaka University, 2006

3. Status or summary

The analysis of the data is essentially complete. A Letter article has recently been submitted for publication. A full article is currently under preparation. This work will become part of the Ph.D. dissertation of Mr. Tao Li at the University of Notre Dame.

E242 7.0 G. Berg

1. Journal

- M. Wiescher, G.P.A. Berg, M.Couder, J.L. Fisker, Y. Fujita, J. Goerres, M.N. Harakeh, K. Hatanaka, A. Matic, W. Tan, A.M. van den Berg, Astrophysical nuclear reactions and the break-out form the hot CNO cycles, Progr. Part. Nucl. Phys (2007), in press

2. Thesis

Doctor: Andrija Matic, University of Groningen, June 2007

3. Status or summary

In this experiment the (p,t) reaction was studied on ^{24}Mg and ^{28}Si targets to measure possible resonance states above the p and α thresholds in ^{22}Mg and ^{26}Si . The measurements were very successful with an unprecedented precision of level energies of ΔE_x = 2 – 5 keV up to and above E_x = 10 MeV owing to the use of the dispersion

matched high resolution Grand Raiden spectrometer. These data allowed the identification of resonance levels and the calculation of stellar reaction rates with a precision of about 17% a significant improvement to previous measurements. This allowed addressing and improving our knowledge of the following astrophysical questions.

a) The rate of the ^{18}Ne(α,p) breakout reaction from the hot CNO cycle at 0.8 T_9 into the NeNa cycle was poorly known (error about 2 orders of magnitude), mainly due to exponential dependence of an the error in the excitation energies of the resonances in ^{22}Mg above the α threshold. This error could be improved significantly.
b) ^{22}Mg decays via ($\beta^+\nu$) with $T_{1/2}$ = 3.86 s and is, therefore, a waiting point in the rp process. It cannot be bypassed by the ^{22}Mg(p,γ)^{23}Al due to the low Q value. However, it can be bypassed via ^{22}Mg(α,p) ^{25}Al at sufficiently high temperatures. Our measurement of ^{28}Si(p,t)^{26}Si provided the first experimental energy levels above the α threshold at 9.146 MeV allowing reliable rate calculations.
c) ^{25}Al can decay via ^{25}Al($\beta^+\nu$)^{25}Mg(p,γ)^{26}Al$_{g.s}$ ($\beta^+\nu$)^{26}Mg*(γ = 1.808 MeV) ^{26}Mg$_{g.s.}$ where E_γ = 1.808 MeV was observed by the satellite based COMPTON γ ray observatory. The bypass reaction ^{25}Al(p,γ)^{26}Si($\beta^+\nu$) ^{26}Al*($\beta^+\nu$)^{26}Mg$_{g.s.}$ at temperatures > 0.4 T_9 that sets constraints on the γ–ray production was not determined well enough due to the lack of resonance levels in ^{26}Si that we measured using the ^{28}Si(p,t)^{26}Si reaction.

The data analysis and stellar rate calculations are completed and are presented together with the astrophysical conclusions in the dissertation of Andrija Matic. Further scientific results of the project as described above will be published in Physical Review.

E243 10.0 G. Berg

3. Status or summary

The (α,^{8}He) reaction plays a unique and important role in the investigation of the rp process. This reaction removes 4 neutrons from the target nucleus and can therefore obtain resonance level information of very proton rich nuclei otherwise only accessible via radioactive beam facilities in inverse kinematics. Experiment E243 was designed to measure the reactions ^{46}Ti (α,^{8}He) ^{42}Ti, and ^{50}Cr (α,^{8}He) ^{46}Cr. We could demonstrate on a ^{28}Si and ^{13}C target that 0 deg setup at the Grand Raiden spectrometer is indeed suitable to measure this reaction. Unfortunately, the cross sections of the reactions of interest are too small to accumulate enough statistics within a week of run time. In

order to make this experiment realistic the luminosity has to be increased by about a factor of 10. The target thicknesses can be increased by about a factor of 2 – 3. The maximum beam current at present is about 100 – 150 pnA. This current needs to be increased by about a factor of 3 – 5 to pursue this experiment successfully.

E246 **3.0** **Y. Uozumi**

E248 **5.5** **H. Sakaguchi**

2. Thesis

Master: Y. Iwao, Kyoto University, March,2007

3. Status or summary

Data reduction has been completed. During the analysis to deduce neutron density distribution we have noticed and realized that the absolute values of the differential cross section affect sensitively the density distribution of the neutrons. And thus the thickness of the neutron skin is also very sensitive to the absolute cross section value. Before getting the final conclusion on the skin thickness, we are going to calibrate the efficiency of the Faraday cups and trigger scintillators in a separate test experiment.

E249 **14.0** **A. Tamii**

2. Thesis

Master: H. Matsubara, Osaka University, March 2006

3. Status or summary

Development of the analysis procedure is mostly finished. Now we are trying to fix the final data.

E250 **7.0** **M. Yosoi**

3. Status or summary

Measurements were successfully finished. Data analysis for the ^{5}He(s-hole) states is in almost final stage. Analysis for the ^{8}Li(s-hole) is in progress.

E251 **6.0** **A. Sakaguch**

3. Status or summary

We obtained subthreshold (p,2pi) data at Ep=430MeV for Be and Cu targets. Data analysis was almost completed. We saw clear yield of the 2pi productions. Theoretical

analyses are in progress for a doctoral thesis and papers.

E252 5.5 N. Botha

1. Journal

- Physical Review C 75 (2007) in press.

3. Status or summary

In order to get supporting data to determine the R^{2} value, the ratio of the GT and Fermi interaction strengths, 34S data taken at the same condition as the 56Fe data was analyzed first. Interesting results from this analysis was summarized as the first report.

The analysis of the main part, the 56Fe data, is in progress at iThmba LABS, South Africa.

E253 6.0 T. Kawabata

2. Thesis

Master: Y. Sasamoto, University of Tokyo, March 2006

3. Status or summary

Data analysis is still in progress.

E255 4.0 S. Terashima

3. Status or summary

Data reduction of both SiO2 and Ice target had done. To study for a nuclear structure and a effective interaction with light-mass nuclear region, we are comparing our experimental data with several density distributions and several interactions.

E256 14.0 T. Wakasa

2. Thesis

Master: M. Dozono, Kyushu University, March 2007

3. Status or summary

J. Phys. Soc. Jpn, submitted.

E258 8.0 T. Noro

2. Thesis

Master: Y. Nagasue,, Kyushu University, March 200 6

3. Status or summary

This experiment was updated to E284 after a short trial measurement.

E259 3.0 K. Fujita

3. Status or summary

We have performed the test experiment to establish the measurement of coherent pion production. The full sized GEM detector for the pion measurement covering the interested energy range was developed and tested. The readout system was also prepared for this experiment using Space-Wire readout protocol. We have succeeded in the coincidence measurement of neutron and pion to identify the excited states of residual nucleus. By observing the missing mass of the residual nucleus from these information, we could extract the ground state, which means that the corresponding events are from coherent pion process. The detailed analysis is in progress at present, and we plan to extract the delta short range correlation parameter g'dd from this data by the end of this year as Fujita-kun's thesis.

E260 3.0 R. Zegers

3. Status or summary

The first publication based on this data is currently being written. Further analysis is in progress.

E263 4.0 S. Nakayama

E270 3.5 Y. Maeda

3. Status of the analysis and a short summay.

The measurement of ^{1}H(p,pp) breakup reaction was performed at 250MeV. Data analysis is in progress.

E271 9.0 K. Hatanaka

3. Status or summary

Data analysis is in progress. A part of results will be presented at INPC2007.

We measured Axx, Ayy and Azz of the dp capture reaction at 200 MeV. The purpose of the experiment is to resolve the discrepancies between RCNP previous data and KVI data. This reaction is sensitive to short range interactions between nucleons and gives important information on the three nucleon system. Results are the experimental part of the dissertation of the graduate student Yuji Tameshige, Osaka University as part of

his PhD project

E272 16.0 M. Sasano

3. Status or summary

The (p,n) measurements at 300 MeV have been performed on the double beta decay nuclei, Ca-48, Ge-76, Mo-100, and Cd-116 for deducing the GT transition strengths B(GT-) in Sc-48, Ga-76, Tc-100, and In-116.

For the transition to the ground state of In-116, the B(GT-) value of 0.26+-0.02 is obtained. From this B(GT-) value and the B(GT+) value by a beta decay experiment, the contribution of the intermediate ground state of In-116 to the nuclear matrix element of the double beta decay in Cd-116 is deduced to be 0.07+-0.03. This value agrees with well with the result of the decay measurement although the contribution of the excited states in In-116 is neglected.

E273 1.0 Y. Fujita

3. Status or summary

Analysis is in progress in collaboration with the Koeln Univeristy group. Clemens Scholl, a PhD student from Koeln is now staying at RCNP and high resolution spectra are under construction.

E274 3.0 T. Yamagata

3. Status or summary

Analysis is in progress.

E277 6.0 A. Odahara

3. Status or summary

In order to study the systematics of the high-spin shape isomers in $N = 83$ isotones, the spin of the ^{151}Er state was investigated using the ^{116}Sn(^{40}Ar,5n) reaction. The γ-γ coincidence relations revealed a new transition which suggested a 61/2 spin for this isomer. The result contradicts the previous assignment of 67/2 by the Grenoble group and is consistent with the prediction by the deformed independent particle model, which explains the isomerism as a sudden shape change in the $N = 83$ isotones. The data analysis is almost completed. The publication is in preparation.

E278 2.0 J. Kataoka

2. Thesis

Master: Y. Kanai, Tokyo Institute of Technology , March 2006

3. Status or summary

Analysis is almost completed, but we would like to have additional data to make the experiment more sense. This is because our detector system (in particular DAQ) has changed significantly this year, and we need follow-up experiments under similar conditions. We will submit a new proposal requesting other beam time this year, or in 2008 at the latest.

We investigated the performance of one-unit PoGOLite sensor irradiated by weak gamma-ray signals (59.5 keV) under constant illumination of 392 MeV protons (0.1 k to 100 k cts/s). We confirmed that our detector system works pretty well under various injection of high energy protons, which is about a factor of 10 larger than that expected in orbit.

E280 3.0 C. Theis

3. Status or summary

We've analyzed the data of all ionization chambers that were used for our measurements with 250 and 392 MeV neutrons. In parallel FLUKA Monte Carlo simulations of the experiment were set up using the measured neutron spectra of Taniguchi-san et al. as source terms and the calculations were compared to the measurements. As a result we saw that the first assumption that the photon contribution is negligible turned out to be incorrect. In terms of fluence it is certainly low, but taking the sensitivity of our ionization chambers into account we found that it cannot be neglected. During our stay we've been informed that no detailed information of the photon spectra at RCNP was available so far and that's why we tried to simulate the ^{7}Li(p,n) reaction to obtain the respective photon spectra. Subsequently, these were taken into account in the simulation in order to obtain the combined contribution of neutrons and photons for our ionization detectors. For the 392 MeV protons we found good agreement between the simulations and measurements but for the 250 MeV protons this was not the case. A more detailed investigation showed that this can be attributed to known problems in the Monte Carlo models describing the ^{7}Li(p,n) reaction for the energy range of 250 MeV and below.

Therefore, we would be very interested if at one time detailed spectral information about photons at the n-TOF facility at RCNP is available. In that case we would very much appreciate if you could inform us about this.

It will be a part of my own PhD thesis at the TU-Graz, Austria, 2007.

E281 **1.0** **K. Takahisa**

E283 **2.0** **T. Yamagata**

3. Status or summary

Data analysis is in progress.

E284 **3.5** **T. Noro**

2. Thesis

Master: H. Takeda, Kyushu University, March 2007

3. Status or summary

A major part of data analysis is finished.

E293 **2.5** **H. Okamura**

3. Status or summary

Data analysis is in progress. A part of data was presented in NEPSE07.