EURICA Workshop

Report of Contributions

https://indico.gsi.de/e/1313

Contribution ID: **0** Type: **not specified**

Role of the neutron d5/2 sub-shell in the evolution of Ge and Se isotopes

Monday, 12 September 2011 13:00 (15 minutes)

Recent data on Ge and Se isotopes above the N=50 shell closure has led to the discussion of a weakening of the Z=28 proton shell, based on relatively low first excited 2+ energies in the N=52 Ge and Se isotones. Further discussion relates to the possible emergence of a new neutron sub-shell closure at N=58, based on the evolution of single particle energies in N=51 isotones. Both effects would arise from tensor forces that result in shifts of single-particle energies, and which hence play a crucial role in the predictions of structure of neutron rich isotopes far above N=50.

Whereas the possibility of a N=58 sub-shell seems more likely for nuclei below the Z=28 shell, above Z=28 data seems to indicate the possibility that the neutron 2d5/2 sub-shell closure reappears in Se isotopes. The closure of this orbital is responsible for the nearly doubly-magic character of 96Zr, but becomes more washed out in Sr and Kr isotopes with only a modest rise of the 2_1+ energy at N=56. In all cases, that is in the Zr, Sr, and Kr isotopes, the 2_1+ energy drops slightly from N=52 to N=54. Recent data on the neutron-rich 88Se, however, indicates a vast change in structure. The 2_1+ energy in the N=54 88Se lies considerably higher than in it's N=52 neighbor isotope. This may be indicative of approaching a pronounced recurrence of a sub-shell closure which may occur at N=56. Another possibility would be the occurrence of a neutron sub-shell at N=54, which seems unlikely since it would afford a dramatic drop of the energy of the neutron 2d3/2 orbital.

We are particularly interested in obtaining data on the N=56 88Ge and 90Se isotopes in order to probe whether their 2_1+ energies indeed raise toward this neutron number. Also the 2_1+ energies of the N=54 86Ge and 88Se need to be measured - in order to track the structural evolution in those isotopes and identify a possible sub-shell closure. Only one experiment so far has identified the energy of the 2_1+ state in 88Se, in the other isotopes mentioned these energies are unknown. The RIBF facility offers the unique possibility to produce neutron-rich nuclei in the A~90 mass region in fission with sufficient yields to perform gamma-spectroscopy with a large HPGe detector array. Spectroscopy can be done after beta-decay, relating gamma-rays to implants in a focal plane detection system.

The most challenging isotope in the context is 88Ge, to be probed via beta-decay from 88Ga. The production rate that can be expected for this isotope lies truly on the frontier. The fission yields for the other isotopes needed for the beta-decay study, that is 86Ga, 88As, and 90As, should be more than sufficient. It may even be possible to have even heavier As isotopes in the fission cocktail, which would allow to track the onset of deformation beyond the possible neutron sub-shell. Likely, more than the first excited state can be observed for nuclei like 88,90Se and 86Ge, which will give further evidence for their structure, e.g., through the energy ratio of the first two excited states, R4/2 = E(4_1+)/E(2_1+).

There is some overlap in interest with the proposal on 92-94Se by Krücken et al., which is particularly focused on the onset of deformation in the more neutron-rich Se isotopes.

Summary

We propose to test the d5/2 sub-shell closure in the N=56 isotopes 88Ge and 90Se by measuring the energies of the respective first excited 2+ states. This study is motivated by the rise in 2_1+ energy that has been observe in 88Se, giving rise to a recurrence of a pronounced shell gap, which is known to be strong in Zr isotopes, but has been washed out at lower Z.

Primary authors: REGAN, Patrick (University of Surrey); WERNER, Volker (Yale University)

Co-authors: GARNSWORTHY, Adam (TRIUMF); HACKMAN, Greg (TRIUMF); DOORNENBAL, Pieter (RIKEN); KRUECKEN, Reiner (TRIUMF); PODOLYAK, Zsolt (University of Surrey)

Presenter: WERNER, Volker (Yale University)

Session Classification: Neutron-Rich I

Contribution ID: **1** Type: **not specified**

Spectroscopic and isomeric study of very neutron rich Iron isotopes

Monday, 12 September 2011 13:30 (15 minutes)

In the region of the neutron rich iron isotopes, around the r-process starting point, only few spectroscopic information is available. We aim to determine life times, beta and isomeric decays and built first level schemes in 70-72Fe and around. We plan to use the unique combination of the high beam intensities available at RIKEN together with BigRIPS-ZeroDegree spectrometer and the EURICA and DSSSD pixel array.

Primary author: BENZONI, Giovanna (INFN)

Co-authors: WATANABE, Hiroshi (RIKEN); WIELAND, Oliver (INFN)

Presenters: BENZONI, Giovanna (INFN); WIELAND, Oliver (INFN)

Session Classification: Neutron-Rich I

Contribution ID: **2** Type: **not specified**

Search for tetrahedral shape around 110Zr and possible shell closure at N=70

Monday, 12 September 2011 15:15 (15 minutes)

Symmetry of tetrahedral shape generates a different degeneracy in single particle levels from the quadrupole deformed shape. The stability of the tetrahedral shape is not established in the atomic nuclei. Neutron-rich nucleus 110Zr, which has the doubly magic numbers of tetrahedral shape, Z = 40 and N = 70, is one of the candidates to search for the tetrahedral shape. Recently, we discovered the candidate of the tetrahedral shape isomer in 108Zr at RIBF, but the energy of isomeric state has not been determined due to low statistics. We propose beta-gamma and isomer spectroscopies of the isomer in 108Zr, and search for isomer in 110Zr, 110,112Mo with EURICA at RIBF. We will discuss possibilities of tetrahedral shape from the energy and half life of isomeric state and systematic search for long-lived isomer in even-even nuclei.

The stability of the tetrahedral shape competes with the stability of different shapes. So, structures in the vicinity of 108Zr are important, especially the shell evolution at N=70, where a shell gap is predicted. The level structure of 110Zr and 112Mo with N=70 would be obtained by the isomer and beta-gamma spectroscopy, respectively. The beta-gamma spectroscopy of lighter Zr, Nb, and Mo isotopes is also performed to investigate deformed level structures.

In this workshop, I will show the results of ^{106,108}Zr from the first decay experiment at RIBF and a proposal of the decay experiment with EURICA around 110Zr.

Primary author: SUMIKAMA, Toshiyuki (Tokyo University of Science)

Presenter: SUMIKAMA, Toshiyuki (Tokyo University of Science)

Session Classification: Neutron-Rich II

Contribution ID: **3** Type: **not specified**

Search for K-Isomers in Neutron-Rich Z~60 Isotopes

Monday, 12 September 2011 16:15 (15 minutes)

Experiments to study excited levels in neutron-rich Z~60 isotopes through isomer spectroscopy will be discussed.

Primary author: IDEGUCHI, Eiji (CNS, University of Tokyo)

Presenter: IDEGUCHI, Eiji (CNS, University of Tokyo)

Session Classification: Neutron-Rich II

Contribution ID: **4** Type: **not specified**

Search for long-lived isomeric activities ”below” 132Sn

Monday, 12 September 2011 15:45 (15 minutes)

The r-process overabundance in the mass region A~120 has been a subject of considerable scientific interest in the last decade. Different nuclear physics phenomena such as shell-quenching and “unreasonably” long beta-decay half-lives were discussed as possible reasons for the observed discrepancy.

Long-lived activities are known to exist throughout a number of odd-Z, even-N and even-Z, odd-N nuclei in the A<132 region. In the regions around the doubly magic nuclei these single-particle isomers are expected to persist up to the respective shell gap, which in the neutron-rich region may lead to situations, where the excited isomeric state has a half-life longer than the ground state half-life. Therefore, the present proposal focuses on the search for long-lived millisecond beta-decaying isomeric states, placed in vicinity to the 132Sn nucleus.

Primary author: LALKOVSKI, Stefan (University of Sofia)

Co-authors: KONDEV, Filip (Argonne National Laboratory, USA); WALKER, Phil (University of Surrey, UK); PODOLYAK, Zsolt (University of Surrey, UK)

Presenter: LALKOVSKI, Stefan (University of Sofia)

Session Classification: Neutron-Rich II

Contribution ID: **5** Type: **not specified**

Neutron monopole drift towards 78Ni investigated by γ-spectroscopy following 81Cu β-decay

Monday, 12 September 2011 14:15 (15 minutes)

We propose to investigate the beta decay of the neutron rich N=52 nucleus 81Cu for EURICA campaign, in order to observe for the first time the low lying excited states in the N=51 isotone 81Zn. N=51 odd isotones constitute the best cases to study the neutron single particle effective energy evolution towards 78Ni. The study of 81Zn level sequence will provide critical data to predict the neutron single particle sequence in the 78Ni field. It is expected in that way to shed light on the structure of 78Ni itself, which could be the most neutron rich example of a doubly magic nucleus in the nuclide chart. The study will be performed at RIBF with EURICA detectors.

Primary author: NIIKURA, Megumi (IPN Orsay)

Presenter: NIIKURA, Megumi (IPN Orsay)

Session Classification: Neutron-Rich I

Contribution ID: **6** Type: **not specified**

Decay Spectroscopy in the vicinity of 78Ni

Monday, 12 September 2011 14:00 (15 minutes)

Study of doubly-closed-shell and neighboring nuclei provides great opportunities for testing of nuclear models and expanding our knowledge of nucleosynthesis processes. Especially, the region around 78Ni (Z=28, N=50) has attracted great interests because of its extreme neutron-to-proton ratio in the region far from the valley of stability. Despite of a great deal of theoretical activity devoted to the 78Ni, a little is known for 78Ni itself and nothing beyond because of their extremely low production yield in the experiment.
RIBF facility has started providing very neutron-rich nuclei with the world's highest intensity uranium beam. Recent discovery of very neutron-rich nuclei including 79Ni [1] assures that systematic study of decay properties (half-lives, beta-delayed gamma) of nuclei around 78Ni becomes feasible eventually.
Here, our proposal of decay spectroscopy in the vicinity of 78Ni will be presented together with possible scientific program with a combination of our high efficiency beta-counting system and high efficiency euroball cluster (E(U)RICA).

[1] T.Ohnishi, et al., JPSJ 79, 073201 (2010).

Primary author: NISHIMURA, Shunji (RIKEN)

Presenter: NISHIMURA, Shunji (RIKEN)

Session Classification: Neutron-Rich I

Contribution ID: **7** Type: **not specified**

b-decay spectroscopy study of the very neutron rich-nuclei Nb-Cd, including the r-process waiting point 128Pd

Monday, 12 September 2011 15:30 (15 minutes)

The b-decay study of the region around the N=82 shell closure is critical for r-process models. With this experiment we intend to study the decay of the N=82 nuclei 128Pd and 129Ag that are expected to be waiting points for the the r-process in most r-process models, and therefore their study will dramatically improve the reliability of the r-process calculations.
New half-lives will also be measured for more than 30 isotopes with N<82 including the r-process nuclei 124Ru, 113Nb that are predicted to be waiting points in some r–process models.
The experiment will also extend the E(2+) systematics of the Pd isotopic chain to 122,124Pd. These nuclei are the first isotopes that are affected by the rapid decrease in deformation predicted by the FRDM model that for more exotic nuclei leads to pronounced changes in the r-process path. E(2+) will also be measured for 116,118Ru and 112Mo, three important nuclei in a region where deformation is the focus of intense theoretical and experimental efforts.
The nuclei of interest will be produced by fission of a 345 A/MeV 238U beam colliding with a 9Be target. Fission fragments will be selected by the BigRIPS spectrometer, and implanted in a stack of Si detectors surrounded by the EURICA gamma detectors.
With our experimental apparatus we will be able to measure half–lives, b–delayed gamma rays as well as photons from the decay of microsecond isomers. The results will have implications for nuclear structure studies by providing data to improve the parameterisation of mass formulas, and will reveal new insights into important open questions such as shell quenching and the neutron pairing interaction.

Primary author: LORUSSO, Giuseppe (RIKEN)

Presenter: LORUSSO, Giuseppe (RIKEN)

Session Classification: Neutron-Rich II

Contribution ID: **8** Type: **not specified**

Status of EURICA

Monday, 12 September 2011 09:20 (20 minutes)

Status report of the EURICA project.

Primary author: DOORNENBAL, Pieter (RIKEN)

Presenter: DOORNENBAL, Pieter (RIKEN)

Session Classification: Introduction

Contribution ID: **9** Type: **not specified**

Non-yrast structure of neutron-rich Zr nuclei

Monday, 12 September 2011 14:30 (15 minutes)

Neutron-rich zirconium (Z=40) nuclei lie in the midst of a shape-changing region with many models predicting a transition from spherical to prolate/oblate coexistence at N~60. Measurements of the mean-square charge radii in the zirconium chain [Ca02] indicate a shape transition at N=59. In order to further investigate the low-lying structure of more-exotic systems, an experiment was undertaken at the GSI facility to study 104,106Zr populated following the beta decay of 104,106Y produced in the projectile fission of a 750 MeV.A 238U beam. The beam impinged on a Be target and the recoiling fission fragments were analysed, separated and slowed in the GSI FRagment Separator and stopped in an array of position-sensitive silicon detectors. Gamma rays emitted following the beta decay of the yttrium ions were measured using the RISING array in its stopped-beam configuration and correlated with the implanted ions. Details of the measurements on the exotic zirconium nuclei will be presented and discussed along with future plans to measure more-exotic systems.

[Ca02] P.Campbell et al., Phys. Rev. Letts. 89 (2002) 082501.

Primary author: BRUCE, Alison (University of Brighton)

Co-authors: GADEA, Andres (University of Valencia); BENZONI, Giovanna (University of Milano); VALIENTE-DOBON, Jose Javier (LNL); PIETRI, Stephane (GSI); PODOLYAK, Zsolt (University of Surrey)

Presenter: BRUCE, Alison (University of Brighton)

Session Classification: Neutron-Rich I

Contribution ID: **10** Type: **not specified**

Investigation of the proton-neutron T=0 condensate through GT decay to the quasi-deuteron 1+ state in odd-odd N=Z Nuclei

Monday, 12 September 2011 11:15 (15 minutes)

It is well known that in the atomic nucleus, alike nucleons (neutrons or protons) in time reverse orbits, couple in pairs giving rise to nuclear superfluidity, with very significant impact in the structure as well as in the collective properties of the nucleus. In addition, nuclei consist of a combination of two fermionic fluids (neutrons and protons) and as a consequence of the isospin (T) degree of freedom, four types of pairs, the triplet with T=1, J=0 and the singlet T=0 J>0, are expected. It has been shown that T=0 pairs will be only relevant in the vicinity of N=Z nuclei[1,2] In medium mass N=Z nuclei, the existence of T=0 pairing has been studied searching for the absence of Coriolis Anti-Pairing effects at high angular momentum in rotational bands[1,2,3]. It has been suggested as well that the structure of heavy N=Z nuclei as the 92Pd can be due to proton-neutron isoscalar pairing correlations [4]. Nevertheless no clear-cut signature has been found, in particular on the existence possibility of a T=0 pairing condensate. It has been suggested that enhanced Gamow-Teller (GT) β-decay rates between the ground state of an even-even N+2=Z nucleus and the lowest I=1 state of its odd-odd N=Z daughter nucleus can be the fingerprint of T=0 pairing. The role played in β-decay by proton-neutron coherent pairs (bosons) have been extensively discussed by F.Iachello [5,6] in the framework of the proton-neutron boson scheme (IBM-4). While in light nuclei strong GT transitions to low lying states result from the presence of approximate SU(4) symmetry, the existence of strong spin-orbit splitting, in heavier nuclei, suppresses the symmetry. The GT strength can then be fragmented over many final states resulting in a reduced B(GT) for the low lying ones [7,8,9,10].
Recently, the Gamow-teller β-decay of the 62Ge T=1 0+ g.s. into excited states of the odd-odd N=Z 62Ga have been studied for the first time at the GSI laboratory with the Fragment Separator (FRS) and the RISING Ge-array coupled to an active implantation setup. The aim was to seek for an enhancement of the B(GT) as fingerprint of the proton-neutron T=0 condensate in the odd-odd N=Z nuclei. Contrary to expected, a diminish B(GT)=0.07±17 gA2/4π has been observed for the transition to the first 1+ state lying at 571 keV excitation energy. A lifetime of τ=119.6 ±20 ms has been measured for the 62Ge ground state.
The reason for choosing the 62Ge T=1 0+ g.s decay was mainly the secondary beam intensities available at FRS during the Rising Stopped beam campaign. Nevertheless, there are strong indications that only in heavy masses A~80 it would be possible to find a real T=0 p-n pairing condensate. In the present LoI we propose the study of the Gamow-Teller decay of the 78Zr or 82Mo, Tz=-1 nuclei, T=1 0+ g.s to the odd-odd N=Z 78Y or 82Nb. While probably the 82Mo is a better choice, the secondary beam intensities might prove the experiment unfeasible.
The 78Zr nuclei will be produced by fragmentation of a 124Xe primary beam at 345 MeV.A in a 1000 μm Be target. The yield with BigRIPS, assuming a primary beam with 10 pnA , will be of the order of 9.0 10-2 leading to the implantation of 7000 78Zr atoms per day. To achieve the sensibility obtained in the 62Ge case 4 days of beam time will be required.
The 82Mo nuclei can be as well produced by fragmentation of a 124Xe primary beam at 345 MeV.A in a 1000 μm Be target. The yield with BigRIPS, assuming a primary beam with 10 pnA , will be of the order of 2.0 10-2 leading to the implantation of 1500 78Zr atoms per day. To achieve the sensibility obtained in the 62Ge case 10 days of beam time will be required. A minimum of 7 days has to be allocated for the 82Mo case
The active stopper, for the beta-decay studies, is required.

[1] W. Satula and R. Wyss Phys Lett. B 393 (1997) 1
[2] S. Frauendorf , J. Sheikh Nucl. Phys. A 645 (1999) 509
[3] G.de Angelis et al., Phys. Lett. B 415 (1997) 217

[4] B. Cederwall et al., Nature 469 (2011) 68
[5] F.Iachello, Proceeding Int. Conf. on Perspectives for the IBM, Padova Italy, (1994) p.1.
[6]F.Iachello, Yale University preprint YCTP-N13-88 (1988).
[7]P.Van Isaker, Rep. Prog. Phys. 62 (1999) 1661.
[8]A.F. Lisetskiy, et al., Eur. Phys. J. A 26 (2005) 51.
[9]I.Petermann, et al., Eur. Phys. J. A 34 (2007) 319.
[10]E.Grodner, A.Gadea et al., in preparation

Primary author: GADEA, Andres (IFIC, CSIC-University of Valencia)

Presenter: GADEA, Andres (IFIC, CSIC-University of Valencia)

Session Classification: N~Z

Contribution ID: **11** Type: **not specified**

Study of proton decays of high-spin isomeric states of N=Z nuclei below 100Sn

Monday, 12 September 2011 10:45 (15 minutes)

Recent work at GSI has enabled us to obtain evidence for the 16+ spin-gap isomer in 96Cd via its beta decay to the 15+ isomeric state in 96Cd. However, large scale shell model calculations using the gds model space indicate that the state should also undergo beta-delayed proton decay. Our previous data did not have sufficient statistics to enable us to search for such decays. It is important to confirm the presence of such a decay mode, since it has implications for the GT strength and the purity of the wavefunction of the 16+ state. In addition, we would also like to perform a dedicated reinvestigation of the proton decay modes of the 21+ isomer in 94Ag where one aim will be to search for firm evidence of fine structure in the single proton decay spectrum. We aim to study the decay modes of both the ground state and 7+ isomer in this nucleus.

Primary author: WADSWORTH, Robert (University of York)

Presenter: WADSWORTH, Robert (University of York)

Session Classification: N~Z

Contribution ID: **12** Type: **not specified**

Workshop Aims

Monday, 12 September 2011 09:15 (5 minutes)

Primary author: REGAN, Patrick (University of Surrey)

Presenter: REGAN, Patrick (University of Surrey)

Session Classification: Introduction

Contribution ID: **13** Type: **not specified**

General Discussions and Next Steps

Monday, 12 September 2011 16:45 (15 minutes)

Primary author: REGAN, Patrick (University of Surrey)

Presenter: REGAN, Patrick (University of Surrey)

Session Classification: General Discussions and Next Steps

Contribution ID: **14** Type: **not specified**

Welcome

Monday, 12 September 2011 09:00 (15 minutes)

Presenter: SCHEIDENBERGER, Christoph (GSI)

Session Classification: Introduction

Contribution ID: **15** Type: **not specified**

Details of BigRIPS relevant to EURICA proposals

Monday, 12 September 2011 09:40 (20 minutes)

Presenter: SUMIKAMA, Toshiyuki (Tokyo Unviversity of Science)

Session Classification: Introduction

Contribution ID: **16** Type: **not specified**

Discussion of proposals and submission to RIKEN NP-PAC

Monday, 12 September 2011 17:00 (30 minutes)

Primary author: DOORNENBAL, Pieter (RIKEN)

Presenter: DOORNENBAL, Pieter (RIKEN)

Session Classification: General Discussions and Next Steps

Contribution ID: **17** Type: **not specified**

Isomer states in neutorn-rich 73,75,77Ni

Monday, 12 September 2011 11:30 (15 minutes)

An experiment based on gamma-decay of isomer state in neutron-rich 77Ni produced from fragmentation of a 238U beam is proposed in order to reveal the neutron single particle energies associated with the N=40 and N=50 shell closures. Based on the lifetime of the 1/2- isomeric state in 77Ni an estimate or at least a lower limit on the energy of the 2+ state in 78Ni can be deduced. Energy and life time of the 1/2- state in lighter 73,75Ni isotopes, which can be measured simultaneously, is needed to reveal the structure of these nuclei from gamma spectroscopy.

Primary author: SOHLER, Dora (Institute of Nuclar research (ATOMKI))

Presenter: SOHLER, Dora (Institute of Nuclar research (ATOMKI))

Session Classification: N~Z

Contribution ID: **19** Type: **not specified**

Beta decay Studies of several Tz=-1 and Tz=-2 nuclei in the fp shell

Monday, 12 September 2011 11:00 (15 minutes)

We have studied the Tz = -1 -> 0 beta decays of 42Ti, 46Cr, 50Fe and 54Ni to the self-conjugate nuclei 42Sc, 46V, 50Mn, and 54Co respectively (Ph.D Thesis, Francisco Molina- Uni. Valencia) at GSI during the stopped beam RISING campaign. The nuclei of interest were produced in the fragmentation of a 58Ni beam at 680 MeV/nucleon. The number of implanted ions of the nucleus of interest was typically 3-6 x 106 in total. The excellent statistics allowed us to determine, among other things, the absolute B(F) and B(GT) values for the Fermi and Gamow-Teller beta transitions. The B(GT) values are of importance inter alia in terms of a comparison with the analogous Charge Exchange (CE) reactions on the mirror nuclei (Fujita et al.,PRL95(2005)212501). The differences between the B(GT) values obtained from the beta decay, which were not large but clearly visible, and the CE can be attributed either to isospin symmetry breaking or to complexities associated with the CE reaction mechanism. A better understanding of this second possibility has an important impact on our understanding of GT excitations in nuclei and the long standing problem of the missing strength.
Motivated by these ideas we have pursued this further in experiments at GANIL, where we have studied the beta decays of the Tz=-1 58Zn and Tz=-2 56Zn nuclei above the f7/2 shell. However these nuclei are more difficult to produce due to the lack of appropriate Tz=+1 stable targets.
The high intensity beam at RIKEN together with the EURICA array would allow us to extend these studies to higher masses and more exotic cases. This would allow, for instance, the study of mirror symmetry in heavier mass systems by comparison with the corresponding charge exchange reactions.
Amongst the cases of interest are the very neutron-deficient Tz=-2 Se and Ge nuclei, which could be compared with the mirror CE process, and the Tz=-1 Ge, Se, and Kr nuclei which are of interest from several viewpoints, a) to study the evolution of the B(GT) strength in the fp shell, b) to study further the "Quasi-rule" for the M1 transitions (Warburton and Weneser in "Isospin in Nuclear Physics", 1969, SBN 7204 0155 0)and c) to study a possible proton-neutron condensate. 71Kr decay is also of great interest since its g.s. seems to be different from its mirror 71Br.
All these cases could be studied using the fragmentation of a 78Kr beam at RIKEN and the EURICA array and could be coupled to the experiment proposed by B. Blank and collaborators, which focuses on two-proton radioactivity, and is already approved.

Primary authors: RUBIO, Berta (University of Valencia); GELLETLY, William (University of Surrey); FUJITA, Yoshitaka (RCNP)

Presenter: RUBIO, Berta (University of Valencia)

Session Classification: N~Z

Contribution ID: **20** Type: **not specified**

Structural evolution of nuclei along the r-process path around A=100

Monday, 12 September 2011 12:45 (15 minutes)

RIBF can produce very neutron rich nuclei in the A=90-110 region with unprecedented intensities. The structural evolution in this mass region is particularly rich since substantial energy gaps between various deformation driving Nilsson orbitals exist and configurations of different shape compete at low excitation energies. At the same time the properties of these nuclei are relevant for the dynamics in time and isospin of the material flow of the astrophysical rapid neutron capture process through this mass region. The recent half-live measurements at RIBF in this mass region have indicated that the r-process flow may be faster through this mass region than anticipated from using traditional models for the prediction of the ground state properties. However, more detailed structural information will be very helpful in understanding the details of the structural evolution in this region and further constrain theoretical models. In particular the half-lives of very neutron-rich Rb isotopes beyond A=102 and the structural evolution in the very neutron rich Sr, Zr, Mo, Pd isotopes would be of great interest in this investigation. We are also particularly interested the decay spectroscopy of neutron-rich As allowing access to Se isotopes around A=100, which lie between the single-particle dominated Ge and the collective Kr isotopes in this mass region. This transition has yet to be mapped out. The Se isotopes around 92–94Se are particularly noteworthy. In the Sr and Kr isotopes, there is a sudden change from transitional behavior to strong prolate deformation at neutron number N=60. However, in the Ge isotopes heavier than 82Ge, there is recent evidence pointing to the emergence of a new shell closure at N=58 arising due to the tensor forces responsible for other emergent behavior at the extremes of neutron excess. These Se isotopes, then, are likely to lie not only along the r-process, but along a frontier beyond which the tensor forces dominate the nuclear structure. These nuclei are truly on the frontier; nothing is known about them, beyond being nucleon-bound. RIBF's particle identification and separation techniques are ideally suited to unambiguous measurement and assignment of decay properties (half-lives, gamma rays, etc) to these exotic nuclei.

Primary authors: GARNSWORTHY, Adam (TRIUMF); HACKMAN, Greg (TRIUMF); KRUECKEN, Reiner (TRIUMF)

Presenter: GARNSWORTHY, Adam (TRIUMF)

Session Classification: Neutron-Rich I

Contribution ID: **21** Type: **not specified**

Study of the N=34 subshell gap

Monday, 12 September 2011 13:15 (15 minutes)

Primary author: VALIENTE-DOBON, Jose Javier (LNL)

Presenter: VALIENTE-DOBON, Jose Javier (LNL)

Session Classification: Neutron-Rich I

Contribution ID: **22** Type: **not specified**

Beta decay of the neutron-rich 132,134Cd isotopes and search for 6+ isomers in 136,138Sn

Monday, 12 September 2011 16:00 (15 minutes)

Primary authors: JUNGCLAUS, Andrea (CSIC Spain); GADEA, Andres (IFIC, CSIC-University of Valencia); SIMPSON, Gary (LPSC Grenoble)

Presenter: SIMPSON, Gary (LPSC Grenoble)

Session Classification: Neutron-Rich II

Contribution ID: **23** Type: **not specified**

Study of 74Ni through beta decay of 74Co

Monday, 12 September 2011 13:45 (15 minutes)

Primary author: DE ANGELIS, Giacomo (INFN Legnaro)

Presenter: DE ANGELIS, Giacomo (INFN Legnaro)

Session Classification: Neutron-Rich I

Contribution ID: **24** Type: **not specified**

152Nd and 170Dy from fission fragments

Monday, 12 September 2011 16:30 (15 minutes)

Primary authors: CACIRLI, Burcu (University of Heidelberg); WATANABE, Hiroshi (RIKEN)

Presenter: REGAN, Patrick (University of Surrey)

Session Classification: Neutron-Rich II

Contribution ID: **25** Type: **not specified**

Decay spectroscopy in the vicinity of 100Sn

Monday, 12 September 2011 10:30 (15 minutes)

The proposal deals with study of doubly - magic 100Sn and neighboring nuclei via measurement of their beta- and isomeric-decay.
Very high production rates, which should be achievable at the RIBF/BigRIPS facility for nuclei in the vicinity of 100Sn together with the EURICA Germanium setup, open new possibilities for the decay spectroscopy.
The main goals of the experiment are: measurement of the Gamow-Teller strength in the decay of 100Sn to 100In at much higher precision. Especially subsequent gamma-gamma coincidences in the daughter nucleus 100In passing to the ground state should allow for a unique definition of its structure. Measurement of the Gamow-Teller strength in the decay of 99Sn and mapping of the proton drip-line in the region of Te-Pd.
The expected counting rates, possible beam purification schemes and several options for the experimental setup dedicated to the decay studies are presented.

Summary

Weak interaction Gamow-Teller (GT) matrix elements are important in various astrophysical scenarios as well as in double-beta decay. The measured values of the GT strength are much lower than predicted in a simple shell model of independent particles. The doubly magic nucleus 100Sn is unique since its large beta-decay energy window enables access to the complete GTGR and the closed shells reduce the effect of ph-correlations. The GT-transition proceeds through the decay of a g9/2 proton to a g7/2 neutron and is predicted to dominantly populate a single 1+ state in 100In for which the amount of quenching is intensively debated.
Recently half-life and Q-value for the GT-decay of 100Sn was measured at GSI-Darmstadt and the smallest log-ft value of any beta-decay and a GT strength of BGT = 9:1 +4.8 -2.3 establishing it as superallowed GT decay.
Using the high intensity beam at the RIBF/BigRIPS facility and a setup very similar to the recent experiment should allow to increase the world statistics of this decay by a factor of 8 and therefore significantly reduce the error bar in the BGT. Especially gamma-gamma coincidences in the daughter nucleus 100In passing to the ground state should allow for a unique definition of its structure. Also hints towards a proton decay of 100 Sn could be verified. In the same experiment also the beta decay of the recently discovered 99Sn will allow to give in comparison a deeper insight to quenching factors and their origins.

Primary author: GERNHÄUSER, Roman (TUM)

Co-authors: LEWITOWICZ, Marek (Ganil); KRÜCKEN, Reiner (Triumf); NISHIMURA, Shunji (Riken); FAESTERMANN, Thomas (TUM)

Presenter: GERNHÄUSER, Roman (TUM)

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