[1] N. Pietralla, O. M. Gorbachenko, Phys. Rev. C **70** (2004) 011304(R)

* gefördert vom BMBF unter 06DA9040I

HK 36.20 Mi 14:00 HG Aula

Description of odd nuclei in the Skyrme-Hartree-Fock method — •Klaus Pototzky[1], Jochen Erler[1], Paul-Gerhard Reinhard[1], and Valentin Nesterenko[2] — [1]Institut für Theoretische Physik II, Universität Erlangen-Nürnberg, Erlangen, Germany — [2]Bogoliubov Laboratory of Theoretical Physics, Joint Institute for Nuclear Research, Dubna, Russia

The Skyrme-Hartree-Fock method is a self-consistent nuclear mean-field model which is widely used and a reliable model for the ground-state properties of nuclei from oxygen up to superheavy elements. It has been mostly applied to even-even nuclei so far. However these represent only a quarter of all known nuclei.

Even-odd and odd-even nuclei require a different treatment, since the time-reversal symmetry of the system is broken. We use a BCS+Blocking approach to describe those nuclei. The symmetry breaking leads to non-vanishing time-odd densities. The terms in the Skyrme energy functional containing time-odd densities are not yet well explored. The effects of these terms are analysed and the results are compared with experimental data. We study the odd-even staggering of binding energies, single particle excitations of odd nuclei and magnetic modes in even nuclei.

HK 36.21 Mi 14:00 HG Aula

Investigation of the triple-humped fission barrier of 233Th — •Lorant Csige[1], Margit Csatlos[3], Attila Krasznahorkay[3], Peter Thirolf[1], Thomas Faestermann[2], Janos Gulyas[3], Dieter Habs[1], Ralf Hertenberger[1], Rudi Lutter[1], Tamas Tornyi[3], and Hans-Friedrich Wirth[2] — [1]Ludwig Maximilians Universitat, Munich, Germany — [2]Technische Universitat, Munich, Germany — [3]Inst. of Nucl. Res. of the Hun. Acad. of Sci.

Previously, sharp fission resonances were observed by Blons and coworkes [1] and interpreted by them as the consequence of a theoretically predicted (hyperdeformed) third potential minimum. They suggested that the observed resonances appeared at those energies where the nucleus has excited states in the third minimum of the multiple-humped potential barrier.

Sharp resonance bands were observed for the first time in the fission probability of the 234U and 236U isotopes, supporting the existence of a deep third minimum of the potential barrier, in good agreement with theoretical predictions. In this theory also a deep third minimum is predicted for 232Th. However, even in the latest cross section calculations a very shallow one was successfully used in reproducing the prompt fission cross sections.

In order to get more insight into the fission barrier landscape of 232Th a new experiment has been performed at the Munich Tandem accelerator using the 232(d,pf) reaction, which excites higher spin states compared to the (n,f) reaction. [1] J. Blons et al., Phys. Rev. Lett. 35 (1975) 174

HK 36.22 Mi 14:00 HG Aula

γ-Winkelverteilungen der astrophysikalisch relevanten Reaktion ^{92}Mo(p, γ) — •Lars Netterdon, Michael Elvers, Janis Endres, Jens Hasper, Anne Sauerwein und Andreas Zilges — Institut für Kernphysik, Universität zu Köln

Experimentell bestimmte (α,γ) und (p,γ) Reaktionsraten für Kerne innerhalb des Reaktionsnetzwerkes des astrophysikalischen p-Prozesses dienen als wichtige Grundlage für umfassende Nukleosynthesemodelle. In diesem Kontext wurde am Kölner Tandem-Beschleuniger der Wirkungsquerschnitt der Reaktion ^{92}Mo(p, γ)^{93}Tc im astrophysikalisch relevanten Energiefenster vermessen. Das Experiment wurde am hocheffizienten HORUS-Spektrometer durchgeführt, das aus 14 HPGe-Detektoren besteht. Durch die hohe Granularität des Spektrometers konnten die Winkelverteilungen verschiedener γ-Übergänge aus dem Reaktionsprodukt ^{93}Tc vermessen werden, deren Kenntnis für die Bestimmung absoluter Reaktionsquerschnitte erforderlich ist. In diesem Beitrag präsentieren wir die experimentelle Methode sowie erste Ergebnisse.

Gefördert durch die DFG (ZI 510/5-1).

HK 36.23 Mi 14:00 HG Aula

(p,γ) reactions in the p-process Gamow window — •Mario Weigand[1,2], Stephan Walter[3], Franz Käppeler[3], Ralf Plag[1,2], and Rene Reifarth[1,2] — [1]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, 64291, Germany — [2]J.W. Goethe Universität, Frankfurt a.M., 60438, Germany — [3]Karlsruhe Institute of Technology (KIT), Campus Nord, Institut für Kernphysik, Postfach 3640, 76021 Karlsruhe, Germany

Most of the elements heavier than iron have been and still are synthesized in neutron-induced in stars of different stages. However, some isotopes are primarily formed in the so-called p-process because they are shielded from the much more effective neutron-induced reactions. The qualitative description of the p-process requires large reaction networks. The most important components here are the proton-, alpha- and gamma-induced reactions and the associated β^+-decays.

At the Karlsruhe Institute of Technology (KIT) ^{103}Rh(p,γ) capture events have been observed with the Karlsruhe 4π-BaF_2-detector, which consists of up to 42 spherically arranged BaF_2-crystals. The protons were accelerated with a pulsed 3.7 MV Van de Graaff accelerator to an energy of 3 MeV and fired on a metallic Rhodium target.

First results from the measurements an overview of the experimental setup will be presented. The experiment was supported by the HGF young investigator project VH-NG-327.

HK 36.24 Mi 14:00 HG Aula

Eine neue Parametrisierung für ein erweitertes relativistisches Mittelfeldmodell mit dichteabhängigen Kopplungen — •Maria Voskresenskaya[1] und Stefan Typel[1,2] — [1]GSI Darmstadt — [2]Excellence Cluster Universe, TU München

Relativistische Mittelfeld(RMF)-Modelle wurden bisher sehr erfolgreich zur phänomenologischen Beschreibung von Atomkernen und Kernmaterie eingesetzt. Parametrisierungen mit dichteabhängigen Nukleon-Meson-Kopplungen zeigen sich dabei besonders flexibel. Eine Anwendung ist die Berechnung der Zustandsgleichung über einen weiten Dichtebereich, wie er für die Beschreibung von Neutronensternen benötigt wird. Die Kopplungen sind jedoch nur in der Nähe der Sättigungsdichte von Kernmaterie gut bestimmt und müssen zu kleinen und großen Dichten hin extrapoliert werden. Ein Vergleich der RMF-Zustandsgleichung für Kernmaterie mit der Virialentwicklung führt zu neuen Bedingungen an die Kopplungen bei kleinen Dichten. Auch bei hohen Dichten lassen sich zusätzliche Einschränkungen an die Parameter, z.B. aus Schwerionenkollisionen, berücksichtigen. In diesem Beitrag werden Ansätze zu einer verbesserten Parametrisierung der Dichteabhängigkeit vorgestellt.

HK 36.25 Mi 14:00 HG Aula

KADoNiS v0.3 - status and development of the Karlsruhe Astrophysical Database of Nucleosynthesis in Stars — •Ralf Plag[1], Iris Dillmann[2], Zsolt Fülöp[3], and Tamás Szücs[3] — [1]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Planckstraße 1, 64291 Darmstadt, Germany — [2]Technische Universität München, Am Coulombwall 6, 85748 Garching, Germany — [3]ATOMKI (Institute for Nuclear Research), Debrecen, Hungary

The KADoNiS project is an online database for cross sections relevant to the s process and p process. The s-process library - a sequel to the well-established Bao et al. compilation - has recently been updated to version 0.3. It now provides recommendations for 357 isotopes, including new datasets for ^{2}H, ^{9}Be, ^{60}Fe, ^{138}La, 42 updated MACS30, and revised stellar enhancement factors. A printed publication will be released in 2010.

The p-process part of Kadonis is a reaction library, which provides experimental data for p-process network calculations. It is currently largely extended in a collaboration with ATOMKI/Debrecen and will include experimental data from (p,γ), (p,n), (α,γ), (α,n), (α,p), (n,α), (p,α) and (γ,n) reactions in or close to the respective Gamow window.

Present status, work in progress as well as plans for a future r-process library will be presented.

This project is supported by the HGF Young Investigators Project VH-NG-327.

HK 36.26 Mi 14:00 HG Aula

Large scale survey of lifetimes and reaction rates for the astrophysical r-process — •Jochen Erler[1], Hans Peter Loens[2], Paul-Gerhard Reinhard[1], Gabriel Martinez-Pinedo[2], and Karlheinz Langanke[2] — [1]Institut für Theoretische Physik II, Universität Erlangen-Nürnberg — [2]Gesellschaft für Schwerionenforschung, Planckstr. 1, 64291 Darmstadt

We present a large scale survey of lifetimes and reaction rates in the regime of SHE for extremely neutron rich nuclei relevant for the astro-