5th LEA-COLLIGA Meeting

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IPN Orsay

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In Flight Fast Timing measurements at VAMOS.

Auteur: Laurent Gaudefroy[1]

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In septembre 2011 we performed the first In Flight Fast Timing (IFFT) measurements at GANIL on 197Au, 152Sm and 172Yb nuclei presenting 1.9ns, 1.4ns, 100ps and 57ps isomers.
States of interest in the target nuclei were populated via Coulomb excitation induced by a 136Xe beam accelerated at 5 A.MeV.
Desexcitation gamma-rays were detected using an array consisting on 16 LaBr3 fast scintillators.
The recoiling nuclei were identified in the VAMOS large acceptence spectrometer that also served for trajectory reconstruction, mandatory for gamma ray detection efficiency correction.

In this talk, I propose to present preliminary results showing that IFFT method is a powerful tool for measuring lifetimes in the range of some tens of ps up to about 10 ns hardly reachable, in flight, using other experimental methods.

1

Multinucleon transfer reactions in the 40Ar+208Pb and 36S+208Pb systems

Auteur: Sandrine Courtin[1]

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Two multinucleon transfer experiments performed at the LNL will be presented.
- The 40Ar+208Pb reaction was used to populate 40-43Ar isotopes via the 0n to 3n channels. Residues were identified in the Prisma spectrometer and the coincident gamma rays in the Clara gamma array.
- More recently, the 36S+208Pb reaction (July 2011) allowed the study of lifetimes of intruder states in N~20 Si, P and S isotopes. Recoils were tagged in the Prisma spectrometer at the grazing angle and gamma-rays were detected in the AGATA demonstrator associated with the Köln plunger device for lifetimes measurement.

2

Study and comparison of the decay modes of the systems formed in the reactions 78Kr+40Ca and 86Kr+48Ca at 10 AMeV

Auteur: Giuseppe POLITI[1]

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The first results of the ISODEC experiment, performed at the INFN-Laboratori Nazionali del Sud (LNS) by using the CHIMERA detector, will be presented. The principal aim of this experiment is to study the competition between the various disintegration modes of 118,134Ba produced in the reactions 78Kr+40Ca and 86Kr+48Ca at 10 AMeV, exploring the isospin dependence of the decay

modes of medium mass compound nuclei compound nuclei. The experiment complements data already obtained at 5.5 MeV/A for 78,82Kr+40Ca reactions, previously realized with beams delivered by GANIL facility and by using the INDRA detector.
Staggering effects are evident in the Z distributions, as well as different isotopic composition and enrichment for the reaction products in the two systems.
Absolute cross sections calculations of the reaction products are in progress, to provide important indication on the isospin influence on the reaction mechanism and fragments production.
Comparisons with theoretical models are in progress to estimate the influence of structural effects during the separation phase in asymmetric fission.

3

BETA-DECAY SPECTROSCOPIC STUDIES OF THE NEUTRON-RICH 211,212,213Tl and 219Bi ISOTOPES

Auteur: Anabel Morales Lopez[1]

Co-auteurs: Andrea Gottardo [2]; Giovanna Benzoni [1]; Jose Javier Valiente-Dobon [2]; Roberto Nicolini [1]

[1] *INFN-Milano*

[2] *INFN-Legnaro*

Auteur correspondant anaisabel.morales@mi.infn.it

The study of the beta-decay process in heavy neutron-rich systems is of main importance to probe the nuclear models used in r-process calculations. Experimental evidence is particularly interesting in nuclei approaching the waiting point A~195, since the r-process nuclei are still inaccessible in laboratory and the beta-decay models used to extrapolate their properties show strong discrepancies in their predictions [1,2].
Here we present the first results of an experiment focused on the investigation of the neutron-rich Tl isotopes, carried out within the "Stopped beam Campaign"of the RISING collaboration at GSI. The nuclei of interest were produced in fragmentation reactions of a relativistic Uranium beam impinging on a thick Be target. The residues were subsequently identified in the magnetic spectrometer Fragment Separator (FRS) and were finally implanted in the RISING Active Stopper [3]. This device consisted of nine Double Sided Silicon Strip Detectors (DSSSD) that recorded the position and time of implantations and beta-electrons. The characteristic gamma-ray transitions of the daughter Pb nuclei were registered using the RISING gamma-ray spectrometer [4], placed in close isotropic geometry around the Active Stopper.
The event-by-event position and time correlations between implantations and gamma-labeled radioactive electrons allowed us to measure the beta-decay half-lives of 211,212,213Tl, as well as the low-energy structure of their daughter nuclei 211,212,213Pb. The comparison of the new lifetimes with the calculations of the nuclear models proposed to describe the r-process provides a significant experimental constraint to their validity near the third r-process abundance peak, confirming previous half-life measurements near the shell closure N=126 [5-7].

[1] P. Möller et al., Phys. Rev. C 67 (2003) 055802
[2] I.N. Borzov, Phys. Rev C 67 (2003) 025802
[3] R. Kumar et al., Nucl. Instr. Meth. A 598 (2009) 754
[4] S, Pietri et al., Nucl. Instr. Meth B 261 (2007) 1079
[5] T. kurtukian et al., Nucl. Instr. Meth A 589 (2008) 472
[6] N. Alkhomashi et al., Phys. Rev. C 80 (2009) 064308
[7] A.I. Morales, PhD thesis. Universidad de Santiago de Compostela, 2011

4

Beyond-mean-field theories with zero-range effective interactions: A way to handle the ultraviolet divergence.

Auteur: Marcella Grasso[1]

[1] *IPNO*

Zero-range effective interactions are commonly used in nuclear physics and in other domains to describe many-body systems within the mean field model. If they are used in a beyond mean-field framework, contributions to the total energy that display an ultraviolet divergence are found. We propose a general strategy to regularize this divergence and we illustrate it in the case of the second-order corrections to the equation of state (EOS) of uniform symmetric matter. By setting a momentum cut-off Λ, we show that for every (physically meaningful) value of Λ it is possible to determine a new interaction such that the EOS with the second-order corrections reproduces the empirical EOS, with a fit of the same quality as that obtained at the mean-field level.

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Search for X-rays characteristic of element with Z = 120

Auteur: Marc Olivier Frégeau[1]

Co-auteurs: Abdou Chbihi [1]; Anna Corsi [2]; Antoine Drouart [3]; Constantin Ciortea [4]; D. Dumitriu [4]; D. Fluerasu [4]; Daniela Fabris [5]; Dominique Jacquet [6]; Fabiana Gramegna [7]; John Frankland [1]; Laurent Nalpas [3]; Laurent Tassan-Got [6]; M Gugiu [4]; Marian Parlog [8]; Marie-France Rivet [6]; Maurice Morjean [1]; Sandro Barlini [9]; Tommaso Marchi [7]; V. L. Kravtchouk [7]; Xavier Ledoux [10]; Éric Bonnet [1]

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[5] *INFN Padova*

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[9] *INFN Firenze*

[10] *CEA/DAM/DIF F-91297 Arpajon*

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Super-heavy compound nuclei (Z = 120 and 124) with long fission times (t ≥ 10-18s) have been recently evidenced through experiments [1] applying the crystal blocking technique. This method, because it
requires high quality monocrystalline targets, cannot be generalized to define and locate possible islands of stability in the super-heavy region. An alternative approach is to use the fluorescence technique which looks for emission of X-rays characteristic of the compound nucleus formed. The first reaction studied in this way has been 238U+64Ni at 6.6 MeV/nucleon leading to Z=120 compound nuclei. We will discuss this method and its application for the very first time in the super-heavy elements
region, and present our latest results and conclusions.

[1] M. Morjean et al., PRL 101 (2008) 072701

7

News from the MAGNEX-EDEN facility at the LNS

Auteur: Francesco Cappuzzello[1]

[1] *Univ. Catania and INFN-LNS*

Auteur correspondant cappuzzello@lns.infn.it

An intense experimental activity has been accomplished during 2011 at the INFN-LNS by the MAGNEX spectrometer team. An overview of the experiments, including some of the main results will be presented. A special emphasis will be given to the activities strongly connecting our group with the French collaborators in the field of two-neutron transfer reactions and their implications on the understanding of neutron-neutron correlations in atomic nuclei.
In addition in the same period the EDEN array of 36 Ne213 liquid scintillators has been moved from IN2P3-IPN Orsay and successfully installed at the INFN-LNS around the MAGNEX scattering chamber. This has opened unprecedented opportunities to face old and new puzzles of nuclear structure and nuclear reactions. A brief report of the status of installation and the commissioning will be given.

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Interdisciplinary activities connected to astrophysical issues at the Orsay Tandem Facility.

Auteur: Marin Chabot[1]

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I will present an overview of interdisciplinary activities connected to astrophysical issues at the Orsay Tandem Facility. It will concern the simulation of the Cosmic Rays on the Plank bolometer, the Cosmic Ray processing of interstellar analogue dusts and, the molecule-atom collision program with the AGAT multi-detector for astrochemical purpose.

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SPES Project: a Neutron Rich ISOL Facility for re-accelerated RIBs

Auteur: Leandro Piazza[1]

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SPES (Selective Production of Exotic Species) is an INFN project to develop a Radioactive Ion Beam (RIB) facility as an intermediate step toward EURISOL.

The SPES Project is under realization at the INFN Legnaro National Laboratories site.

The SPES Project main goal is to provide a production and accelerator system of exotic beams to perform forefront research in nuclear physics by studying nuclei far from stability. The SPES Project is concentrating on the production of neutron-rich radioactive nuclei with mass in the range 80-160.

The final energy of the radioactive beams on target will range from few MeV/u up to 11 MeV/u for A=130.

The SPES acceleration system will be presented, together with the facility realization status.

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Beyond-mean-field theories with zero-range effective interactions: A way to handle the ultraviolet divergence.

Auteur: Marcella Grasso[1]

[1] *IPNO*

Zero-range effective interactions are commonly used in nuclear physics and in other domains to describe many-body systems within the mean field model. If they are used in a beyond mean-field framework, contributions to the total energy that display an ultraviolet divergence are found. We propose a general strategy to regularize this divergence and we illustrate it in the case of the second-order corrections to the equation of state (EOS) of uniform symmetric matter. By setting a momentum cut-off Λ, we show that for every (physically meaningful) value of Λ it is possible to determine a new interaction such that the EOS with the second-order corrections reproduces the empirical EOS, with a fit of the same quality as that obtained at the mean-field level.

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In-beam and isomer spectroscopy in the third island of inversion at EXOGAM+VAMOS

Auteur: Emmanuel Clement[1]

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Excited states in a wide range of neutron rich nuclei around 68Ni has been studied in multi nucleon transfer reactions in inverse kinematics using a 238U beam at the Coulomb barrier and the large acceptance spectrometer VAMOS and the segmented germanium clover detectors EXOGAM at GANIL. In a first experiment, the lifetimes of the first excited states in even-even Fe and even-odd Co isotopes towards N=40 have been measured for the first time using the recoil-distance Doppler shift method. A sudden increase of collectivity from 62Fe to 64Fe has been observed and probe the weakness of the N=40 subshell gap. This observation is confirmed by the onset of a collective character in the neutron rich zinc and germanium isotopes. Moreover, collective 7/2- states observed in the structure of copper isotopes above nickel can be interpreted as a one proton in the p3/2 orbital coupled to the first 2+ state in nickel isotones. Similarly, a one proton hole in the f7/2 orbital coupled to the first 2+ state in nickel isotones would induce some collectivity in the cobalt isotopes as suggested by D. Pauwels et al. To demonstrate this, the lifetime of the first excited 9/2- and 3/2- states in 63-65Co have been measured and the B(E2) transition probability extracted. The data extracted from these experiments have been compared with large scale shell model calculations performed with ANTOINE code. Evidence of coexisting neutron, proton intruder states and “normal” state will be presented. A second experiment was recently done at the GANIL facility aiming to perform combined prompt and delayed spectroscopy at the VAMOS spectrometer in solenoid configuration. Preliminary results on new isomers and prompt decays in odd-mass in the third island of inversion will be presented.

13

Upgrading the RIPEN Apparatus with Digital Electronics

Auteur: Tommaso Marchi[1]

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The RIPEN apparatus is a neutron detector array composed of BC501 liquid scintillators specifically suited for neutron detection and time of flight measurement. It was installed at Legnaro National Laboratory in early '90s, while the last measurement campaign was performed in 2007. At present the apparatus is undergoing a process of complete substitution of readout/acquisition electronics. The capabilities of digital electronics have been tested using CAEN V1720 VME digitizers (12 bit, 250MS/s). Analogue RC/CR emulation filters have been developed to perform neutron gamma discrimination: zero crossing technique as well as gate integrated method have been implemented.
In June 2011 a subset of 8 detectors was successfully used to perform an in-beam experiment to measure neutron production cross sections. This required the use of 2 VME synchronized acquisition boards and the development of a specific on-line analysis software. We will present a short description of the RIPEN apparatus at LNL and the digital electronic setup. We will also show preliminary results from the above mentioned in-beam test.

Detection arrays and RIBS / **14**

Recent news from the S3 spectrometer at SPIRAL2

Auteurs: Emmanuel Clement[1]; Hervé Savajols[1]

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In this presentation, recent new on the design and construction of the S3 spectrometer will be presented (spectromter design, target station, detection system).

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Neutron-rich 71Cu by transfer reactions at Ganil

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The series of copper isotopes (Z=29) is of prime interest for nuclear structure. The first 5/2 level in the odd isotopes, carrying most of the f5/2 proton strength, sharply drops in energy beyond N=40 and becomes the ground state in 75Cu. The position and the strength distribution of the f7/2 spin-orbit partner is essential to understand the underlying mechanism of this effect, bent to have major implications for structure variations towards 78Ni. With this purpose in mind the 72Zn(d,3He)71Cu transfer reaction was performed at Ganil with the Must-2 particle array, giving precisely access to proton-hole states in copper. The data are currently under analysis.

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Microscopic theory of the gamma decay of nuclear giant resonances

Auteur: Marco Brenna[1]

Co-auteurs: Gianluca Colo' [1]; Pier Francesco Bortignon [1]

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A microscopic formalism that allows the calculation of the gamma decay of nuclear excited states has been developed. In particular, it has been applied to the direct gamma decay of the Isoscalar Giant Quadrupole Resonance in 208Pb to the ground state and to the low-lying octupole state, as well. The phonons are calculated within fully self-consistent RPA, while the calculation of the gamma decay width is performed at the lowest contributing order of the perturbation theory within the framework of the Nuclear Field Theory (NFT), including consistently the whole effective Skyrme interaction in the particle-vibration couplig vertex. The decay width to the lowest 3- state turns out to be only a few percent of the decay width to the ground state, as indicated by the experiment.

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Progress on the development and construction of the 50 kW Neutron Converter for Spiral 2 project

Auteur: Judilka Bermudez[1]

Co-auteurs: Emil Udup [2]; Gabriela Acosta [1]; Luigi Tecchio [1]

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[2] *HHNI-Bucharest*

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LNL-INFN is in charge of the research, development and construction of the 50 kW neutron converter for the Spiral 2 facility for producing radioactive ion beams. In the Spiral 2 project, the deuterons primary beam 40 MeV and 5 mA interacts with a graphite converter for producing a neutron flux of 1x1012 neutrons/s/cm2. The high neutron flux is required for inducing fissions on the UCx fissile target that leads to reach high fission rates and high intensity of the radioactive ion beams. The design of the converter is based on a graphite rotating wheel, that allows the dissipation of the total power of the primary beam, avoiding complex cooling systems. The design had been conceived in such a way to house also the 200 kW converter. A brief summary of the recent developments and state of art on the construction will be presented.

18

About Predicitve Power of Nuclear Theories and Strengthening the Link with Experiment

Auteurs: Bartek SZPAK[1]; Jerzy DUDEK[2]

[1] *IFJ, Polish Academy of Sciences, Cracow, Poland*

[2] *IPHC and Univerite de Strasbourg*

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It is (too) often thought (and even said) that the theory has predictive power, when the comparison between the data and the theory graph looks good. [Something looking good for someone is perhaps quite unsatisfactory for someone else, and with such a definition we have an infinity of different predictive powers in the circulation! - in-acceptable in the XXIst century!]

This presentation is oriented for the experimental audiences; The idea originates from a sub-field of Applied Mathematics known under the name of "Inverse Problem" but this latter term has in fact not much in common with the "inverse problem of" quantum mechanics where one finds the potential

for the Schrodinger equation, out
of the energy spectra and scattering information.

In short: We formulate an approach according to which each theory (in particular the nuclear ones) provides not only its results (numbers) but also probabilities that these numbers appear in nature; For instance - what is the probability that the results for 132Sn obtained with the Hamiltonian optimized for 208Pb, will in
in f a c t hold true? [when the experiments will be finally done!]. From this posing of the problem it becomes clear that we will present stochastic analysis of the parameter adjustments of theories [why do we find in the literature over 120 various parametrisations of the Skyrme-HF Hamiltonian - and yet, predictions
for exotic nuclei obtained with them are so very different???] and general hints on: What to do? - but first of all - What NOT to do? with a given theory, if one does not want to l o o s e the predictive power form the start?

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Nuclear response to two-neutron transfer via the (18O,16O) reaction

Auteur: Manuela Cavallaro[1]

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A study of the structure of different nuclei was pursued at the Catania INFN-LNS laboratory by the (18O,16O) two-neutron transfer reaction at 84 MeV incident energy. The experiments were performed using several solid targets from light (9Be, 11B, 12,13C, 16O, 28Si) to heavier ones (58,64Ni, 120Sn, 208Pb). The 16O ejectiles were detected at forward angles by the MAGNEX magnetic spectrometer. Thanks to an innovative technique the ejectiles were identified without the need of time of flight measurements. Exploiting the large momentum acceptance (20%) and solid angle (50 msr) of the spectrometer, energy spectra were obtained with a relevant yield up to about 20 MeV excitation energy. The application of the powerful trajectory reconstruction technique did allow to get energy spectra with energy resolution of about 100 keV and angular distributions with angular resolution better than 0.3°. In the energy spectra several known low lying and resonant states of the product nuclei have been observed. A common feature observed with light nuclei is the appearance of unknown resonant structures at for example 10.5 and 13.6 MeV in 15C and 16 MeV in 14C. The strong population of these latter together with the measured width can reveal the excitation of a collective mode connected with the transfer of a pair. Considerations based on kinematical matching conditions and on the shell configuration of the explored nuclei explain why such a mode is so excited in such reactions. In addition the measured angular distributions seems to indicate a transfer of a correlated neutron pair in L = 0 configuration, compatible with the Giant Pairing Vibration mode. Theoretical calculations have been performed in order to estimate the contribution of the break-up both of two correlated neutrons and of two independent ones.

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Anomalous light flashes: from astronauts to protontherapy

Auteur: Elias Khan[1]

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Heavy ion interactions in the eye can induce light flashes (phosphenes). Both Neil Armstrong and Edwin Aldrin reported unexpected visual perceptions during their Moon landing mission, due to cosmic rays interactions. We have undertaken a clinical ground study of proton-induced phosphenes.

Sixty percent of the patients treated for choroidal melanomas at the Institut Curie –Centre de Protontherapie in Orsay using 73 MeV protons, report anomalous phosphenes. The present study may be the first indication of phosphenes triggered by protons of few tens of MeV.

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Status report of SPIRAL2

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Determination of local energy density functionals from Brueckner-Hartree-Fock calculations.

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Protontherapy at LNS

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Low-lying dipole response within the second RPA in 40,48Ca nuclei

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(no title)

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Recent measurements on neutron transfer reactions at deep sub-barrier energies with PRISMA

Auteur: lorenzo corradi[1]

[1] *INFN - Laboratori Nazionali di Legnaro*

Auteur correspondant corradi@lnl.infn.it

Recent measurements performed in inverse kinematics at deep sub-barrier energies in the 96Zr+40Ca system will be presented.

Target-like recoils have been fully identified with the large solid angle magnetic spectrometer PRISMA. The experimental data for one and two neutron transfer channels have been compared with semi-classical microscopic calculations.
For the two neutron transfer channels it is found that the transition to the 0+ state at ~6 MeV, whose wavefunction is dominated by the two neutrons in the 2p_{3/2} shell, is much larger than the ground state one. The comparison with the inclusive data reveals that transitions to states with high multi-polarity and non-natural parity are important, suggesting
that more complex two-particle correlations have to be taken into account.

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The FRIB-LNS facility and the transfer and purification line for the radioactive ion beam at SPES

Auteur: Luciano Calabretta[1]

Co-auteurs: Danilo Rifuggiato [1]; Luigi Cosentino [1]; Mario Maggiore [2]; annamaria porcellato [2]; antonio Caruso [1]; antonio dainelli [2]; antonio maugeri [1]; emilio zappalà [1]; francesca moisio [2]; michele comunian [2]; santi passarello [1]

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At the end of the 2010, the optic of the extraction beam line of the superconducting cyclotron of LNS was strongly modified. The installation of news quadrupoles and of a cooled target allows to increase the production and collection efficiency of the radioactive ion beam produced in flight.
A short description of the new optic and of the achieved performances will be presented.
A new device, called high energy chopper, will be installed next year along the extraction line.
This new device will remove a large part of the spurious beam, reducing the amount of the of a factor 10, with a clear upgrade of the FRIB-LNS performances.
The new design of the transfer beam line of the radioactive ion beam for the project SPES will be also presented. The main feature of the High resolution mass separator and of the preliminary study on the RFQ beam cooler will be also presented.

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NEDA detector status

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(no title)

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Status of GALILEO

Auteur: Calin Alexandru Ur[1]

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GALILEO is a project aiming to the building of a 4pi high-resolution gamma-ray array by using GASP tapered detectors and capsules of the EUROBALL Cluster detectors. The array will be located at the National Laboratories of Legnaro where stable beams are provided by the Tandem-ALPI-PIAVE accelerator complex and, in the future, exotic radioactive ion beams will be delivered by SPES. One of the most innovative activities of the project is the transformation of the original EUROBALL 7-capsules cluster detectors in triple cluster detectors. The triple cluster detectors will be placed on a ring at 90 degrees with respect to the beam axis while the GASP tapered detectors will cover symmetrically the forward and backward angles. R&D activities are conducted for the development of a complete cryostat for the triple cluster detector and for building new anti-Compton shields optimized for the shape of the new triple cluster detector. The development of the front-end, digital sampling, preprocessing and readout electronics is advancing in synergy with the recent developments made or ongoing for the AGATA project. The talk will make an overview of the status and perspectives of the GALILEO project within the general context of the gamma-ray spectroscopy activity at the National Laboratories of Legnaro.

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ORGAM 2

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(no title)

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A Recoil-Distance Doppler-Shift lifetime experiment on neutron-rich Zn isotopes with AGATA

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LaBr3 detectors, phototubes, electronics and signal processing: hands-on report about on-going research

Auteur: Stefano Riboldi[1]

Co-auteurs: Agnese Giaz [1]; Benedicte Million [2]; Ciro Boiano [2]; Fabio Crespi [2]; Franco Camera [1]; Luna Pellegri [1]; Nives Blasi [2]; Oliver Wieland [2]; Roberto Nicolini [1]; Sergio Brambilla [2]

[1] *Universita' degli Studi di Milano, INFN*

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Since a couple of years, the Milano group (INFN and University) is interested in LaBr3 scintillators as detectors for nuclear physics experiments. Ten detectors (3.5" x 8" size, by Saint Gobain) are available and some of them have already been used (Legnaro, GSI, Riken, etc.) with satisfactory results.
A few physical and technical factors practically limiting the intrinsic performance of LaBr3 detectors have been highlighted and at least partially overcome by proper photo-tube selection, design of a dedicated active voltage divider network, acquisition analysis of signals in shape and subsequent digital algorithms.
Design of a dedicated multi-channel digital acquisition system for LaBr3 detectors is in progress.

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Studies for Aluminum photo-ionization in hot cavity for the SPES Project

Auteur: Daniele Scarpa[1]

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Beside the Uranium Carbide (UCx) target that will be used in SPES (Selective Production of Exotic Species) project, a SiC target will he first to be used to deliver some p-rich beams and validate the function of the SPES facility. Hitting SiC target with protons, one of the elements coming out from nuclear reaction is Aluminum with its isotopes. In order to obtain an Aluminum ion beam, among various type of ionization techniques, main effectiveness is expected from laser photo-ionization. In the past off line studies on laser photoionization have been made in Pavia Spectroscopy Laboratory, testing the selective laser photoionization on Aluminum Hollow Cathode Lamp as atomic source. At Laboratori Nazionali di Legnaro, recently a XeCl excimer laser was installed in order to provide laser ionization in the hot cavity and start first measurements. Results are promising to justify further studies with this technique, aiming a better characterization of the SPES ion extraction capability under laser photoionization. Furthermore with the incoming Wien filter will be possible to monitor the selectivity of the process.

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Study of the 60Fe(n,gamma)61Fe reaction of astrophysical interest via (d,p) transfer reaction

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Résumé:

60Fe is of special interest in nuclear astrophysics. Indeed, the recent detection of 60Fe caracteristic gamma-ray lines by RHESSI and INTEGRAL spacecrafts is a strong evidence that 60Fe nucleosynthesis is still going on in the Galaxy. Moreover, the detection of an 60Ni (daughter-nuclei of 60Fe) excess in presolar grains give us information about the conditions of formation of the early solar system.
However, several reactions involved in 60Fe nucleosynthesis suffer from large uncertainties, which imply uncertainties on the 60Fe yields predicted by stellar models. It is the case of 60Fe destruction reaction, 60Fe(n,γ)61Fe.
We studied the direct capture part of the 60Fe(n,γ)61Fe reaction via the d(60Fe,p) transfer reaction at LISE/GANIL. The experimental setup consists in two beam tracking detectors, four MUST2 telescopes, and four EXOGAM clovers. The method used to extract the energy of 61Fe excited states populated via

the transfer method as well as the measured angualr distributions will be explained. DWBA analysis of the measured differential cross-sections, which allowed us to extract angular momentum and spectroscopic factors of the populated states below the neutron threshold will be presented. Experimental results will finally be compared to shell-model calculations.