The 24th AGATA Week - ACC Meeting

Monday, 9 September 2024 - Friday, 13 September 2024

Milano

Programme

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Monday, 9 September 2024

Arrival (13:00 - 13:30)

Detectors WG (9 Sept 2024, 13:30 - 15:45)

[5] Introduction by the local organizers (13:30, 15 minutes)

[4] Overview of the AGATA Triple Cryostats and Detectors (13:45, 25 minutes)

Presenter: HESS, Herbert (IKP)

[6] Status of the AGATA capsules (14:10, 25 minutes)

Presenter: ZIELINSKA, Magdalena (CEA Saclay)

[7] Status of the AGATA cryostats (14:35, 25 minutes)

Presenter: SIGWARD, Marie-Hélène (IPHC - CNRS)

[8] Neutron damage effects on A009 and status of A601 (15:00, 25 minutes)

Presenter: EVERETT, Christopher

[9] Recent Developments in the Fabrication of Planar and Coaxial HPGe Detectors (15:25, 20 minutes)

Presenter: BERTOLDO, S

Coffee (15:45 - 16:15)

News from the host laboratories (9 Sept 2024, 16:15 - 17:35)

[10] Update on the FAIR campaign (16:15, 20 minutes)

Presenter: WIMMER, Kathrin (GSI)

[11] Updates on SPES (16:35, 20 minutes)

Presenter: MARCHI, Tommaso (INFN Laboratori Nazionali di Legnaro - Università di Padova)

[12] Updates on Tandem ALPI PIAVE (16:55, 20 minutes)

Presenter: FAGOTTI, Enrico (INFN LNL)

[13] Ancillaries at LNL (17:15, 20 minutes)

Presenter: GOASDUFF, Alain (INFN - LNL)

Social event (18:00 - 20:00)

Tuesday, 10 September 2024

PSA and Tracking (10 Sept 2024, 09:00 - 10:30)

[14] Introduction (09:00, 10 minutes)

Presenter: BOSTON, Andrew (University of Liverpool)

[15] PSA activities at Lyon (09:10, 30 minutes)

Presenter: DUDOUET, Jérémie (IP2I)

[16] Liverpool R&D; (ML/AI) Status (09:40, 30 minutes)

Presenter: HALLOWAY, Fraser

[45] Development of Self-calibration technique for gamma-ray tracing array (10:10, 20 minutes)

Presenter: SIDONG, Chen

coffee break (10:30 - 11:00)

PSA and Tracking (10 Sept 2024, 11:00 - 12:40)

[57] Introduction to characterization session (11:00, 5 minutes)

Presenter: JUDSON, D (Liverpool)

[18] Scanning table Strasbourg - A005 report (11:05, 30 minutes)

Presenter: DUCHENE, Gilbert (IPHC - CNRS - UNISTRA)

[58] Liverpool characterisation update (11:35, 15 minutes)

Presenter: EVERETT, C. (Liverpool)

[59] Salamanca characterisation update (11:50, 10 minutes)

Presenter: QUINTANA, B. (Salamanca)

[46] Tracking performance with position dependent uncertainties (12:00, 20 minutes)

Presenter: LOPEZ-MARTENS, Araceli (CSNSM)

[21] Discussion on PSA and Tracking Developments (12:20, 20 minutes)

Lunch (12:40 - 14:00)

Front End Electronic 1 (10 Sept 2024, 14:00 - 16:00)

[22] Introduction and Schedule (14:00, 10 minutes)

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

[23] Digitizers : Status and advancements (14:10, 25 minutes)

Presenter: PULLIA, Alberto (University of Milan and INFN)

[24] PACE Hardware and Firmware Status (14:35, 30 minutes)

Presenter: COLLADO RUIZ, Javier (IFIC-CSIC)

[25] STARE Hardware and production Firmware Status (15:05, 30 minutes)

Presenter: KARKOUR, Nabil (CNRS/IN2P3/IJCLAB)

[26] Mechanics and Power supply Status (15:35, 25 minutes)

Presenter: GONZALEZ, Vicente

Coffee (16:00 - 16:30)

Front End Electronic 2 (10 Sept 2024, 16:30 - 18:00)

[27] Status of the Triggers (GTS, logic, less) (16:30, 25 minutes)

Presenter: GOASDUFF, Alain (INFN - LNL)

[28] Status of the SMART development (REMOTE) (16:55, 25 minutes)

Presenter: WITTWER, Gilles (GANIL)
(REMOTE)

[29] Status of the R&D; on Energy Processing (17:20, 25 minutes)

Presenter: KOGIMTZIS, M.

[30] Discussion (17:45, 15 minutes)

Wednesday, 11 September 2024

Data Acquisition 1 (11 Sept 2024, 09:00 - 11:00)

[31] Introduction (09:00, 10 minutes)

Presenter: STEZOWSKI, Olivier (IP2I)

[32] Data Analysis with Ancillaries (09:10, 20 minutes)

Presenter: BRUGNARA, Daniele (University of Padova - LNL INFN)

[33] AGATA DAQ Infrastructure (09:30, 20 minutes)

Presenter: LE JEANNIC, Patrick (IJCLab / CNRS)

[34] Data analysis infrastructures @LNL (09:50, 20 minutes)

Presenter: GOASDUFF, Alain (INFN - LNL)

[35] Data Analysis & Reprocessing status (10:10, 20 minutes)

Presenter: DUDOUET, Jeremie (IP2I)

[36] V2 electronic data pipeline (10:30, 30 minutes)

Presenter: STEZOWSKI, Olivier (IP2I)

coffee break (11:00 - 11:30)

Data Acquisition 2 (11 Sept 2024, 11:30 - 12:50)

[37] DAQ interface : Topology Manager & backpressure soft (11:30, 20 minutes)

Presenter: ELLOUMI, Souhir ({CNRS}UMR9012)

[38] Slow Control and monitorin (11:50, 20 minutes)

Presenter: BONNIN, Christian (IPHC Strasbourg)

[39] Report online/offline interface (12:10, 20 minutes)

Presenter: BAULIEU, Guillaume (IN2P3/IP2I)

[40] PSA optimization (in remote) (12:30, 20 minutes)

Presenter: IJCLAB

Lunch (12:50 - 14:30)

EMC discussions - (Infra - FEBE - Detectors) (14:30 - 14:55)

- **Presenter: KARKOUR, Nabil (CNRS/IN2P3/IJCLAB)**

Parallel sessions :: Via Valvassori Peroni or Dipartimento di Fisica (15:00 - 18:00)

Social Diner (20:00 - 23:00)

Thursday, 12 September 2024

Infrastructure (12 Sept 2024, 09:00 - 10:15)

[41] DSS- LVPS-AF (09:00, 20 minutes)

Presenter: MENEGAZZO, Roberto (INFN - Sezione di Padova)

[42] Phase2 Mechanics (09:20, 20 minutes)

Presenter: SMITH, Richard

[43] From AGATA at PRISMA towards AGATA at 0° updates (09:40, 20 minutes)

Presenter: BENZONI, Giovanna (INFN)

[44] Data Base (10:00, 15 minutes)

Presenter: STEZOWSKI, Olivier (IP2I)

Coffee (10:15 - 10:40)

Performances at LNL (10:40 - 11:00)

- **Presenter: PEREZ, Rosa**

Simulation and commissionning (12 Sept 2024, 11:00 - 12:30)

[60] PostPSA improvements (11:00, 15 minutes)

Presenter: PILOTTO, Elia (University of Padova)

[48] Status of the AGATA simulation code and development (11:15, 20 minutes)

Presenter: LABICHE, Marc (STFC Daresbury Laboratory)

[49] I/O AGATA ROOT trees (11:35, 20 minutes)

Presenter: SIDONG, Chen

[50] Ancillaries in the simulation package (11:55, 20 minutes)

Presenters: BRUGNARA, Daniele (University of Padova - LNL INFN), ZANON, Irene (Stockholm University)

[51] Discussion on commission experiment for the 0-degree campaign (12:15, 15 minutes)

Lunch (12:30 - 14:00)

AMB Report (12 Sept 2024, 14:00 - 14:40)

[52] AGATA Project (14:00, 20 minutes)

Presenter: CLEMENT, Emmanuel ({CNRS}UPR3266)

[53] LNL Campaign (14:20, 20 minutes)

Presenter: VALIENTE DOBON, Jose Javier (Laboratori Nazionali di Legnaro (INFN))

ACC (12 Sept 2024, 14:40 - 15:30)

[77] Welcome from ACC Chair (14:40, 5 minutes)

Presenter: LEONI, Silvia (University of Milano and INFFN Milano)

[78] News from AGATA Steering committee (14:45, 15 minutes)

Presenter: GORSKA, Magdalena (GSI Darmstadt)

[73] Report on AGATA@LNL experiment 23.08: Coulomb excitation of 60Ni (15:00, 15 minutes)

Presenter: HADYNSKA-KLEK, Kasia (Heavy Ion Laboratory University of Warsaw)
The nickel isotopes offer a unique laboratory to investigate shape evolution in the vicinity of doubly-magic N=Z nucleus, ^{56}Ni (Z=N=28), which should exhibit similar structural properties to those observed in the Z=N=20 region. Indeed, observation of the SD structures was reported also in ^{56}Ni, explained as the result of $mp-mh$ excitations like in the case of ^{40}Ca [3]. However, recently the questions on the validity of Z/N=28 as a good magic number have been brought up triggering the discussion on the deformation in the nickel region, including the signatures of shape coexistence. Microscopic and collective properties in the vicinity of ^{56}Ni shall be evaluated with the dedicated measurements of the deformation and the neighboring nuclei. To this end, the Coulomb excitation studies focused on the structure of ^{58,60,62}Ni isotopes are currently undertaken at INFN LNL, IJC Lab in Orsay and at HIL Warsaw. These, together with the recent findings from the γ-ray and electron spectroscopy measurements reporting the unexpectedly large $E0$ transition strengths for the 2$^+_2\to2$^+_1$ transitions of ^{58,60,62}Ni [2], shall bring crucial information enabling the further discussion on the electromagnetic properties of Ni isotopes. Coulomb excitation of ^{60}Ni beam of 240 MeV energy impinging on ^{208}Pb target was performed at INFN LNL, Italy in October 2023. The experiment was carried out using 12 AGATA triple clusters [3,4] coupled to the particle detection array SPIDER [5] to register back-scattered beam ions. SPIDER was placed at laboratory angles to enhance the probability of multistep Coulomb excitation. Details of the experiment performed with AGATA at LNL along with the current status of the data analysis will be presented. [1] D. Rudolph et al., Phys. Rev. Lett. 82, 3763 (1999) [2] L.J. Evitts et al., Phys. Lett. B 779, 396 (2018). [3] S. Akkoyun et al., NIM A668 (2012) 26. [4] J.J. Valiente-Dobon et al., NIM A1049 (2023) 168040. [5] M. Rocchini et al., NIM A971 (2020) 164030.

[61] DSAM of 56Ni and 60Zn (15:15, 15 minutes)

Presenter: BALOGH, Matus (INFN LNL)
In this contribution, we will present the current state of the analysis of experiments 23.07 and 23.09 studying the 56Ni and 60Zn isotopes. The goal of these experiments is to investigate the N=Z region by measuring lifetimes using the DSAM technique. These experiments were performed back-to-back, using an identical 16O@80 MeV beam and an identical AGATA+OSCAR (dE-E telescope) setup. Currently, the analysis is in the setup phase, aiming to optimize the energy calibration of the telescopes to achieve the best excitation energy resolution. Clean selection of the populated excited states is crucial for the final DSAM analysis.

Coffee (15:30 - 16:00)

ACC (12 Sept 2024, 16:00 - 18:00)

[79] AGATA Location from 2027 : Possible campaign at LNL (16:00, 20 minutes)

[80] AGATA Location from 2027 : Possible campaign at GANIL (16:20, 20 minutes)

Presenter: FARGET, Fanny (GANIL)

[81] AGATA Location from 2027 : Open discussion - Public (16:40, 20 minutes)

Presenter: LEONI, Silvia (University of Milano and INFFN Milano)

[82] AGATA Collaboration Council Meeting (Closed Session) (17:00, 1 hour)

Friday, 13 September 2024

ACC (13 Sept 2024, 09:00 - 11:00)

[63] Lifetime measurement of astrophysically relevant 6.793 MeV state of 15O (09:00, 15 minutes)

Presenter: PILOTTO, Elia (University of Padova)

In this contribution, we will present the current state of the analysis of experiment 23.003, aimed at the measurement of the lifetime of the 6.793 MeV excited state of 15O with sub-fs uncertainty. This experiment has strong astrophysical implications, as the lifetime we aim to measure strongly influences the value of the S-factor at Gamow-window energies for stars like our Sun. The experiment was performed using AGATA+SAURON (CD DSSSD detector) setup. Careful characterization of the targets employed was also performed using IBA techniques. At the moment much work was put into the optimization of the AGATA data processing and we are very close to get a first lifetime estimate.

[65] Spectroscopy and lifetime measurements toward the Island of Inversion with the AGATA-PRISMA setup (09:15, 15 minutes)

Presenter: GENNA, Davide (Università degli Studi di Milano & INFN Sezione di Milano)

We present recent AGATA-PRISMA results on multi-nucleon transfer reactions induced by ²²Ne and ²⁶Mg beams on a ²³⁸U target at LNL. The experiments aim at exploring the boundaries of the N = 20 Island of Inversion by following the evolution of negative parity states originating from fp shell excitations, locating excited intruder configurations, and tracking the development of quadrupole and octupole collectivity toward N = 20. This work is primarily focused on the spectroscopy of Ne and Mg isotopes with neutron number N = 12−18 to benchmark state-of-the-art nuclear structure theories. The experimental setup, comprising the AGATA γ array coupled to the PRISMA magnetic spectrometer, allowed us to detect and identify the ions of interest and measure, in coincidence, γ rays from excited states as well as lifetimes with the DSAM technique. EM transition rates and excitation energies will be compared to state-of-the art theoretical calculations to track the evolution of nuclear structure toward the Island of Inversion. Preliminary results and future perspectives will be discussed.

[71] Lifetime measurements for the study of intruder states towards the island of inversion along the N = 20 shell closure (09:30, 15 minutes)

Presenter: NICOLÁS DEL ÁLAMO, Raquel (INFN Padova and Università degli studi di Padova)

Lifetime measurements are commonly used to unravel the nature and properties of nuclear states, as they are closely related to transition probabilities, which provide information on the nuclear wave functions. The aim of the experiment here presented was to study the interplay of spherical (0 □ω) and intruder (2 □ω) configurations in the low-lying states of isotopes on the edge of the N=20 island of inversion. Specifically, the goal was to determine the lifetime of the first two 2+ states of ^{34}Si and the first $5/2^+$ state of ^{35}P using the Doppler Shift Attenuation Method. The experiment was conducted at the LNL facility in November 2022, employing the PRISMA magnetic spectrometer and the AGATA array. This presentation offers an overview of the current status of data analysis. The data sorting has been concluded, with our main focus now on further developing the GEANT4 simulation to mimic the experimental conditions. The simulation is necessary for extracting lifetimes from the experimental line shapes.

[69] Report on AGATA experiment 001 phase 2 (LNL PAC: 22.07) (09:45, 15 minutes)

Presenter: ZAGO, Luca (University of Padova, INFN LNL)

The disappearance of the N=20 shell closure in the so-called “island of inversion” around ^{32}Mg is one of the most striking examples of the strength of nucleon-nucleon correlations. In this region, the quadrupole-deformed intruder configuration (based on a multi-particle multi-hole configuration) becomes the ground state, subverting the expected shell ordering predicted by a harmonic oscillator plus spin-orbit term. The odd N=21 isotones therefore yield the possibility of a direct investigation of the ordering between single-particle and intruder states along the same chain, although experimental study of such nuclei becomes increasingly difficult with decreasing Z. Available spectroscopic evidence suggests that in ^{37}S the single-particle and collective intruder configurations are strongly connected, thus placing ^{37}S at the upper edge of the island of inversion. However, information on observables directly related to the wavefunction composition is rather scarce. The first excited state (3/2^{-} state at 646 keV) is the only one with a measured lifetime, but no transition probability has been firmly determined for intruder states, in particular those connected with strong branching ratios to the a priori spherical single-particle states. A combined DSAM+RDDS measurement has been performed to measure such transition probabilities, in particular for the 3/2^{+} state at 1397 keV (1p-1h nature) and the 7/2^{-} at 2023 keV (2p-2h nature), exploiting the full performance of the AGATA spectrometer in terms of energy and angular resolutions. The ^{37}S nucleus has been produced via the ^{36}S(d,p) reaction in inverse kinematics, detecting the recoiling protons in SPIDER to obtain an accurate reconstruction of the excitation energy of ^{37}S. This contribution will show the status of the analysis and some preliminary results obtained so far

[62] Report on the AGATA experiment number 011 (10:00, 15 minutes)

Presenter: ANDREETTA, Giuseppe (UNIPD, INFN LNL)

The pairing interaction, responsible for the two-nucleon correlation, plays a fundamental role in defining the low-energy spectra of atomic nuclei and the properties of their ground state. The effect of pairing correlations in the reaction dynamics can be explored by using heavy-ion reactions, in particular those involving a transfer of few nucleons. In this context, an interesting analogy between the nuclear pairing and the Cooper pairing in superconductors can be investigated through heavy-ion collisions, focusing on nucleon-pair transfer and searching for a possible effect, predicted by a BCS-like theory applied to nuclei: the Josephson Effect. The idea was already suggested in the ’70s, but only recently more quantitative calculations, assisted by promising experimental results, revived the interest on the subject and ignited a more systematic research. The transfer of neutron Cooper pairs was therefore studied through the interaction between two superfluid nuclei, 116Sn and 60Ni, using the Advanced Gamma-Ray Tracking Spectrometer AGATA and the large-acceptance magnetic spectrometer PRISMA at Legnaro National Laboratories, INFN.

[75] Report on the AGATA experiment number 22.18 (10:15, 15 minutes)

Presenter: KJUS, Robin (CEA Saclay)

The experiment 22.18 was performed to study the nucleus ^{96}Zr utilising the γ-ray tracking spectrometer AGATA coupled with the heavy-ion detector array SPIDER at INFN-LNL. This experiment is extremely timely in order to provide directly the $3^-_ 1 \rightarrow 0^+_1$ γ-ray transition probability for the first time. Previous measurements suggested that the γ-ray transition probability for the first 3^- state is one of the largest across the nuclear chart. This observation has never been reproduced by any theoretical calculations, and it is puzzling as it does not correspond to a similar increase in the neighbour isotopic chains. A recent study, instead, provides a significantly reduced γ-ray transition probability for the $3^-_1 \rightarrow 0^+_1$ transition, which is in better agreement with state-of-the-art shell-model calculations. Nevertheless, up to now the experimental values were obtained only via indirect methods. In this talk, we will present the preliminary results on the decay of this state to the ground state. The obtained B(E3) value seems to confirm how this quantity is not as large as previously thought, supporting the idea that it does not represent an outstanding value in the nuclide chart.

[3] Two-Phonon Octupole excitation in 96Zr (10:30, 15 minutes)

Presenter: STRAMACCIONI, Damiano

We present the preliminary analysis of an experiment performed at INFN LNL in November 2023 aimed at studying the two-octupole phonon collectivity in ^{96}Zr. The goal of the experiment was to perform a γ-decay branching ratio measurement from the 6$^+$ to the 3$^-$ state, so as to extract the B(E3; $6^+ \rightarrow 3^-$) value. If large, this parameter would indicate for the 6^+ level to be a member of the $3^-\otimes3^-$ multiplet. The 6^+ state was populated via the ^{96}Zr(p,p’)^{96}Zr proton inelastic scattering and the scattered protons were measured in the SAURON Double-Sided Silicon Strip detector. These were used to select the reaction channel of interest, in coincidence with the γ rays in the AGATA array.

[74] Report on the AGATA experiment number 23.061 (Combined lifetime and transition-probability measurements in 96Zr via Coulomb excitation / May 23-29, 2024) (10:45, 15 minutes)

Presenter: AHMED, Zarin (University of Guelph)

Report on the AGATA experiment number 23.061 Spokespersons: M. Zielińska, F. Ercolano, N. Marchini, J.J. Valiente Dobón In this talk, I will report on the recent “Combined lifetime and transition-probability measurements in 96Zr via Coulomb excitation” experiment, conducted using the AGATA + PRISMA + Plunger detector setup during the May 23-29, 2024 beamtime. The primary aim of the experiment was to deduce the E2 and E3 transition strengths in 96Zr by analyzing cross-sections measured in both safe and unsafe Coulomb excitation, as well as to provide deeper insights into octupole collectivity in 96Zr. Our specific objectives included verifying the placements of the 4+ band members, investigating the previously reported anomalously large B (E3;3-> 0+) strengths, understanding the properties of the lesser known third 2+ state, independently evaluating the transition strengths from this state and exploring the postulated two-octupole-phonon nature of the 6+ state. I will review our initial expectations outlined in our experiment proposal and discuss the extent to which these objectives were met during the May 2024 beamtime, highlighting the challenges encountered. This will include some spectra from the online analysis conducted during the experiment. Additionally, I will reflect on my progress in data analysis since the experiment, including my ongoing efforts to understand and address the neutron damage corrections required for each of the AGATA crystals. Meanwhile, Damiano Stramaccioni from INFN-LNL and University of Padova is analysing this data in parallel, aiming at the extraction of lifetimes. Moving forward, a key objective of this project is to assess the reliability of unsafe Coulomb excitation in obtaining transition strength from measured cross-sections, which could be crucial for compensating for low RIB intensities in future experiments.

Coffee (11:00 - 11:30)

ACC (13 Sept 2024, 11:30 - 13:30)

[66] Investigating shape coexistence in Z≈N A≈70 nuclei using Coulomb excitation of selenium-74 (11:30, 15 minutes)

Presenter: KJUS, Robin (CEA Saclay)

The neutron-deficient selenium and krypton have been observed to exhibit a wide range of shapes which can be linked to large shell gaps. Typically, for even-even nuclei in this region, the ground states are of prolate deformation with oblate states built on a deformed 0^+ state. However, certain nuclei, such as krypton-72 and selenium-68, are suggested to have the reverse configuration, i.e. oblate ground state with a prolate band built on the excited 0^+. Our analysis focuses on selenium-74 (Z=34, N=40), which from existing spectroscopic data has been thought to exhibit strong configuration mixing at low spin. A more recent beta-decay measurement provided for the first time firm spin assignment of multiple low-lying states in selenium-74 and proposed an alternative interpretation, namely that the states typically believed to be of either oblate or prolate shape are of vibrational quasi-spherical character. In our analysis, based on data obtained in 2022 in a Coulomb excitation experiment at LNL in Italy, we seek to obtain quadrupole moments and relative signs for E2 matrix elements in selenium-74, as well as the matrix elements for transitions between states that are very closely situated in energy.

[76] Report on AGATA@LNL experiment E22.41 "Probing Multiple Shape Coexistence in 110Cd with Coulomb Excitation" (11:45, 15 minutes)

Presenter: PIĘTKA, Iwona (Heavy Ion Laboratory, University of Warsaw, Warsaw, Poland)

For several decades, stable even-mass Cd isotopes have been considered to be textbook examples of multiphonon spherical vibrators [1] based on the excitation energy pattern of their low-lying states. However, a detailed study of ^{110}In β decay and subsequent beyond-mean-field theoretical calculations [2-5] suggested instead the presence of multiple shape coexistence in ^{110}Cd and ^{112}Cd isotopes. To verify this hypothesis complete sets of transitional and diagonal E2 matrix elements, including their relative signs, are needed. This key experimental information can be obtained by applying the low-energy Coulomb-excitation technique [6]. Coulomb excitation of ^{110}Cd using a 187-MeV ^{60}Ni beam was performed at National Institute for Nuclear Physics - Legnaro National Laboratories, Italy [7]. This experiment was a part of a broader program focused on systematic Coulomb-excitation studies of ^{110}Cd initiated at Heavy Ion Laboratory, University of Warsaw, with light beams of ^{32}S [5] and ^{14}N ions [8]. The ^{60}Ni + ^{110}Cd experiment was carried out using 11 AGATA triple clusters [9,10] and the particle detection array SPIDER [11] to register back-scattered beam ions. SPIDER was placed at laboratory angles ranging from 128 to 160 degrees to enhance the probability of multistep Coulomb excitation. In total 20 states of both negative and positive parity were populated up to 3 MeV of excitation energy, including in particular the 0^+_3 state at 1731 keV. Details of the experiment performed with AGATA at LNL and chosen aspects of the on-going data analysis will be presented along with the preliminary results obtained. References [1] R.F. Casten, Nuclear Structure from a Simple Perspective (Oxford Univ. Press 1990) [2] P.E. Garrett et al., Phys. Rev. C 86 (2012) 044304. [3] P.E. Garrett et al., Phys. Rev. C 101 (2020) 044302. [4] P.E. Garrett et al., Phys. Rev. Lett. 123 (2019) 142502. [5] K. Wrzosek-Lipska et al., Acta Phys. Pol. B51 (2020) 789. [6] M. Zielińska, Low-Energy Coulomb Excitation and Nuclear Deformation, in: The Euroschool on Exotic Beams, vol.VI, S.M. Lenzi and D.Cortina-Gil (eds.) Lecture Notes in Physics 1005, pp. 43-86 (Springer, 2022) [7] K. Wrzosek-Lipska et al., INFN-LNL-273 (2023), 24. [8] I. Piętka, MSc. thesis, Unversity of Warsaw, Poland (2023) [9] S. Akkoyun et al., Nucl. Instrum. Methods A668 (2012) 26. [10] J.J. Valiente-Dobón et al., Nucl. Instrum. Methods A1049 (2023) 168040. [11] M. Rocchini et al., Nucl. Instrum. Methods A971 (2020) 164030.

[70] Report on experiment EXP_009 (22.23) (12:00, 15 minutes)

Presenter: ANGELINI, Filippo (INFN-LNL and University of Padova)

In December 2022, an experiment was performed at INFN-LNL with a ^{208}Pb beam at 1300 MeV impinging on a ^{9}Be target, using the inverse kinematics fusion-fission reaction for both nuclear structure and reactions studies. The experiment was performed using the AGATA γ-ray tracking array coupled to the magnetic spectrometer PRISMA [1–3]. This setup allowed one to measure the γ rays from the de-excitation of the fission fragments and to study the dynamics of the fission of the compound nucleus, ^{217}Rn. One of the interesting nuclear structure issues that can be tackled in the neutron-rich region reached through the fission of this system is the evolution of the shell gap at $N=50$. The observation of the reduction of the $N=50$ shell gap [4, 5] is a phenomenon that motivated different measurements in the $N=50$ isotones towards ^{78}Ni. In particular, estimates starting from mass measurements show a decrease of the $N=50$ gap size from $Z=40$ until ^{82}Ge, while for ^{80}Zn a re-increase is observed [6]. A second method to estimate the gap size is with the energy of medium-spin states in $N=50$ even-even isotones. The fusion-fission reaction mechanism is an effective production method for spectroscopy of these levels because it can populate states at higher spins than transfer reactions, up to 6-8 units of angular momentum [6]. While the production cross section for the very exotic N = 50 nuclei with Z < 31 becomes small, the less neutron-rich isotopes in this region are populated with higher yields and a more detailed spectroscopy of their excited levels is possible. We will show preliminary results on γ-ray spectroscopy of N = 40 − 50 isotopes in the region with Z = 29 − 32. In parallel

to the γ-ray spectroscopy of the energy levels of the fission products, the measurement of the fragments with the large acceptance spectrometer PRISMA gives access to key quantities for the description of the fission dynamics of the ^{217}Rn compound nucleus. The (A,Z) identification and the reconstruction of the fragment velocities in the center of mass of the fissioning system allow the extraction of relevant observables, such as the total kinetic energy (TKE), the neutron excess N/Z and the neutron evaporation as a function of the nuclear charge [7]. For the examined system of ^{217}Rn, symmetric fission is expected [8] and therefore structure effects on the yield distribution should be smaller, but the neutron-rich part of this region was never tested experimentally and observables which are sensitive to the influence of nuclear structure in fission, such as N/Z, still have to be studied. The goal in this experiment is to study the behaviour of the relevant observables in the fission fragments to find features around particular Z or N numbers [9] that might show the role of shell effects at high excitation energy in this region of nuclei. We will show preliminary results on the fission fragment identification and distributions.

[67] Report on the AGATA@Legnaro experiment EXP 22.04 (12:15, 15 minutes)

Presenter: ABELS, Rainer (University of Cologne)

With the AGATA-PRISMA setup at INFN Legnaro, the experiment "Pathway to nuclear structure in heavy neutron rich nuclei in the vicinity of N=126 and nuclei northwest of ^{132}Sn via multinucleon transfer reactions" was carried out to measure excited states to answer open questions in these regions of the nuclear chart. A primary ^{136}Xe beam with an energy of 1GeV hitting a ^{208}Pb target was used to produce the nuclei of interest via multinucleon transfer reactions. The beam-like reaction products are detected with the PRISMA spectrometer positioned at the grazing angle. With the PRISMA spectrometer, the energy E, nuclear charge Z, velocity β, charge state q and mass number A of the beam-like isotopes are measured in the range of Z=53-56 to select the nuclei of interest. Data analysis is perfomed for all components of the PRISMA spectrometer in order to achieve the best possible identification of the difficult-to-access neutron-rich lead-like isotopes. Coincident gamma-ray spectra from excited states of the beam- and target-like particles were measured with the AGATA spectrometer composed of 33 HPGe crystals. Status of the selection of the reaction channels and the actual status of the data analysis will be presented.

[68] Analysis of EXP-017 and EXP-022: Challenges, Solutions, and Future Directions (12:30, 15 minutes)

Presenter: SULLIVAN, Conor (University of Liverpool)

This presentation explores results from two experiments, EXP_017 (23.015) and EXP_022 (22.096), focussing on high-spin states in ^{136,137}Nd and octupole deformation in uranium isotopes, respectively. In EXP_017, the investigation centered on the decays out of highly deformed rotational bands in ^{136}Nd and ^{137}Nd. These bands challenge existing nuclear structure theories by persisting in high-energy regions where damping is typically expected. The experiment aimed to utilise the AGATA detector array coupled to the EUCLIDES ancillary device to perform high-statistics measurements, enabling the identification of low-lying states and the determination of spin and parity. Despite challenges with efficiency and background, preliminary results suggest future promise at running this type of experiment with AGATA. EXP_022 aimed to study octupole deformation in ^{226}U and ^{228}U isotopes, which are predicted to exhibit "pear-shaped" structures. The experiment used the AGATA, PRISMA, and DANTE detector arrays to study these isotopes through multinucleon transfer reactions induced by a ^{129}Xe beam on a ^{232}Th target. Analysis of the experiment is ongoing and preliminary results are to be presented.

[72] Report on the data analysis of the experiment 23.015 devoted to the search for the decay-out of the oblate, triaxial and highly-deformed bands in 136,137Nd (12:45, 15 minutes)

Presenter: PETRACHE, Costel (IJClab Université Paris Sud and CNRS/IN2P3)

The experiment 23.015 performed in October 21-26, 2023 was devoted to the search for the decay out of an extremely regular rotational band in ^{137}Nd, interpreted as built on oblate shape, that extends to a spin of about 75/2 and an excitation energy of 4.5 MeV above yrast at the highest spins. We measured 7 days with the ^{33}S+^{110}Pd reaction at 180 MeV and the AGATA+EUCLIDES setup. The status of the data analysis will be reported. This band is interesting because is highly excited at very high spin, where the number of states per keV are several orders of magnitude higher than close to the yrast line. It survives as a long cascade of discrete transitions in a very hot E^*-I$ region where the bands are expected to be completely damped, which is in contradiction with the present understanding of the nuclear structure at high temperature. CNS calculations suggests normal-deformed oblate shape for the band O. However, an alternative interpretation assuming much higher band-head spin (+13$\hbar$) and deformation has been recently proposed. We therefore proposed to perform a high-statistics thin-target measurement to firmly link the observed band to low-lying states and to fix its spins and parity.

[64] Report on the AGATA EXP_013 (22.85) (13:00, 15 minutes)

Presenter: AYATOLLAHZADEH, Hamid (University of the West of Scotland)

Recent calculations have suggested that the region of strong octupole correlations in the light actinides extends to higher Z values than previously thought, with neutron-deficient plutonium (Z = 94) and curium (Z = 96) nuclei predicted to have large β 3 values in their ground states [1, 2]. In order to test the predictions, an experiment has been performed to study the structure of neutron-deficient plutonium (Z = 94) isotopes. The experiment was carried out using the AGATA γ-ray spectrometer [3, 4] together with the PRISMA [5] magnetic spectrometer and the DANTE channel-plate array [6]. The main aim of the experiment was to

identify excited states in the isotopes 232 Pu and 234 Pu. The nuclei of interest were populated using multi-nucleon transfer reactions induced with a beam of 112 Sn incident on a thin 238 U target. Reaction channels were selected by identifying the beam-like reaction products behind the focal plane of PRISMA and, where possible, detecting target-like products in the DANTE detectors. Analysis of the data is ongoing and the preliminary results will be presented. This work is supported by Science and Technology Facilities Council, UK, under grants numbered ST/P005101/1 and ST/V001124/1. References [1] Y. Cao et al., Phys. Rev. C. 102, 024311 (2020). [2] K. Nomura et al., Phys. Rev. C. 103, 044311 (2021). [3] S. Akkoyun et al., Nucl. Instrum. Meth. 668, 26 (2012). [4] J. J. Valiente-Dobón et al., Nucl. Instrum. Meth. A1049, 168040 (2023). [5] A. M. Stefanini et al., Nucl. Phys. A701, 217 (2002). [6] G. de Angelis, AIP Conf. Proc. 1609, 71-76 (2014).

[83] Concluding remarks (13:15, 15 minutes)

Presenters: ZIELINSKA, Magdalena (CEA Saclay), LEONI, Silvia (University of Milano and INFFN Milano)