EURO-LABS 3rd Annual Meeting

Report of Contributions

https://indico.cern.ch/e/euro-labs-tam

Contribution ID: **89** Type: **not specified**

Steering Committee Meeting (closed session - tbc)

Session Classification: Pre-meeting

Contribution ID: **90** Type: **not specified**

Visit to CERN Science Gateway

Sunday 27 October 2024 14:00 (3 hours)

Free visit to CERN Science Gateway.

Presenter: EFTHYMIOPOULOS, Ilias (CERN)

Session Classification: Pre-meeting

Contribution ID: **91** Type: **not specified**

Registration

Monday 28 October 2024 08:30 (20 minutes)

Presenter: EFTHYMIOPOULOS, Ilias (CERN)

Session Classification: Plenary session

Contribution ID: **92** Type: **not specified**

Opening

Monday 28 October 2024 08:50 (10 minutes)

Presenter: EFTHYMIOPOULOS, Ilias (CERN)

Session Classification: Plenary session

Contribution ID: **93** Type: **not specified**

Welcome address

Monday 28 October 2024 09:00 (30 minutes)

CERN Director of Research and Computing

Presenter: MNICH, Joachim Josef (CERN)

Session Classification: Plenary session

Contribution ID: **94** Type: **not specified**

Project scientific report

Monday 28 October 2024 09:30 (30 minutes)

Setting the scene:
- what achieved so far,
- what is ahead

Presenter: ALAHARI, Navin (GANIL)

Session Classification: Plenary session

Contribution ID: **95** Type: **not specified**

Nuclear Physics Roadmap

Monday 28 October 2024 10:00 (30 minutes)

Presenter: LEWITOWICZ, Marek

Session Classification: Plenary session

Contribution ID: **96** Type: **not specified**

ECFA report on HEP activities en route to the ESPP update

Monday 28 October 2024 11:00 (30 minutes)

Presenter: SPHICAS, Paris (CERN/Athens)

Session Classification: Plenary session

Contribution ID: **97** Type: **not specified**

Challenges and R&D opportunities for the Future electron-positron Circular Collide

Monday 28 October 2024 11:30 (30 minutes)

Presenter: KEINTZEL, Jacqueline (CERN)

Session Classification: Plenary session

Contribution ID: **98** Type: **not specified**

Determination of single-neutron energies and spectroscopic factors outside 132Sn

Monday 28 October 2024 14:10 (10 minutes)

ISODLE

Facility identifier

Work-package

Presenter: MACGREGOR, Patrick (CERN)

Session Classification: Plenary session

Contribution ID: **99** Type: **not specified**

Uniform beam delivery and real time dosimetry for FLASH radiotherapy applications

Monday 28 October 2024 14:35 (15 minutes)

CLEAR

Facility identifier

Work-package

Presenter: CORSINI, Roberto (CERN)

Session Classification: Plenary session

Contribution ID: **100** Type: **not specified**

R3B commissioning and Probing nucleon-nucleon correlations in atomic nuclei via (p,pd) QFS reaction

Monday 28 October 2024 14:00 (10 minutes)

GSI/FAIR

Facility identifier

Work-package

Presenter: WHITEHEAD, Matt

Session Classification: Plenary session

Contribution ID: **101** Type: **not specified**

Test of Low Gain Avalanche Diodes at the AIC-144 cyclotron

Monday 28 October 2024 14:20 (15 minutes)

Facility identifier

Work-package

Presenter: OLKO, Pawel (Institute of Nuclear Physics Polish Academy of Sciences)

Session Classification: Plenary session

Contribution ID: **102** Type: **not specified**

High precision 209Bi(n,γ) cross section measurement at n_TOF EAR2

Monday 28 October 2024 15:45 (10 minutes)

nTOF

Facility identifier

Work-package

Presenter: BALIBREA CORREA, Javier (Univ. of Valencia and CSIC (ES))

Session Classification: Plenary session

Contribution ID: **103** Type: **not specified**

Open Science and Data - Progress report

Tuesday 29 October 2024 10:15 (20 minutes)

Facility identifier

Work-package

Presenter: LEMASSON, Antoine (GANIL/CNRS)

Session Classification: Plenary session

Contribution ID: **104** Type: **not specified**

Search for E1 strength below the Giant Dipole Resonance from zero to finite temperature at IFIN-HH and CCB facilities

Monday 28 October 2024 14:50 (10 minutes)

NLC-CCB & IFIN-HH

Facility identifier

Work-package

Presenter: WIELAND, Oliver (INFN sezione di Milano)

Session Classification: Plenary session

Contribution ID: **105** Type: **not specified**

A direct measurement of a relativistic pair-plasma beam instability at The HiRadMat Facility (CERN)

Tuesday 29 October 2024 09:20 (15 minutes)

Relativistic electron-positron plasmas are believed to occur in extreme astrophysical environments such as the jets from black-holes and neutron-star magnetospheres. In this talk, we discuss the first experimental realisation of relativistic electron-positron pair plasmas and direct measurements of magnetic field amplification due to kinetic pair-plasma instabilities.

Facility identifier

Work-package

Presenter: Dr HALLIDAY, Jack (University of Oxford, United Kingdom)

Session Classification: Plenary session

Contribution ID: **106** Type: **not specified**

WP5 - highlight presentation

Session Classification: Plenary session

Contribution ID: **107** Type: **not specified**

Irradiation of detectors to extreme neutron fluences up to 10^18 n_eq/cm^2 in the TRIGA reactor

Monday 28 October 2024 16:05 (15 minutes)

Facility identifier

Work-package

Presenter: MANDIC, Igor (Jozef Stefan Institute (SI))

Session Classification: Plenary session

Contribution ID: **108** Type: **not specified**

Lessons learned from P1 reporting

Wednesday 30 October 2024 09:00 (20 minutes)

Facility identifier

Work-package

Presenter: PEZZOTTA, Barbara

Session Classification: Plenary session

Contribution ID: **109** Type: **not specified**

Steps and schedule for P2 report

Wednesday 30 October 2024 09:25 (40 minutes)

Presenter: COLONNA, Maria

Session Classification: Plenary session

Contribution ID: **110** Type: **not specified**

WP4 report - looking ahead program

Wednesday 30 October 2024 10:05 (25 minutes)

Presenter: Prof. MIKUZ, Marko (Jozef Stefan Institute (SI))

Session Classification: Plenary session

Contribution ID: **111** Type: **not specified**

WP3 report - looking ahead program

Wednesday 30 October 2024 11:50 (25 minutes)

Presenter: EFTHYMIOPOULOS, Ilias (CERN)

Session Classification: Plenary session

Contribution ID: **112** Type: **not specified**

WP5 report - looking ahead program

Wednesday 30 October 2024 11:25 (25 minutes)

Presenters: GARCIA BORGE, Maria (CSIC Madrid); GARCIA BORGE, Maria Jose (Consejo Superior de Investigaciones Cientificas (CSIC) (ES))

Session Classification: Plenary session

Contribution ID: **113** Type: **not specified**

WP2 report - looking ahead program

Wednesday 30 October 2024 11:00 (25 minutes)

Presenters: MAJ, Adam (Polish Academy of Sciences (PL)); MAJ, Adam

Session Classification: Plenary session

Contribution ID: **114** Type: **not specified**

Closing remarks

Wednesday 30 October 2024 12:30 (10 minutes)

Presenter: ALAHARI, Navin (GANIL)

Session Classification: Plenary session

Contribution ID: **115** Type: **not specified**

Innovation Fostering in Accelerator Science and Technology (I.FAST) - Project Report

Monday 28 October 2024 12:00 (30 minutes)

Presenter: VRETENAR, Maurizio (CERN)

Session Classification: Plenary session

Contribution ID: **116** Type: **not specified**

Advancement and Innovation for Detectors at Accelerators (AIDAinnova) - Project Report

Tuesday 29 October 2024 09:00 (20 minutes)

Presenter: GIACOMELLI, Paolo (Universita e INFN, Bologna (IT))

Session Classification: Plenary session

Contribution ID: **117** Type: **not specified**

Geoff: Applications and Developments in 2024

Tuesday 29 October 2024 09:35 (15 minutes)

Presenter: MADYSA, Nico (GSI - Helmholtzzentrum fur Schwerionenforschung GmbH (DE))

Session Classification: Plenary session

Contribution ID: **118** Type: **not specified**

Project Office Report

Tuesday 29 October 2024 11:50 (25 minutes)

Facility identifier

Work-package

Presenters: GIACOMELLI, Paolo (Universita e INFN, Bologna (IT)); GIACOMELLI, Paolo (INFN Sezione di Bologna)

Session Classification: Plenary session

Contribution ID: **119** Type: **not specified**

Application of Machine Learning for beam profile monitoring

Tuesday 29 October 2024 09:50 (15 minutes)

Presenter: SZUMEGA, Jaroslaw (CERN EP-DT-DD, Mines ParisTech (FR))

Session Classification: Plenary session

Contribution ID: **120** Type: **not specified**

Carbon and Proton FLASH: Technical preparation for the clinical application

Tuesday 29 October 2024 11:05 (15 minutes)

Presenter: CHARUCHINDA, Warisara

Session Classification: Plenary session

Contribution ID: **121** Type: **not specified**

CLEAR@CERN - New user beam line and dedicated equipment

Tuesday 29 October 2024 11:35 (15 minutes)

Presenter: FARABOLINI, Wilfrid (CERN)

Session Classification: Plenary session

Contribution ID: **122** Type: **not specified**

Report on Training Schools and co-sponsoring schools and future plans

Presenter: TRACHE, Livius (IFIN-HH)

Session Classification: Plenary session

Contribution ID: **123** Type: **not specified**

ERIBS: towards better heavy ion beam services

Tuesday 29 October 2024 11:20 (15 minutes)

Presenter: GREEENLEES, Paul

Session Classification: Plenary session

Contribution ID: **124** Type: **not specified**

Cooling system and graphical user interface for EMC test station

Monday 28 October 2024 16:40 (15 minutes)

Facility identifier

Work-package

Presenters: ARTECHE, Fernando (Instituto Tecnológico de Aragón); ARTECHE GONZALEZ, Fernando Jose (Aragon Institute of Technology Itainnova (ES))

Session Classification: Plenary session

Contribution ID: **125** Type: **not specified**

WP3 - service improvements

Session Classification: Plenary session

Contribution ID: **131** Type: **Poster**

A New Beamline for Extremely Clean Beams at ISOLDE

With the advent of nuclear structure studies using antiproton annihilations on the surface of unstable nuclei at the PUMA experiment [1], isobaric beam purity and vacuum requirements with < 10ˆ-10 mbar motivate the installation of a new beamline at ISOLDE. A Multi-Reflection Time-of-Flight mass spectrometer (MR-ToF MS) is currently in commissioning at the MIRACLS experiment [2], promising up to a factor hundred higher throughput with mass separation powers in excess of 100,000 within only a few milliseconds of storage time [3]. In this contribution, the current design plans for the new transfer beamline at RC6, incorporating the MIRACLS Paul trap and MR-ToF MS, will be presented.
[1] T. Aumann et al., Eur. Phys. J. A (2022) 58: 88
[2] F. Maier et al., NIM A 1048 (2023), 167927
[3] F. Maier et al., NIM A 1056 (2023), 168545

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

ISOLDE

Author: NIES, Lukas (CERN)

Session Classification: Cocktail - Poster session

Contribution ID: **132** Type: **Poster**

MIRACLS: Laser spectroscopy of radioactive isotopes in an MR-ToF device

A wealth of theoretical models, both phenomenological and from first principles, have been developed in order to predict the various properties of the atomic nucleus. In order to test modern nuclear theory, experimentalists need to push towards the most exotic nuclei for benchmarking these predictions.

In this regard, Collinear Laser Spectroscopy (CLS) has proven to be a powerful technique for probing exotic radionuclides. With a single measurement of a hyperfine spectrum, the nuclear spin, electromagnetic moments, and charge radius of a particular atomic species can be extracted.

The Multi Ion Reflection Apparatus for Collinear Laser Spectroscopy (MIRACLS) is a new experimental setup in the ISOLDE facility at CERN which aims to improve the sensitivity of conventional CLS by conducting it in a high-energy (> 10 keV) multi-reflection time-of-flight (MR-ToF) device [1, 2], a type of ion trap which utilizes two electrostatic mirrors to reflect ion bunches back and forth for several thousands of revolutions. In this configuration, we gain a sensitivity boost compared to conventional CLS since ion bunches are "recycled"after each revolution. As a result, exotic radionuclides with very low production yields become accessible, such as the magnesium isotope ^{34}Mg, which will be the first physics case of MIRACLS and will give fresh insights on the "island of inversion"around the $N = 20$ neutron shell closure.

Besides CLS, the high-energy MR-ToF device at MIRACLS can also be used for highly selective, high-flux mass separation to provide purified beams of radioactive isotopes [3]. These pure beams are a requirement for other experimental programs such as PUMA, which aims to exploit antiprotons to probe the surface effects of atomic nuclei such as halo nucleons or neutron skins [4].

In this poster, I will describe the operating principles of MIRACLS and show the results of our first online measurements.

References

[1] Simon Sels et al. "First steps in the development of the multi ion reflection apparatus for collinear laser spectroscopy". In: NIMA B 463 (2020), pp.310-314.
[2] F.M. Maier et al. "Simulation studies of a 30-keV MR-ToF device for highly sensitive collinear laser spectroscopy". In: NIMA A 1048 (2023).
[3] F.M. Maier et al. "Increased beam energy as a pathway towards a highly selective and high-flux MR-ToF mass separator". In: NIMA A 1056 (2023).
[4] T Aumann et al. "PUMA, antiProton unstable matter annihilation". In: Eur. Phys. J. A 58.5 (2022), p. 88.

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

ISOLDE

Author: ROITMAN, Anthony (McGill University, (CA))

Session Classification: Cocktail - Poster session

Contribution ID: **133** Type: **Poster**

Theo4Exp A Comprehensive Theory Service for the EURO-LABS Community

Theo4Exp is a virtual infrastructure which provides theoretical tools within the **EURO-LABS** project. It is aimed mainly at experimental nuclear physicists to enable them standard but advanced calculations helpful in data interpretation, favouring collaboration between theorists and experimentalists. It is designed as an open access platform, where key computer codes, as well as results of calculations, have been made accessible to the community. It includes three different platforms:

- **MeanField4Exp** hosted by IFJ PAN in Cracow,
- **Reaction4Exp** hosted by University of Seville, and
- **Structure4Exp** hosted by University of Milan.

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

IFJ PAN

Authors: RODRÍGUEZ-GALLARDO, M.; COLÒ, G.; DEDES, I.; DUDEK, J.; GAAMOUCI, A.; MOUMENE, I.; MUÑOZ-CHIMBO, C. T.

Session Classification: Cocktail - Poster session

Contribution ID: **134** Type: **Poster**

The Beam Test Facility of the "Laboratori Nazionali di Frascati"

The Beam Test Facility (BTF) of the National Laboratories of Frascati provides external users with positron/electron primary and secondary beams in various configurations for detector calibration purposes.
The BTF beam is organized into bunches, with a repetition rate of up to 49 pulses per second from the DAΦNE LINAC facility. Each bunch offers impressive flexibility, accommodating a multiplicity ranging from a minimum of 1 to 10^{10} particles per bunch (depending on the specific hall and line). For secondary beams, energy selection spans a wide range, from 30 MeV up to maximum energies of 750 MeV (for electrons) and 510 MeV (for positrons).
A notable strength of BTF lies in its user-friendly approach. The beam can easily manipulated in various beam parameters to meet users' specific needs, even during ongoing data collection. The facility comprises two experimental halls: BTFEH1 and BTFEH2. Both experimental halls feature remotely controlled movable tables, beam diagnostics, and essential services to facilitate experiments. These services include data delivery of machine and detector parameters, laser alignment, networking support, high voltage assistance, and provisions for compressed air, fluids, and gas pipelines.

Work-package

WP3 - RIs for Accelerator R&D

Facility identifier

INFN Frascati Beam Test Facility (BTF)

Author: DIOCIAIUTI, Eleonora (INFN e Laboratori Nazionali di Frascati (IT))

Co-authors: DI GIULIO, Claudio; Dr DI GIOVENALE, Domenico (INFN-LNF); Dr CARDELLI, Fabio; Mr FOGGETTA, Luca Gennaro (INFN); BUONOMO, bruno (INFN-LNF)

Session Classification: Cocktail - Poster session

Contribution ID: **135** Type: **Poster**

Laser Spectroscopy of neutron deficient Thallium Isotopes

Presenting the results from the COLLAPS run of neutron deficient Thallium Isotopes collected in 2023, including details of the experimental method. Preliminary results from analysis and values for isotope shifts, magnetic dipole moments and electric quadrupole moments will be presented. In addition to this some wider comparison with the lead region for broader trends will be shown.

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

ISOLDE

Author: MATTHEWS, Edward Noel (Technische Universitaet Darmstadt (DE) and EP-SME-IS)

Session Classification: Cocktail - Poster session

Contribution ID: **136** Type: **Poster**

First laser-spectroscopy measurements across N = 32 in the calcium isotopic chain

Over a decade ago, the first experimental evidence for the N=32 sub shell closure in the calcium isotopic chain emerged [1,2]. Subsequent experimental and theoretical investigations have confirmed this finding. However, in laser spectroscopy measurements extending up to ^{52}Ca (N=32), no indications of this shell gap were apparent [3]. Crossing the shell gap with laser spectroscopy setups has proved difficult due to the simultaneous requirement of a sensitivity of approximately 10 ions/s and a measurement uncertainty on the order of MHz.

This contribution presents the first laser spectroscopy measurements of ^{53,54}Ca, facilitated by an extension of the collinear laser spectroscopy technique employed at the COLLAPS setup at ISOLDE/CERN. This technique, termed as *radioactive detection after optical pumping and state selective charge exchange* (ROC), combines the high sensitivity of a particle detection scheme with the high resolution of low-power, continuous wave lasers utilized in a collinear geometry. The methodology of this technique will be explained, followed by the presentation and discussion of preliminary values for the charge radius and magnetic dipole moment of ^{53,54}Ca in the context of the robustness of the N=32 sub shell closure.

[1] Wienholtz, F. et al. Nature vol. 498, 346-349 (2013)

[2] Steppenbeck, D. et al. Nature vol. 502, 207-210 (2013)

[3] R.F. Garcia Ruiz et al, Nature Physics vol. 12, 594-598 (2016)

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

ISOLDE

Authors: MATTHEWS, Edward Noel (Technische Universitaet Darmstadt (DE) and EP-SME-IS); LELLINGER, Tim Enrico (CERN, Technische Universitaet Darmstadt (DE))

Session Classification: Cocktail - Poster session

Contribution ID: **137** Type: **Poster**

GANIL's Target Laboratory: Supporting Nuclear Physics with Advanced Target Development

The GANIL facility is an infrastructure dedicated to fundamental research using ion beams in fields such as nuclear physics, materials science, astrophysics, radiobiology, etc. GANIL's target laboratory is part of the European EuroLabs project, which, among other objectives, brings together the community of 'nuclear target manufacturers' at the European level to produce a wide range of tailored targets for fundamental research in nuclear physics. By mastering techniques such as physical vapor deposition and mechanical rolling, targets with thicknesses ranging from a few tens of μg/cm² to several mg/cm² can be created. Different shapes can be produced, such as thin foils, self-supporting films, or deposited layers on backing materials, each chosen based on the specific properties of the target material and the desired outcome. In order to meet new experimental requirements, particularly those linked to the SPIRAL2, 'Neutrons for Science' (NFS), and 'Super Separator Spectrometer' (S3) facilities, an upgrade of the current target laboratory is underway to significantly expand and optimize target production capabilities, particularly by developing a wide range of targets with an emphasis on rare earth elements, extending to the production of isotopically enriched targets. The latter pave the way for in-depth studies of nuclear reactions and exotic nuclei, as well as the production of radioisotopes for medical applications.

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

GANIL

Author: RAHALI, Radia (GANIL)

Co-authors: Dr STODEL, Christelle (GANIL); Dr PEROCHEAU, Franck (GANIL); Mr FREMONT, George (GANIL); Mr BOURGES, Marius (GANIL)

Session Classification: Cocktail - Poster session

Contribution ID: **138** Type: **Poster**

Formation mechanism of PbV centers from implanted Pb in diamond

Colour centers in diamond have currently found applications in quantum devices, in particular the nitrogen-vacancy center NV, which is being used as a nanoscale sensor for magnetic fields or temperature. Group-IV vacancy centers are, thanks to their symmetry properties (due to the so-called split-vacancy configuration), of great interest as spin-photon interfaces for a number of quantum applications [1] in which they are considered superior to NV, which does not possess mirror-symmetry. PbV- [1-3], containing the heaviest group-IV atom, holds particular promise due to its predicted long spin-coherence times [3]. Recently, photon emission with transform-limited linewidth at temperatures above 10 K has been shown from PbV- [4], making the center a major candidate for the realization of quantum repeaters. Optically active PbV- centers have been realized following ion implantation and high temperature annealing (>1200℃), however, little is known about their structural formation mechanism.

In order to study the PbV structural yield of formation from implanted Pb, we have investigated its lattice location by using the beta emission channeling (EC) technique from the radioactive isotope 209Pb (t1/2=3.25 h) produced at the ISOLDE/CERN facility. Following implantation at room temperature (RT) with 8E11 cm-2 50 keV 209Pb, EC characterization revealed ˜40% of implanted 209Pb on the so-called bond-center (BC) sites, which are characteristic for the split-vacancy configuration, in addition to ˜60% on substitutional sites. Annealing at 600℃ or 900℃ did not substantially alter the BC fractions, and implantation at these elevated temperatures resulted in the same high BC fractions ˜40%. PbV thus shows a high structural yield of formation for various implantation conditions, as well as a high thermal stability. In a different sample, implanted with stable 208Pb at a fluence of 5E12 cm-2 and annealed at 1100℃, RT fluorescence from the C and D ZPL of PbV- at 552 and 557 nm following excitation with 450 nm was observed. We conclude that, while thermal annealing is required in order to restore or modify the crystal environment so that luminescence from PbV centers can be excited and/or observed, it does not increase their structural formation yield, which is already high directly following RT implantation. The formation mechanism of PbV and possible scenarios for its optical activation will be discussed and a comparison given to the cases of GeV [5] and SnV [6].

This project has received funding from the European Union's Horizon Europe Research and Innovation programme under Grant Agreement No 101057511.

References

1. C. Bradac, W. Gao, J. Forneris, M.E. Trusheim, I. Aharonovich, Quantum nanophotonics with group IV defects in diamond, Nature Comm. 10 (2019) 5625.

2. S. Ditalia Tchernij et al., Spectral features of Pb-related color centers in diamond –a systematic photoluminescence characterization, New J. Phys. 23 (2021) 063032.

3. P. Wang et al., Low-temperature spectroscopic investigation of lead-vacancy centers in diamond fabricated by high-pressure and high-temperature treatment, ACS Photonics 8 (2021) 2947.

4. P. Wang et al., Transform-limited photon emission from a lead vacancy center in diamond above 10 K, Phys. Rev. Lett. 132 (2024) 073601.

5. U. Wahl et al, "Structural formation yield of GeV centers from implanted Ge in diamond", Materials for Quantum Technologies 4 (2024) 025101.

6. U. Wahl et al, "Direct structural identification and quantification of the split-vacancy configuration for implanted Sn in diamond", Phys. Rev. Lett. 125 (2020) 045301.

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

CERN-ISOLDE

Authors: WAHL, Ulrich (Universidade de Lisboa (PT)); MARTINS CORREIA, Joao (Universidade de Lisboa (PT)); GRANADEIRO COSTA, Angelo Rafael (Universidade de Lisboa (PT)); BIESMANS, Brecht (KU Leuven (BE)); DANILOV, Kirill (KU Leuven (BE)); TUNHUMA, Shandirai Malven (KU Leuven (BE)); DE MATOS LAMELAS, Afonso Xavier; BRAS DE SEQUEIRA AMARAL, Vitor (University of Aveiro (PT)); JOHNSTON, Karl; VANTOMME, André; DA COSTA PEREIRA, Lino Miguel (KU Leuven (BE))

Session Classification: Cocktail - Poster session

Contribution ID: **139** Type: **Poster**

Local effects in vanadia-based compounds

The current study focuses on the temperature-dependent structural modulation of the local environment of M2+ ions in vanadium bronzes MxV2O5 and vanadates xMnO-V2O5. The growing interest in V2O5-based materials is in view of their potential for cathodes in M ion batteries, as highlighted in recent research [1]. Although the (de)intercalation mechanism of M ions is considered fundamental to charge transfer [2], a detailed description of this process is still lacking. In this regard, it becomes interesting to investigate vanadia-based materials with local methods, such as Time-Differential Perturbed Angular Correlation (TDPAC) spectroscopy to gain deeper insights into the structural dynamics involved. Samples were synthesized using incipient wetness impregnation method and the standard Pechini route. The X-ray diffraction method was employed to control over sample quality. For TDPAC measurements, the radioactive probes were introduced either through ion implantation of 111mCd beam at ISOLDE or directly during synthesis using 111InCl3 sourced from IPEN-Brazil. The behavior of hyperfine parameters indicates a temperature-dependent modulation of the local environment of the Cd probes in both V2O5:Cd and xMnO-V2O5:Cd systems. The observed effect can be associated to either distortions induce by the probe atom; or to intrinsic local structural variation. The two possibilities will be discussed in this presentation.

Work-package

Facility identifier

ISOLDE

Author: ALVES MIRANDA FILHO, Arnaldo (Instituto de Pesquisas Energeticas e Nucleares (BR))

Co-authors: BURIMOVA, Anastasia (Instituto de Pesquisas Energeticas e Nucleares (BR)); CARBONARI, Artur Wilson (Instituto de Pesquisas Energeticas e Nucleares (BR)); SCHELL, Juliana (Institut Fur Materialwissenschaft Universität Duisburg-Essen (DE))

Session Classification: Cocktail - Poster session

Contribution ID: **140** Type: **Poster**

The INFN Test Facility for Large Magnets

The Test Facility for Large Magnets is a cryogenic test facility located in Salerno, at the Fisciano campus, covering an area of 450 m2. It is dedicated to the large-scale superconducting magnets tests providing a cryogenic infrastructure equipped with the He refrigerator of 200W @ 4.5 K and 30m3 He gas tank. The facility has been adapted to carry out the Site Acceptance Tests of the quadrupole modules for the Heavy-Ion-Synchrotron SIS100 under construction in Germany. It features all the necessary instrumentation to perform electrical integrity tests both at warm and cold, power tests up to 250 A and cryogenic tests through the use of a supercritical helium distribution.

Work-package

WP3 - RIs for Accelerator R&D

Facility identifier

THOR

Author: Dr CHIUCHIOLO, Antonella (INFN)

Session Classification: Cocktail - Poster session

Contribution ID: **141** Type: **Poster**

CLEAR: Cluster of Low Energy Accelerators for Research

The Cluster of Low Energy Accelerators for Research (CLEAR) is a consortium comprising three research facilities [1]: ATOMKI in Debrecen [2], CNA in Seville [3], and IST in Lisbon [4]. CLEAR is part of the EURO-LABS EU Project [5], each facility offering 640 hours of Transnational Access to stable-ion and neutron beams annually.
The consortium operates under a unified Program Advisory Committee and holds three proposal calls per year. These proposals cover various fields, including nuclear physics, nuclear applications, and nuclear technology, where low-energy accelerators play a key role.
As of September 2024, 10 proposals have been successfully completed, meeting criteria such as scientific excellence, cross-disciplinary relevance, and training opportunities. Notably, many proposals came from first-time users, broadening the international reach and collaborations of the CLEAR facilities.

1. https://institucional.us.es/clear/transnational-access
2. https://www.atomki.hu/en/
3. https://cna.us.es/index.php/en/
4. https://c2tn.tecnico.ulisboa.pt/facilities/nuclear-microprobe/
5. https://web.infn.it/EURO-LABS/

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

CLEAR Consortium

Authors: BIRI, Sandor (. HUN-REN Institute for Nuclear Research (Atomki), Bem ter 18/c, 4026 Debrecen, Hungary); Prof. GOMEZ-CAMACHO, JOAQUIN (Centro Nacional de Aceleradores (CNA), Universidad de Sevilla (US) - J. Andalucía - CSIC, E-41092, Sevilla, Spain); CORREGIDOR, Victoria (Campus Tecnológico e Nuclear (CTN), E.N.10 (km 139.7), Instituto Superior Técnico, Universidade de Lisboa, 2695-066 Bobadela, Portugal)

Session Classification: Cocktail - Poster session

Contribution ID: **143** Type: **Poster**

Targets for Nuclear Physics within the EURO-LABS project: activities @ INFN –LNS

The European nuclear target community has benefited by funds within the EURO-LABS work package WP2-5-2 on "targets for Nuclear Physics". The last one is a joint project by the INFN –LNS, INFN –LNL and INFN –Turin in Italy, GSI/FAIR in Germany, GANIL, CNRS –IJCLAB, CNRS –IPHC Strasbourg in France, University of Warsaw/HIL in Poland, IFIN –HH in Romania, LIP/FCUL –Lisbon in Portugal and PSI in Switzerland. The goal of the activities of WP2-5-2 is to gather the community of nuclear target makers and users having specific expertise in the field of target manufacturing and characterization. Into this context, the relevant facilities and research activities at INFN –LNS will be briefly described.

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

INFN-LNS

Author: Dr SOUKERAS, Vasileios (INFN-LNS)

Co-author: WP2-5-2 COLLABORATION, for the EURO-LABS

Session Classification: Cocktail - Poster session

Contribution ID: **144** Type: **Poster**

Measurement of the neutron capture cross section of ^{64}Ni at n_TOF

Neutron capture cross sections of ^{64}Ni is an important parameter to accurately simulate the s-process and validate stellar models. As ^{64}Ni is among the seeds of the s-process, the uncertainty on its capture cross section has been shown to significantly affect the predicted abundances of many isotopes produced by the s-process both in massive and AGB stars. Moreover, the uncertain value of this cross section may be the cause of the discrepancy observed between predicted and measured ^{64}Ni isotopic ratios in SiC presolar grains. Indeed, the MACS reported by different releases of data libraries show discrepancies higher than a factor 2 at 5 keV. For these reasons, a new accurate time-of-flight measurement was carried out during summer 2023 at the n_TOF facility at CERN. At the moment, only preliminary results are available, but they already show important discrepancies with respect to the latest data library releases. These discrepancies are expected to significantly impact on the Maxwellian Average Cross Section at the energies of astrophysical interest.

Work-package

Facility identifier

n_TOF

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Co-authors: Dr TAGLIENTE, Giuseppe (INFN Bari); Dr MILAZZO, Paolo Maria (INFN Trieste)

Session Classification: Cocktail - Poster session

Contribution ID: **145** Type: **Poster**

The ISOLDE Solenoidal Spectrometer as a probe of single-particle structure along the magnesium isotopic chain

The ISOLDE Solenoidal Spectrometer (ISS) is a device designed to measure the reaction products from nuclear scattering reactions in inverse kinematics, where a heavy radioactive ion beam is fired at a lighter target. The strong solenoidal magnetic field focuses the lighter product of interest onto a bespoke on-axis silicon array, from which the excitation energy and angle of scattering can be extracted without the kinematic hindrances that occur when a magnetic field is not present. Additional detectors can be used to measure the heavier reaction product of interest, as well as reaction products from competing reactions.

An application of this technique is to study the single-particle structure of the magnesium isotope chain. These isotopes lie in a region of the nuclear chart called the $N = 20$ "island of inversion", which is neutron-rich and of particular importance for understanding the evolution of nuclear structure. In this region, deformed intruder configurations (particle-hole excitations) dominate at ground-state and low-excitation energies which is facilitated by the weakening of the $N = 20$ shell closure. Additionally, this shell gap weakens as protons are removed, leading to a new shell closure emerging at $N = 16$, which produces doubly-magic properties in ^{24}O. The magnesium isotopes exhibit a swift transition into the island between ^{30}Mg and ^{31}Mg, and thus are a useful measure of how single-particle structure evolves into the island. Data on isotopes in this region can be used to test the validity of current nuclear models, and be used to further refine them for other nuclei in the island.

This poster will present the solenoidal spectrometer technique used at ISOLDE, and present the recently published results on the nuclear structure of ^{29}Mg populated using the d(^{28}Mg,p) reaction (9.47 MeV/u) [1] and some preliminary results for ^{31}Mg populated using the d(^{30}Mg,p) reaction (8.52 MeV/u).

[1] P. T. MacGregor et al., Phys. Rev. C 104, L051301, Nov 2021

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

CERN

Author: MACGREGOR, Patrick (CERN)

Session Classification: Cocktail - Poster session

Contribution ID: **146** Type: **Poster**

β-decay spectroscopy with laser-polarised beams at VITO

β-decay spectroscopy is a powerful experimental tool for studying complex phenomena emerging in exotic neutron-rich nuclei, such as β-delayed one- and multi-neutron emission [1-3].
A novel approach to β-decay experiments, pioneered by a group from the University of Osaka [4,5], has recently been implemented at the VITO beamline [6] at ISOLDE. The new end station, called DeVITO [7], has been integrated with a laser polarisation setup, enabling β-decay spectroscopy studies with spin-oriented nuclei. This unique combination allows measurements of β-particle emission asymmetry in coincidence with γ-rays and/or neutrons, providing a solid foundation for unambiguous spin-parity assignments for states involved in allowed β transitions. This poster contribution presents the setup used in the first DeVITO experiment [8] as well as its physics motivation and preliminary results.

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new-β-decay-station-unlocks-advanced-decay-spectroscopy-experiments-laser
[8] M. Piersa-Siłkowska, M. Madurga, M. Kowalska et al., CERN-INTC-2023-026 ; INTC-P-662.

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

ISOLDE

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Session Classification: Cocktail - Poster session

Contribution ID: **147** Type: **Poster**

The FREIA Laboratory

Poster describing the FREIA lab, the service improvements and the Transnational access granted.

Work-package

WP3 - RIs for Accelerator R&D

Facility identifier

FREIA, Uppsala University

Authors: PROFATILOVA, Iaroslava; SANTIAGO KERN, Rocio (Uppsala University (SE))

Session Classification: Cocktail - Poster session

Contribution ID: **148** Type: **Poster**

LPA-UHI100 platform : an optimised laser-driven electron sources for device testing

An overview of the LPA-UHI100 platform will be detailed, including service improvement that allows increasing the repetition rate of the laser-driven electron source.
A detailed plan of the implementation and tests of new ML toolkit developped by GSI (GeOFF) will be presented as well. This should reduce the optimisation time for delivering optimised electron beam to users.

Work-package

Facility identifier

LPA-UHI100

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Session Classification: Cocktail - Poster session

Contribution ID: **150** Type: **Poster**

Measurement of the ^{166,167,nat}Er cross-sections at n_TOF EAR1

The research on Burnable Absorbers (BA) inside nuclear power plants has demonstrated that erbium is a viable alternative to gadolinium. Erbium enhances the safety of fission power plants and plays a significant role in nuclear astrophysics, particularly in s-process nucleosynthesis. However, the evaluated uncertainty data for erbium isotopes remain relatively high. To address this, an experimental campaign at n_TOF EAR1 was proposed. The project aims to measure the capture cross section of ^{167}Er, which is listed as a priority by the NEA HPRL. The measurements were conducted in 2023 using an array of C_6D_6 detectors and a precisely characterized natural sample. The energy range of interest for this experiment extends from thermal neutron energy up to 50 eV. In 2024, additional measurements with C_6D_6 detectors were performed on enriched ^{166}Er and ^{167}Er samples at n_TOF EAR1. These measurements will extend the explored energy range of the capture cross section up to the keV region.

Work-package

Facility identifier

n_TOF

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Session Classification: Cocktail - Poster session

Contribution ID: **151** Type: **Poster**

Neutron Inelastic Scattering measurements at n_TOF

The development of the next generation of nuclear technologies require precise knowledge of a broad range of nuclear data. Specifically, the cross sections of reactions induced by fast neutrons play a crucial role in the design of Gen IV nuclear reactors, with four out of the six considered prototypes being of the fast reactor type. Fusion reactors also necessitate accurate neutron inelastic cross section data. Typically, low uncertainties in neutron inelastic scattering cross sections are achieved through means of γ spectroscopy. On this respect, enhancements can be achieved by taking advantage by the excellent timing response and large efficiency of LaBr3(Ce) crystals. Given its outstanding neutron beam characteristics, the n_TOF facility is ideal for testing the feasibility of measuring the neutron-induced inelastic channel using LaBr3(Ce) detectors. Preliminary results from the testing different LaBr3(Ce) protypes used to measure 24Mg(n,n') will be presented.

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

n_TOF

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Session Classification: Cocktail - Poster session

Contribution ID: **152** Type: **Poster**

The 243Am(n,f) cross-section campaign at the n_TOF facility at CERN

Measurements of the 243Am(n,f) cross-section have been carried out at the n_TOF facility both in EAR1 and EAR2

Work-package

Facility identifier

n_TOF

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Session Classification: Cocktail - Poster session

Contribution ID: **153** Type: **Poster**

Diamond Detector Measurements at the NEAR Station of the n_TOF facility at CERN

The new experimental area of the n_TOF facility at CERN, namely NEAR, has been built at a very short distance from the Pb spallation target (approximately 2.5 m) in order to take advantage of the extremely high neutron fluence expected and perform various challenging measurements for numerous applications. In this experimental area, due to the high instantaneous flux, only passive techniques, such as the multiple foil activation technique, have been performed to characterize the neutron flux. However, diamond exhibits very promising properties for in beam neutron detection, leading to the widespread usage of diamond detection systems in radiation applications, particularly in neutron induced reaction studies and neutron fluence measurements.

In this work, a newly built single crystalline diamond detector and associated electronics were developed from CIVIDEC Instrumentation, for in-beam neutron measurements, aiming to measure the neutron flux in the harsh environmental conditions of the NEAR station. It was essential to perform numerous experiments in order to test the response of the detector and the electronics as well as to determine the optimized experimental set-up. One test was performed on EAR2 and three followed at the NEAR station, where it was the first time an in-beam measurement was attempted. These challenging measurements were spread out in 2023-2024, and required frequent visits at CERN, partially supported by EURO-LABS. Some preliminary results of these tests will be presented.

Work-package

Facility identifier

n_TOF facility CERN

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Session Classification: Cocktail - Poster session

Contribution ID: **154** Type: **Poster**

Neutron capture cross-section measurement of 146Nd(n,γ) @ n_TOF-EAR2

The slow neutron capture process is one of the main mechanisms of stellar nucleosynthesis for isotopes heavier than 56Fe, being of special importance in the region of the valley of stability.
The measurement of the neutron capture cross sections in time-of-flight facilities, such as n_TOF, provides nuclear data for isotopic ratios and stellar evolution models.
These models are evaluated in comparison to observational data, of which measurements of star-dust silicon carbide (SiC) grains is the most precise.

Measurements of SiC are in disagreement with recent model predictions for the Nd isotopes, [1,2,3], consistently predicting a 15% higher neutron-capture cross section of 146Nd.
Moreover, the current reference data for 146Nd(n,γ), by Bao et al. [4], is based on a measurement of the unresolved resonance region (URR), between 3 and 225 keV, by Wisshak [5], and shows discrepancies with other measurements.

The recent experimental campaign, [6], at EAR2-n_TOF, [7], using a high sensitivity setup, [8], and a high-purity sample of 146Nd has the objective of measuring the resolved resonance region (RRR) of 146Nd up to 5 keV. Preliminary results from this campaign will be presented.

An outlook into a complementary campaign on the activation of 146Nd(n,γ) in a quasi-stellar spectra, yielding 147Nd with a suitable half-life (≈11d) to directly determine the MACS, will be included.

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(5) K. Wisshak et al., Phys. Rev. C 57, 391 (1998)
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Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

n_TOF

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Session Classification: Cocktail - Poster session

Contribution ID: **155** Type: **Poster**

Sizes and shapes of Tm isotopes explored via laser spectroscopy

High resolution laser spectroscopy has been used to study the atomic hyperfine structure of thulium isotopes (Z=69). This technique results in a model independent measurement of the nuclear magnetic dipole and electric quadrupole moments, as well as the change in mean-square charge radius, with respect to the stable 169Tm. Collinear laser spectroscopy measurements were performed using the COLLAPS experiment based at ISOLDE, CERN. From a preliminary study to measure isotope yield and assess the chosen transition, measurements of thulium isotopes ranging from 155 –175 were taken and have been analysed, with these results being the focus of the poster. This paves the way for studying the more neutron-deficient isotopes of thulium.

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

ISOLDE

Author: HUGHES, Jack Brian (University of Liverpool (GB))

Session Classification: Cocktail - Poster session

Contribution ID: **156** Type: **Poster**

Test of a large drift-gap MicroMegas detector for TPC application

The MM-TPC collaboration has tested a MicroMegas detector for TPC purposes both in a single particle and high particle regime.
This has been possible thanks to the INFN Frascati Beam Test Facility (BTF) facility that provided electrons and positrons at $450\,\mathrm{MeV}$ energy with multiplicity ranging from 1 to 10^4.
The detector under test was a $40 \times 50\,\mathrm{cm}^2$ MicroMegas gaseous detector with extended drift gap of $5\,\mathrm{cm}$, which is ten times the standard one, to allow the ionization of more gas atoms and thus a larger number of reconstructed hits for improved tracking performances.
A small $10 \times 10\,\mathrm{cm}^2$ MicroMegas chamber, also with extended drift gap, was used to provide a reference position, perpendicular to the BTF electron beam, while the large MicroMegas chamber was tilted by 22°.
Both chambers were filled with $\mathrm{Ar} : \mathrm{CF4} : \mathrm{iC_4H_{10}}$ gas mixture with 88:10:2 vol%, and equipped with APV front-end electronics.
Drift voltages scans were performed to measure investigate the maximum drift velocity reachable, and to test the inclined track position reconstruction with the micro-TPC method.
Tests at higher multiplicity were also carried out in order to measure the rate sustainability at such a high flux for a possible use of the detector as a beam monitor device.
This contribution will describe the results obtained from the above studies, showing the good response of the detector for a precise inclined track reconstruction.

Work-package

WP3 - RIs for Accelerator R&D

Facility identifier

INFN Frascati Beam Test Facility (BTF)

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Session Classification: Cocktail - Poster session

Contribution ID: **157** Type: **Poster**

SPARC_LAB test facility for Advanced Electron Beam Applications

The SPARC_LAB (Sources for Plasma Accelerators and Radiation Compton with Lasers and Beams) facility is a state-of-the-art research center at Frascati National Laboratories (Rome, Italy) designed to provide external users with access to a high-brightness electron beam for a wide range of scientific applications. SPARC_LAB consists of a photoinjector, SPARC, capable of generating high-brightness electron beams up to 170 MeV, and a multi-hundred terawatt laser, FLAME, which can produce high-power and ultra-short laser pulses. At present, SPARC is oriented to research high-gradient acceleration with plasma, able to produce and accelerate electron beams capable of driving the 12 m long undulator for FEL generation, in the framework of the international EuPRAXIA project. Through the Eurolabs project, the aim is to provide and fund access to SPARC_LAB for external researchers, enabling experimental activities using the SPARC linear accelerator and the FLAME laser. This initiative fosters collaboration within the international scientific community, driving advancements in plasma-based acceleration, free electron lasers, and other frontier technologies.

Work-package

WP3 - RIs for Accelerator R&D

Facility identifier

INFN - LNF

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Session Classification: Cocktail - Poster session

Contribution ID: **158** Type: **Poster**

openNP Research Data Management

This poster aims to present an overview of openNP-RDM, a digital repository platform dedicated to open science for nuclear physics.

Work-package

WP5 - Open, Diverser and Inclusive science

Facility identifier

GANIL

Author: FABLE, Quentin (GANIL/CNRS)

Session Classification: Cocktail - Poster session

Contribution ID: **159** Type: **Poster**

Single particle behaviour above magic Sn: laser spectroscopy of neutron deficient Sb isotopes at CRIS

Recent progressions of nuclear theories have allowed for the descriptions of heavier, complicated systems such as the doubly magic ^{100}Sn. Experimental efforts have been invested in studying the surrounding region near the proton shell closure at Z=50. Sb (Z=51) lies a single proton above this Z=50 proton shell closure and the single valence proton allows for the investigation of single-particle behaviour predicted by the nuclear shell model. This contribution will present an overview of the project as well as preliminary measurements of the hyperfine structure of the neutron deficient $^{111-123}$Sb isotopes performed at the CRIS experiment at ISOLDE, CERN.

This project has received funding from the European Union's Horizon Europe Research and Innovation programme under Grant Agreement No 101057511

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

ISOLDE

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Session Classification: Cocktail - Poster session

Contribution ID: **160** Type: **Poster**

Scientific-technical infrastructures of GSI and FAIR

The scientific-technical infrastructures of GSI and FAIR attract many national and international user groups to perform forefront research in accelerator-based science. For research groups with approved experiments, beams and experimental facilities are provided free of charge. This contribution will highlight the accelerator facilities, the experimental areas, and results from recent activities at GSI and FAIR, which were supported by Euro-Labs TA.

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

GSI

Authors: HORNUNG, Christine; SCHEIDENBERGER, Christoph

Session Classification: Cocktail - Poster session

Contribution ID: **161** Type: **Poster**

Precision measurement of hyperfine structure constant using laser-rf double-resonance spectroscopy

This study aims to precisely measure the hyperfine structure (HFS) constant A, in neutron-rich potassium isotopes [1]. The in-beam laser-rf double-resonance spectroscopy [2] in a collinear geometry will be performed to obtain the relative precision of up to 10-4. This method, which has previously been applied only to stable isotopes, brings significantly enhanced precision through the use of RF excitations between substates of the ground hyperfine structure multiplet. In our experimental setup, an ion beam is optically pumped before it enters a 2-meter-long region, where it propagates collinearly with a traveling RF wave. When the RF frequency is resonant with the energy difference between two adjacent hyperfine sublevels, it allows the population of ions to transition. Then the beam enters the probing zone, where optical photons are monitored and detected.

The A factor obtained, will be combined with the magnetic dipole moments measured using -NMR technique [3] to calculate the magnetization distribution within the neutron-rich nuclei. The data interpretation will be done with the help of nuclear density functional theory approach with angular momentum symmetry restoration [4] using HFODD code [5]. These findings will provide valuable benchmarks for refining nuclear models and advancing our understanding of the magnetic properties and structure of neutron-rich isotopes.

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Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

ISOLDE

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Session Classification: Cocktail - Poster session

Contribution ID: **162** Type: **Poster**

Overview of the 2024 Miniball experimental campaign at ISOLDE

The Miniball gamma-ray spectrometer at ISOLDE-CERN is employed to investigate both collective and single-particle nuclear properties in radioactive isotopes. The spectrometer comprises eight assemblies of three high-purity germanium detectors, and is complemented with ancillary silicon detectors for particle detection. It exploits the re-accelerated radioactive ion beams provided by the HIE-ISOLDE facility to perform Coulomb excitation and nucleon transfer reactions.

The 2024 Miniball campaign at ISOLDE focused on Coulomb excitation reaction experiments to investigate nuclear deformation for medium-mass and heavy nuclei. Highlights of the recent experiments performed at Miniball will be presented.

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

ISOLDE

Author: PORZIO, Carlotta (CERN)

Session Classification: Cocktail - Poster session

Contribution ID: **163** Type: **Poster**

Cost-effective method to monitor kinetic instabilities in ECRIS

Kinetic instabilities in ECR plasmas can significantly affect the output of the ion source, leading to temporary drops in beam quality and current. This can have adverse effects on experiments making use of these beams. As part of the EUROLABS –ERIBS effort to optimise the performance of ECRIS and avoid interruptions in performance, the LNS-LNL task force is focused on developing experimental and computational tools to map the onset of instabilities to the operating conditions of the plasma. We present here updates on the status of the experimental setup which will be used to characterise the spatial and temporal evolution of ms-scale short-term kinetic instabilities and alert the operator to disruptions in source operation. The setup comprises of a set of non-invasive diagnostics based on detection of broadband radiation in RF, visible and X-ray domains. The visible range diagnostic includes a high sensitivity PIN detector with ultrafast response (˜1.5 GHz) which can detect the optical transient accompanying the instability. Both visible and X-ray diagnostics will be triggered by signals from RF diode which will first detect the onset of instability. The setup is proposed to be a cost-effective method to monitor the plasma but can also be coupled with PIC simulations to computationally identify stable regimes of ECRIS operation which can further our understanding of these devices

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

INFN LNL-LNS

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Session Classification: Cocktail - Poster session

Contribution ID: **164** Type: **Poster**

Magnetic Moment Measurement of 11Be with ppm Accuracy

β detected NMR is a method that allows investigations of short-lived isotopes with a precision inaccessible to conventional NMR. This increased sensitivity is gained by combining hyperpolarisation of the nuclear spin generated through optical pumping with an efficient detection of the asymmetrically emitted β-particles from the decaying isotopes. One of the isotopes scheduled to be investigated with β detected NMR at VITO is ^{11}Be. It is of interest because it is a single neutron halo nucleus. Measuring the magnetic moment of ^{11}Be with greater accuracy will help to give insights into the nuclear magnetisation distribution of ^{11}Be and thus directly confirm its halo structure.

To enable such measurements, the VITO beamline has undergone multiple major upgrades and extensions in the past, such as, the installation of a superconducting solenoidal magnet with sub-ppm homogeneity and the ability to measure in liquid samples [1]. The beta detectors are a critical aspect; their purpose is to detect the asymmetrically emitted β-particles from the hyperpolarized decaying isotopes. A new detector setup is currently being developed it will consist of two plastic scintillators light guides and silicon photomultipliers. It will be able to measure the energies of the detected β-particles. This is useful because in ^{11}Be the two most intense transitions, the transition to the ground state and the first excited state have opposite beta asymmetry parameters and cancel each other out [2]. Including only the higher energy decay to the ground state will result in an increased observed β-decay asymmetry and thus enable the measurement of ^{11}Be.

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Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

ISOLDE

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Session Classification: Cocktail - Poster session

Contribution ID: **165** Type: **Poster**

Production routes of 129m,131m,133mXe for gamma-MRI project - novel medical imaging technique

The novel gamma-MRI imaging modality should allow the simultaneous exploitation the advantages of SPECT –sensitivity of gamma-ray detection, and MRI –spatial resolution and flexibility. The combination of these techniques relies use gamma-emitting nuclei (like in SPECT) with highly polarized spins, leading to anisotropic emission of gamma-ray, and allowing spin manipulation with rf pulses (like in MRI).

Production of $11/2^-$ spin isomers ^{129m}Xe ($T_{1/2}$=8.9 days), ^{131m}Xe ($T_{1/2}$=11.8 days) and ^{133m}Xe ($T_{1/2}$=2.2 days) is an important aspect of the gamma-MRI project. This contribution will present results of systematic studies of two production routes: at ISOLDE and in nuclear reactors. At ISOLDE, during four beamtimes in 2022 and 2023, we investigated the best production and implantation conditions. We used a UC_x with plasma ion source and a cooled transfer line and implanted beams of different Xe isotopes inside the GLM chamber into aluminium and gold foils with and without beam sweeping for seconds and hours. We then compared the number of implanted ions and the activity of the samples determined with ISOLDE gamma detectors to our simulations based on the ISOLDE in-target yields. As a result, we could determine the isomeric ratio for $11/2^-$ to $3/2^+$ states and the total efficiency of xenon extraction from the target. The study allowed us to determine the best conditions to collect high-activity samples (>10MBq) of ^{129m,131m,133m}Xe.

The second method of ^{129m}Xe and ^{131m}Xe production that we investigated in several campaigns between 2020 and 2023, is based on neutron irradiation of highly enriched stable ^{128}Xe and ^{130}Xe samples in the high-flux nuclear reactors: RHF reactor at Institute Laue-Langevin (ILL, Grenoble, France) and MARIA reactor in the National Centre for Nuclear Research (NCBJ, Swierk, Poland). We developed and optimised experimental setups for efficient enclosure of stable Xe, extraction and characterisation of the produced xenon isomers. The results show that both reactors provide isomer activities sufficient for the project (>50 MBq) with few unstable contaminants [M.Chojnacki et al, Appl. Radiat. Isot. 205 (2024) 111174] . This poster will give a brief introduction to the gamma-MRI technique and will provide experimental details as well as results of xenon-isomer production at ISOLDE and at ILL and MARIA reactors.

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

ISOLDE

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Session Classification: Cocktail - Poster session

Contribution ID: **166** Type: **Poster**

Cyclotron Center Bronowice in Kraków - the facility and main achievements

The Cyclotron Center Bronowice is the proton beam medical facility at the Institute of Nuclear Physics Polish Academy of Sciences devoted mainly to conduct hadron cancer therapy. Additionally it offers the possibility of using proton beams for nuclear physics research. The cyclotron delivers protons with the energy of 230 MeV which can be degraded to any energy down to 70 MeV using energy selector and then the proton beam can be sent to therapy rooms or to experimental hall.
The extensive research program conducted, mainly during weekends, concerns nuclear physics studies and performance of detectors. The experiments are selected, based on proposals, by the International Advisory Committee, composed of world-class nuclear physics experts. Some of them are supported by the EURO-LABs funds.
Among others, the main achievements are studies of gamma decay of proton induced collective excitations as giant quadrupole resonances or pygmy states, decay of stretched states, and evaluation of performance and capabilities of new detector concepts for the large scale facilities, e.g. CALIFA array for R3Be experiment at FAIR.

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

NLC-CCB

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Session Classification: Cocktail - Poster session

Contribution ID: **167** Type: **Poster**

The Heavy Ion Laboratory at the University of Warsaw - a facility portrait

The Heavy Ion Laboratory at the University of Warsaw as a part of the National Laboratory of Cyclotrons is the Polish transnational access facility. The Warsaw U-200P cyclotron delivers beams of heavy ions for experiments conducted by international experimental teams with the ICARE, EAGLE, and NEDA setups. Selected results obtained in this European transnational access program will be presented.

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

NLC_SLCJ

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Session Classification: Cocktail - Poster session

Contribution ID: **168** Type: **Poster**

Remote irradiation controls at the UMCG PARTREC cyclotron

The recent Covid pandemic has shown the importance of providing accelerator users with tools to control their experiments remotely. Giving them direct access to the control system would however constitute a major security risk, on top of the system itself being often complex to use.

At the PARTREC accelerator, work is ongoing to provide secure access via an interface PC connected to the public Eduroam network. This interface can interact with the control system PC only by exchanging data over a serial cable, thus minimising the attack surface. The interface PC provides a simple GUI for sending and receiving commands to the control system PC, alongside a live video feed of the irradiation room and the operators'room via RTSP. Customers can connect to it via VPN. The possibility is also given of using the customer's own laptop as interface, manually exchanging commands as strings over serial.

Controls available to users will include:

 Beam on/off Dose/fluence specification Energy at sample via degrader Field size: Collimator and/or Scan magnet settings Positioning: control of XY-table, rotation stage Flux/Dose rate (Beam intensity)

 For each setting, setter and getter commands are defined to control and receive feedback from equipment. A simple server written in Python is set up on the control system PC, handling the serial communication and interfacing with the control system. The implementation provided can control the irradiation by calling a set of LabVIEW routines, which constitute the bulk of the pre-existing irradiation control system. The server is designed for flexibility, and LabVIEW can be exchanged with any control system of choice.

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

UMCG PARTREC

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Session Classification: Cocktail - Poster session

Contribution ID: **169** Type: **Poster**

Streamlined and remote access (EURO-LABS Task 2.5.C1)

The streamlined and remote access subtask aims at the improvement of accessibility to the European accelerator facilities. The main goals are:

 improved dissemination of facility characteristics; streamlined proposal submission; unified forms for the supported personal access to the TA experiments and comprehensive database of the TA support usage; minimisation of required access to experimental areas and travel time for on-call experts; fostering of off-site participation (leading to increased training opportunities for early-career scientists, improved inter-institutional knowledge transfer, early problem recognition and timely intervention).

 The status of the remote access activities will be reported. The web-accessed ”remote access toolkit database” (eurolabs-remote.gsi.de) containing information and (where applicable) documentation containing a wide variety of remote-access tools has been developed. The content of the database is based upon the results of a comprehensive survey targeting EURO-LABS research infrastructures that was carried out in early 2023. The technical implementation of some selected remote access features has started. Some examples will be discussed. At PARTREC, an interface that is operated by the beam time user from any (remote) location and that interacts with the irradiation control system only by exchanging text strings over a serial cable has been developed and tested. This form of communication was chosen to minimize security risks to the accelerator and beam line control systems.

Work-package

WP2 - RIs for Nuclear Physics

Facility identifier

UMCG PARTREC

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Session Classification: Cocktail - Poster session

Contribution ID: **170** Type: **Poster**

HRMT-60 - RaDIATE Material Studies

HRMT-60 experiment was performed at the CERN-HiRadMat facility in October 2022 to understand thermal shock response of conventional materials and novel materials to support the design and operation of future multi-MW accelerator beam windows and secondary particle-production targets. This experiment, organized within the framework of the RaDIATE collaboration, builds on the previous HRMT-43 (BeGrid2) experiment, where a variety of materials in both non-irradiated and previously proton-irradiated conditions were tested. The primary goal was to understand the failure mechanisms, limits and flow behavior of the various material specimens, as well as compare and contrast the thermal shock response of previously irradiated materials to their non-irradiated counterparts. A total of 120 samples were tested at different beam conditions. This poster will present the preliminary results of several materials tested during this experiments.

Work-package

WP3 - RIs for Accelerator R&D

Facility identifier

HiRadMat

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Session Classification: Cocktail - Poster session

Contribution ID: **171** Type: **Poster**

INCT –RAPID –Centre for Radiation Research and Technology

The RAPID infrastructure of the Institute of Nuclear Chemistry and Technology (INCT) is a versatile research platform allowing pilot-scale electron beam irradiation for research and demonstrations with a broad range of beam parameters. It includes: 1) linear electron beam accelerator (LAE 10, INCT) with nanosecond pulse radiolysis set-up, 2) Linear electron beam accelerator (Elektronika, Toriy, Russia) capable of emitting electron beams of electron energy 10 MeV and a beam power of up to 15 kW, which is primarily used for radiation processing applications including sterilization and microbial decontamination, 3) pilot plant facility equipped with the ILU 6 accelerator (INP, Russia), which can emit beams of electrons with energy ranging from 0.2 to 2 MeV and an average beam power of up to 20 kW and can be used for polymer modification, liquids or gaseous samples irradiation.

The project "Crosslinking of self-assembled fatty acids on copper by electron beam irradiation"was conducted at INCT through EURO-LABS, using the ILU-6 accelerator. The aim of the study was to explore the potential of electron beams for synthetizing stable, nano-thick polymer coatings on metal substrates. In the experiments, electron beams with energies of 1.7 MeV and 250 keV were used to crosslink a layer of behenic acid, a saturated fatty acids self-assembled on copper surfaces. The results demonstrated that electron beam irradiation successfully crosslinked these thin films. Moreover, the protective properties achieved through e-beam irradiation were comparable to those obtained with gamma irradiation, while offering a faster and simpler processing method.

Work-package

WP3 - RIs for Accelerator R&D

Facility identifier

RAPID

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Session Classification: Cocktail - Poster session

Contribution ID: **172** Type: **Poster**

Medical Activities in CLEAR: Studies Towards Radiotherapy Using Very High Energy Electrons (VHEE) in the FLASH Regime

Given the present availability of high-gradient accelerator technology for compact and cost-effective electron linacs in the 100-200 MeV energy range, the interest for Very High Energy Electron (VHEE) radiotherapy (RT) for cancer treatment recently reached an all-time high. Particular significance is assumed by the Ultra-High Dose Rate (UHDR) regime where the so-called FLASH biological effect takes place, in which cancer cells are damaged while healthy tissue is largely spared. VHEE beams from linacs are especially well adapted for FLASH RT, given their penetration depth and the high beam current needed to treat large deep-seated tumours. In recent years, several multi-disciplinary user groups carried out a number of studies on VHEE and FLASH RT issues using the CERN Linear Accelerator for Research (CLEAR) user facility, in close collaboration with the local operation team. In this paper we give an overview of such activities and describe the main results of chemical and biological tests aimed at clarifying the damage mechanisms at the root of the FLASH effect and the relevant beam parameters needed to achieve it. We also describe the dedicated systems and methods developed and used in CLEAR for these activities, focusing on recent advances in the crucial aspects of uniform beam delivery and high dose rate real-time dosimetry.

Work-package

WP3 - RIs for Accelerator R&D

Facility identifier

CLEAR

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Session Classification: Cocktail - Poster session

Contribution ID: **173** Type: **Poster**

The CLEAR User Facility: a Review of the Experimental Methods and Future Plans

The CERN Linear Electron Accelerator for Research (CLEAR), operating since 2017, is a user facility providing electron beams for a large and varied range of experiments. The electron beam is produced from a Cs2Te photocathode and is accelerated between 30 MeV and 220 MeV in a 20 m long linear accelerator. In 2022, several hardware and software tools were upgraded and novel procedures and methods were developed to address specific user requirements, including a further extension of the beam parameter ranges. In the paper, these improvements are described and the experimental activities during 2022/2023 are outlined. An outlook on future potential upgrades and on the planned experimental activities in the next years is also given.

Work-package

WP3 - RIs for Accelerator R&D

Facility identifier

CLEAR

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Session Classification: Cocktail - Poster session

Contribution ID: **174** Type: **not specified**

Operational improvements and upgrades of the CLEAR user facility

The CERN Linear Accelerator for Research (CLEAR) at CERN is a user facility providing a 30-200 MeV electron beam for accelerator R&D and irradiation studies, including medical applications. In this poster we will outline the most recent improvements in CLEAR operation and beam control and delivery, and describe the upgrades under way, giving an update of their current status. These upgrades include a new front-end for the laser system which will enable an highly flexible time structure, better stability and higher repetition rates, and the implementation of a second beam line which will provide additional testing capability and whose optics has been designed to match user requirements. Finally, we will discuss the proposed future experimental programme of the facility, particularly in view of the novel capabilities provided by the upgrades.

Work-package

WP3 - RIs for Accelerator R&D

Facility identifier

CLEAR

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Session Classification: Cocktail - Poster session

Contribution ID: **175** Type: **not specified**

Lifetime measurements around 48Cα

Monday 28 October 2024 16:20 (10 minutes)

Presenter: ANDREETTA, Giuseppe

Session Classification: Plenary session

Contribution ID: **176** Type: **not specified**

New fission studies at ALTO with nu-Ball2/PARIS

Monday 28 October 2024 15:55 (10 minutes)

Presenter: HIVER, Corentin

Session Classification: Plenary session

Contribution ID: **177** Type: **not specified**

Lifetime measurements in the N=Z nucleus 66As

Monday 28 October 2024 16:30 (10 minutes)

Presenter: GREENLEES, Paul

Session Classification: Plenary session

Contribution ID: **178** Type: **not specified**

Studies of proton-rich nuclei with EAGLE-NEDA-DIAMANT

Tuesday 29 October 2024 10:05 (10 minutes)

Presenter: HADYNSKA-KLEK, Katarzyna (Heavy Ion Laboratory, University of Warsaw (PL))

Session Classification: Plenary session

Contribution ID: **179** Type: **not specified**

Report from the GB meeting

Wednesday 30 October 2024 12:15 (15 minutes)

Presenter: GSCHWENDTNER, Edda (CERN)

Session Classification: Plenary session

Contribution ID: **180** Type: **not specified**

Transnational Access experiments at the KIT electron synchrotron test facility KARA

Monday 28 October 2024 15:00 (15 minutes)

Presenter: Dr RUPRECHT, Robert (KIT)

Session Classification: Plenary session

Contribution ID: **188** Type: **not specified**

Social Media Plan

Wednesday 30 October 2024 09:20 (5 minutes)

Presenter: MELANDRI , Stefania

Session Classification: Plenary session