



UNIVERSITÀ
DEGLI STUDI
DI MILANO



VII Topical Workshop on Modern Aspects in Nuclear Structure

The Many Facets of Nuclear Structure

BORMIO 3 - 8 February 2025

<https://agenda.infn.it/event/40436/overview>

Conference Hall: SALA TERME, Via Stelvio, 14 Bormio

PROGRAM

SYMPOSIUM
on Resonances and Related Topics
on the occasion of Angela Bracco's farewell from Milano University

MONDAY, 3rd February 2025

9:00-9:10 **OPENING**

CHAIR: **M. Borge** (Instituto de Estructura de la Materia, Madrid, Spain)

9:10-9:50 Progress in the study of electric giant and pygmy resonances over the last five decades
M. N. Harakeh (University of Groningen, Netherlands)

9:50-10:30 Electric Dipole Oscillations at Finite Temperature from the perspective of my long-
standing collaboration with Angela
A. Maj (IFJ PAN Krakow, Poland)

10:30-11:00 **COFFEE BREAK**

CHAIR: **D. Vretenar** (University of Zagreb, Croatia)

11:00-11:40 The Pygmy Dipole Resonance
E. G. Lanza (INFN Catania, Italy)

11:40-12:20 Theory updates on nuclear resonances: giant and pygmy, cold and hot, classical and
quantum
E. Litvinova (Western Michigan University, USA)

12:20-15:00 **LUNCH BREAK**

CHAIR: **A. Bruce** (University of Brighton, UK)

15:00-15:40 Experimental studies of the microscopic structure of the pygmy dipole resonance
M. -C. Spieker (Florida State University, USA)

15:40-16:20 Quasi-continuum M1 strength as function of nuclear deformation
M. Guttormsen (University of Oslo, Norway)

16:20-17:00 Particle-Vibration Coupling and Pairing Correlations
F. Barranco (University of Sevilla, Spain)

17:00-17:30 **COFFEE BREAK**

CHAIR: **K. Blaum** (Max-Planck Institut für Kernphysik, Heidelberg, Germany)

17:30-18:10 Angela and the Electric Dipole Response – Giant and Pygmy, Hot and Cold
P. von Neumann-Cosel (TU Darmstadt, Germany)

18:10-18:50 Nuclear Photonics at ELI-NP
C. A. Ur (ELI-NP & IFIN-HH, Bucharest, Romania)

19:45 **WELCOME COCKTAIL at MIRAMONTI HOTEL**

TUESDAY, 4th February 2025 – MORNING

8:50-9:00 **WELCOME**

GROUND-STATE PROPERTIES

CHAIR: **M. Lewitowicz** (GANIL, France)

9:00-9:25 Precision mass measurements for nuclear structure and fundamental studies
K. Blaum (Max-Planck Institut für Kernphysik, Heidelberg, Germany)

9:25-9:45 Studies of neutron-rich Tl-Bi isotopes at the ISOLDE Decay Station facilitated by in-source laser spectroscopy
A. Andreyev (University of York, UK)

9:45-10:00 Ground state properties of Chromium isotopes from stability to the N=40 Island of Inversion
L. Lalanne (IPHC, Strasbourg, France)

10:00-10:15 Investigating the changes in nuclear structure below $Z = 50$ with Ag
B. van den Borne (KU Leuven, Belgium)*

10:15-10:40 New opportunities at the ISOL@MYRRHA facility
A. Koszorus (KU Leuven & SCK CEN, Belgium)

10:40-11:05 Towards neutrino-nucleus scattering with coupled-cluster theory
S. Bacca (Johannes Gutenberg University, Mainz, Germany)

11:05-11:35 **COFFEE BREAK**

AB INITIO & NEW EXPERIMENTS

CHAIR: **B. Fornal** (IFJ PAN Krakow, Poland)

11:35-12:00 Ab initio calculations of heavy nuclei
T. Miyagi (Tsukuba University, Japan)

12:00-12:25 Recent achievements and future challenges in developing microscopic optical potentials for nuclear reactions
M. Vorabbi (University of Surrey, UK)

12:25-12:45 Test of the charge symmetry hypothesis of NN interaction from the Coulomb-free p-p scattering cross section and its relation to universality
A. Tumino (Kore University of Enna & INFN LNS, Italy)

12:45-13:10 Recent Progress and Achievements with the SAMURAI Spectrometer
H. Otsu (RIKEN, Japan)

13:10-13:30 Search for a neutron dark decay in ${}^6\text{He}$
H. Savajols (GANIL, France)

13:30-14:30 **LUNCH BREAK**

TUESDAY, 4th February 2025 – AFTERNOON

14:30-16:30 Remote Access Working Group Feedback Meeting

Reports from EURO-LABS WP2.5, Task C1 on the collection of “Remote Access Tools for Experiments” will be presented, together with working examples on the exploitation of such tools. A purpose of the meeting is to receive feedback from research infrastructure users.

Everyone is invited **Zoom link: <https://cern.zoom.us/j/2742091206?omn=63630250453>**

14:30-14:45 Introduction on the WP2.5, Task C1 “Remote Access Tools for Experiments”
H. M. Albers (GSI, Germany)

14:45-15:15 Description of the DataBase and Platform
N. Hubbard (GSI, Germany)

15:15-15:45 The PARTREC case
J. Magini (UMCG PARTREC, Groeningen, Netherlands)

15:45-16:30 Open discussion

16:30-17:00 **COFFEE BREAK**

BETA DECAY

CHAIR: **F. Kondev** (Argonne National Laboratory, USA)

17:00-17:25 Weak interactions in nuclei and door-way states to many-particle many-hole configurations
F. Minato (Kyushu University, Japan)

17:25-17:50 Recent TAS results for fundamental nuclear physics and applications
E. Nacher (IFIC CSIC - University of Valencia, Spain)

17:50-18:15 The PANDORA Project: a novel approach to investigate nuclear astrophysics phenomena in a magnetoplasma
D. Santonocito (INFN LNS, Italy)

18:15-18:40 Advancements in Decay Spectroscopy with GRIFFIN: Recent highlights and Future Directions
V. Vedia (Triumph, Canada & CERN, Switzerland)

18:40-19:05 Beta-delayed neutron decays of very neutron-rich nuclei
R. Grzywacz (University of Tennessee, USA)

19:05-19:20 The role of forbidden transitions on β -decay half-lives within Skyrme quasiparticle vibration coupling framework
X. Zhi (Lanzhou University, China)*

WEDNESDAY, 5th February 2025 – MORNING

NUCLEAR ASTROPHYSICS

- CHAIR:** **A. Tumino** (Kore University of Enna & INFN LNS, Italy)
- 9:00-9:25 Probing Heavy Element Nucleosynthesis Through Electromagnetic Observations
G. Martinez-Pinedo (GSI, Germany)
- 9:25-9:45 Nuclear Astrophysics with TPCs and Gamma-Beams
M. Gai (University of Connecticut, USA)
- 9:45-10:00 Sensitivities of the r-process rare-earth peak abundances to nuclear masses and β -decay rates
Y. W. Hao (Lanzhou University, China)*
- 10:00-10:15 Bayesian inference on nuclear data and neutron star observations for the nuclear equation of state
P. Klausner (University of Milano & INFN, Italy)*
- 10:15-10:40 Recent studies of resonant reactions of astrophysical interest using transfer reactions
F. Hammache (IJCLab, Orsay, France)
- 10:40-10:55 Helium burning: Addressing discrepancies and future approaches
K. C. W. Li (University of Oslo, Norway)
- 10:55-11:25 **COFFEE BREAK**

TRANSFER REACTIONS & SPECTROSCOPY

- CHAIR:** **R. Raabe** (KU Leuven, Belgium)
- 11:25-11:50 Transfer reactions with ACTAR TPC: Complete study of neutron-rich oxygen isotopes: $^{19-20}\text{O}$
B. Fernandez-Dominguez (IGFAE/University of Santiago de Compostela, Spain)
- 11:50-12:10 The $^{36}\text{S}(p,d)^{35}\text{S}$ reaction at 66 MeV
R. Neveling (iThemba LABS, South Africa)
- 12:10-12:30 Increasing quenching of spectroscopic factors in neutron-deficient C isotopes: a signature of short-range correlations?
O. Sorlin (GANIL, France)
- 12:30-12:55 Single-Neutron Strength Outside of ^{132}Sn
B. Kay (Argonne National Laboratory, USA)
- 12:55-13:10 Searching for Alpha-cluster Condensed State in ^{20}Ne
A. Camaini (University of Firenze & INFN, Italy)
- 13:10-13:25 Search for Double alpha decay
L. Heitz (CEA & IJCLab, Orsay, France)*
- 13:25-14:00 **LUNCH BREAK**

WEDNESDAY, 5th February 2025 – AFTERNOON

14:00-17:00 Joint Meeting of the PARIS Management Board, Collaboration Council and Steering Committee (per invitation)

16:30-17:00 COFFEE BREAK

APPLICATIONS

CHAIR: **M. Guttormsen** (University of Oslo, Norway)

17:00-17:25 The Isotope Harvesting Program at the Facility for Rare Isotope Beams (FRIB)
G. Severin (Michigan State University, USA)

17:25-17:45 SPES Low Energy RIB's for nuclear physics and applications
A. Andrighetto (INFN LNL, Italy)

17:45-18:05 Understanding Scintillation Mechanisms: Theory, Limitations, and Future Research Directions
W. Wolszczak (LBNL, USA)

18:05-18:20 Practical use of scintillators in nuclear structure physics experiments
P. Schotanus (SCIONIX, Netherlands)

18:20-18:35 Development of a precise energy calibration method of Ge detectors for Θ^- -Carbon atomic X-ray measurement at J-PARC
R. Imamoto (Tohoku University, Japan)*

18:35-18:50 The PARTREC cyclotron: irradiation facilities, neutron-rich nuclides spectroscopy, and remote access controls
J. Magini (UMCG PARTREC, Groningen, Netherlands)*

18:50-19:05 Italian Radioactive Waste Management: siting of a near surface disposal facility and site characterization
M. Lombardo (SOGIN, Italy)

THURSDAY, 6th February 2025 – MORNING

NUCLEAR SHAPES

CHAIR: M. Kimura (RIKEN, Japan)

- 9:00-9:25 Shapes, rotations and vibrations of heavy nuclei
T. Otsuka (University of Tokyo, Japan)
- 9:25-9:50 Multiple shapes at low spin in nuclei close to the magic numbers
N. Marginean (IFIN-HH, Bucharest, Romania)
- 9:50-10:05 Spherical-Oblate Shape Coexistence in ^{94}Zr from a Model-Independent Analysis
N. Marchini (INFN Firenze, Italy)*
- 10:05-10:20 Octupole Collectivity in ^{96}Zr from Low-Energy Coulomb Excitation with the AGATA+SPIDER Setup
F. Ercolano (University of Napoli & INFN, Italy)*
- 10:20-10:35 Shape coexistence of Zr and the neighbouring isotopes described by nuclear shell model
K. Yanase (RIKEN, Japan)*
- 10:35-10:50 Prospects for the study of collective states and search for the exotic shapes using a modernized Recoil Filter Detector coupled with an EAGLE germanium array
M. Matejska-Minda (IFJ PAN Krakow, Poland)

10:50-11:20 **COFFEE BREAK**

SHELL STRUCTURE

CHAIR: T. Otsuka (University of Tokyo, Japan)

- 11:20-11:40 Microscopic Description of Low-Energy Nuclear Reactions Based on TDHF and GCM
M. Kimura (RIKEN, Japan)
- 11:40-12:05 Allowed and forbidden beta decays within the Realistic Shell Model
G. de Gregorio (University of Campania & INFN, Italy)
- 12:05-12:30 News and highlights from the ISOLDE Decay Station
J. Cubiss (University of Edinburgh, UK)
- 12:30-12:45 Exploring Coexisting Structures in ^{178}Pt through the β -decay of isomerically pure beams
C. Page (University of York, UK)*
- 12:45-13:00 Probing the doubly magic shell closure at ^{132}Sn by Coulomb excitation of neutron-rich ^{130}Sn
M. Droste (University of Cologne, Germany)*
- 13:00-13:15 Investigation of low-lying excited states in ^{214}Po and ^{214}Bi
A. Esmaylzadeh (University of Cologne, Germany)*

13:15 -14:00 **LUNCH BREAK**

THURSDAY, 6th February 2025 – AFTERNOON

14:00-17:00 PARIS Collaboration Meeting - Open Session “Future of PARIS – LNL Legnaro and beyond”

- 14:00-14:20 Status of PARIS
A. Maj (IFJ PAN Krakow, Poland)
- 14:20-14:40 Physics cases for AGATA+PARIS@LNL
F. Camera (University of Milano & INFN, Italy)
- 14:40-14:55 Mechanical Coupling to AGATA in LNL
I. Matea (IJCLab, Orsay, France)
- 14:55-15:10 Electronics and DAQ
S. Brambilla (INFN Milano, Italy)
- 15:10-15:25 Investigation of a high spin structure in the vicinity of ^{44}Ti via discrete and continuum gamma spectroscopy with AGATA and PARIS.
P. Bednarczyk (IFJ PAN Krakow, Poland)
- 15:25-15:40 New PARIS projects at CCB Krakow and PARIS polarisation capabilities
M. Ciemała (IFJ PAN Krakow, Poland)
- 15:40-15:55 Opportunities for PARIS in GANIL/SPIRAL2
M. Lewitowicz (GANIL, France)
- 15:55-16:10 Opportunities for PARIS in IJCLab Orsay
J. Wilson (IJCLab, Orsay, France)
- 16:10-16:25 Opportunities for PARIS in India
V. Nanal (TIFR, India)
- 16:25-16:40 Perspectives of the PARIS project at the Heavy Ion Laboratory in Warsaw
K. Hadyńska-Klęk (University of Warsaw, Poland)
- 16:40-17:00 Open Discussion

16:50-17:20 COFFEE BREAK

SUPERHEAVIES

CHAIR: H. Savajols (GANIL, France)

17:20-17:40 Further steps towards next generation of covariant energy density functionals
A. V. Afanasiev (Mississippi State University, USA)

17:40-18:05 Metastable States in Superheavy Nuclei
D. Ackermann (GANIL, France)

18:05-18:20 Solving the $^{244,245}\text{Md}$ puzzle
S. Kumar (GANIL, France)*

18:20-18:35 Towards the synthesis of new heavy nuclei: a study of multinucleon transfer reactions with $^{136}\text{Xe} + ^{238}\text{U}$
J. Bequet (CEA/DPhN, Saclay, France)*

18:35-18:50 Status of the Fast Radioactive Ion Extraction and Neutralization Device for S3 (FRIENDS3)
E. Morin (IJCLab, Orsay, France)*

18:50-19:10 Performances of SIRIUS for the decay spectroscopy of superheavy nuclei
J. Piot (GANIL, France)

FRIDAY, 7th February 2025 – MORNING

RESONANCES

CHAIR: J. Meng (Peking University, China)

9:00-9:25 Nuclear Collective Vibrations: from Lab to Stars
Y. F. Niu (Lanzhou University, China)

9:25-9:40 The description of nuclear giant resonances in a self-consistent quasiparticle-vibration coupling approach
Z. Li (Peking University, China)*

9:40-9:55 Study of Giant Monopole Resonance in $^{58,68}\text{Ni}$ with ACTAR@GANIL
D. Thisse (CEA-Saclay, France)

9:55-10:20 Pygmy and giant resonances studied at CCB of IFJ PAN Krakow – highlights from the experimental campaign
M. Kmiecik (IFJ PAN Krakow, Poland)

10:20-10:35 Investigating the character of the pygmy dipole resonance in ^{96}Mo via (p,d) and(d,p).
T. C. Khumalo (iThemba LABS, South Africa)*

10:35-10:50 Description of the γ decay and $0\nu\beta\beta$ decay with the (quasi)particle vibration coupling model
W. L. Lv (Peking University, China)*

10:50-11:20 **COFFEE BREAK**

RESONANCES & NUCLEAR STRUCTURE

CHAIR: A. Maj (IFJ PAN Krakow, Poland)

11:20-11:35 Systematic investigation of E1 strength below Sn in the tin isotopic chain using the (d,p γ) reaction
M. Müllenmeister (University of Cologne, Germany)*

11:35-11:50 Investigation of the low-lying dipole strength of ^{62}Ni via real photon scattering
T. Schüttler (University of Cologne, Germany)*

11:50-12:05 First study of the PDR via neutron inelastic scattering at GANIL-SPIRAL2/NFS
P. Miriot-Jaubert (CEA-Saclay/IRFU/DPhN, France)*

12:05-12:25 Parity-violating asymmetry and dipole polarizabilities in atomic nuclei: how do they reconcile with each other?
X. Roca-Maza (University of Barcelona, Spain & Milano, Italy)

12:25-12:50 DESPEC Experiment Highlights from FAIR Phase-0
H. M. Albers (GSI, Germany)

12:50-13:05 Insights into the structure of neutron-rich rare-earth nuclei using the DESPEC setup in FAIR Phase-0
J. E. L. Larsson (GSI & TU Darmstadt, Germany)*

13:05-13:20 Setup and test of a beam profile monitor for coulomb excitation measurements at FAIR
D. Bittner (University of Cologne, Germany)*

13:20-16:30 **LUNCH BREAK**

FRIDAY, 7th February 2025 – AFTERNOON

16:30-17:00 COFFEE BREAK

NUCLEAR STRUCTURE

CHAIR: P. Reiter (University of Cologne, Germany)

17:00-17:25 The AGATA campaign at LNL: nuclear structure from high-resolution γ -ray spectroscopy
A. Gottardo (INFN LNL, Italy)

17:25-17:40 Mixing between single particle and intruder states towards the N=20 island of inversion:
lifetimes in ^{37}S
L. Zago* (University of Milano & INFN LNL, Italy)

17:40-18:00 Spectroscopic Factor Investigation in the N=40 Island of Inversion
C. Porzio (CERN, Switzerland)

18:00-18:20 Investigation of the Level Scheme in ^{107}Te
D. Mengoni (University of Padova & INFN, Italy)

18:20-18:35 Results on the multinucleon knockout reaction around ^{86}Mo using GRETINA and the S800
spectrometer at NSCL
P. Aguilera (INFN Padova, Italy)

18:35-18:55 Nuclear structure beyond the proton drip line
R. Page (University of Liverpool, UK)

18:55-19:10 Spin entanglement in time-dependent two-proton emission
T. Oishi (RIKEN, Japan)

SATURDAY, 8th February 2025 – MORNING

FISSION

CHAIR: **D. Ackermann** (GANIL, France)

- 9:00-9:25 Microscopic Models of Induced Fission Dynamics
D. Vretenar (University of Zagreb, Croatia)
- 9:25-9:40 Quantum Information Tools Applied to Nuclear Scission
G. Accorto (CEA/DAM/DIFF, Saclay, France)
- 9:40-9:55 β -delayed fission of neutron-rich actinides
S. Bara (KU Leuven, Belgium)*
- 9:55-10:20 Fission studies with the nu-Ball2 array
J. Wilson (IJCLab, Orsay, France)
- 10:20-10:35 Fast-timing@nu-Ball2 fission campaign: verification of the analysis and new results for the neutron-rich isotopes $^{134,136}\text{Te}$
J. Fischer (University of Cologne, Germany)*
- 10:35-10:50 Medium spin states in the ^{87}Se isotope produced in neutron induced fission of ^{233}U and ^{235}U targets
K. Gajewska (IFJ PAN Krakow, Poland)*

10:50-11:20 **COFFEE BREAK**

REACTIONS

CHAIR: **F. Barranco** (University of Sevilla, Spain)

- 11:20-11:45 Surrogate reactions in inverse kinematics at heavy-ion storage rings
B. Jurado (CNRS & IN2P3 Bordeaux, France)
- 11:45-12:10 Multi-proton emission in beta-decays along the proton drip-line
H. O. U. Fynbo (Aarhus University, Denmark)
- 12:10-12:30 Nuclear Physics studies at the 5MV tandem in Madrid
O. Tengblad (Instituto de Estructura de la Materia-CSIC, Madrid, Spain)
- 12:30-12:45 Influence of the intermediary nucleus continuum on pairing enhancement in a two-neutron transfer process
G. Singh (Johannes Gutenberg University, Mainz, Germany)*
- 12:45-13:00 Search for a nuclear Josephson effect in $^{60}\text{Ni}+^{116}\text{Sn}$ sub-barrier transfer reactions with the PRISMA+AGATA set-up
G. Andretta (University of Padova & INFN LNL, Italy)*
- 13:00-13:15 Quantal and deformation effects in charge-asymmetric low-energy reactions
L. Shvedov (INFN LNS, Italy)

13:15-16:30 **LUNCH BREAK**

SATURDAY, 8th February 2025 – AFTERNOON

16:30-17:00 **COFFEE BREAK**

BETA DECAY & ISOSPIN

CHAIR: **O. Sorlin** (GANIL, France)

17:00-17:20 Novel microscopic approaches for Spin-Isospin excitations and Beta-decay with tensor force

H. Sagawa (RIKEN, Japan)

17:20-17:40 Deformation and isospin breaking effects in the A=71 mirror system

A. Algora (IFIC CSIC - University of Valencia, Spain)

17:40-17:55 Isospin symmetry breaking energy density functional based on quantum chromodynamics

T. Naito (RIKEN, Japan)*

17:55-18:15 Study of the isospin mixing of the 2+ doublet in ⁸Be populated in the β⁺/EC decay of ⁸B

M. J. G. Borge (Instituto de Estructura de la Materia, Madrid, Spain)

18:15-18:30 Two-neutrino double beta decay in the DFT-rooted No-Core Configuration Interaction model

J. Miskiewicz (University of Warsaw, Poland)*

18:30-18:45 Study of beta-decay half-lives by relativistic quasiparticle-vibration coupling model with localized exchange terms

L. Guo (Lanzhou University, China)*

18:45-19:05 Beta Decay Spectroscopy of Neutron-rich Nuclei in the A=100 and 160 Regions and the validity of the Nilsson Model

F. G. Kondev (Argonne National Laboratory, USA)

19:05-19:20 **CONCLUDING REMARKS**

20:30 **CONFERENCE DINNER at MIRAMONTI HOTEL**

***Special Prizes for Young Speakers:**

Prizes are foreseen for best talks given by young speakers (PhD students and Post-Docs)

POSTER LIST

1. **Simone Bottoni**, University of Milano and INFN, Italy – *Search for the gamma decay of the narrow near-threshold proton resonance in ^{11}B*
2. **Stefano Brolli**, University of Milano and INFN, Italy – *Diagrammatic Monte Carlo for finite systems*
3. **Stefano Capra**, University of Milano and INFN, Italy – *Technological developments of the N3G project: a mechanical and electronic perspective*
4. **Giacomo Corbari**, University of Milano and INFN, Italy – *Shape coexistence in stable Sn isotopes*
5. **Giacomo Corbari**, University of Milano and INFN, Italy – *Gamma decay from near-neutron-threshold state in ^{14}C*
6. **Davide Genna**, University of Milano and INFN, Italy – *Structure evolution of Ne isotopes towards the Island of Inversion at $N = 20$*
7. **Agnese Giaz**, University of Milano and INFN, Italy – *Intrinsic fast neutron efficiency measurements of CLYC scintillators of various sizes*
8. **Agnese Giaz**, University of Milano and INFN, Italy – *Ongoing search for Pigmy dipole resonance in Ni isotopes*
9. **Massimiliano Luciani**, University of Milano and INFN, Italy – *Searching for shape coexistence in Ca isotopes*
10. **Stefano Riboldi**, University of Milano and INFN, Italy – *A Real-time Multiplicity-based Event Validator for Detector Arrays*