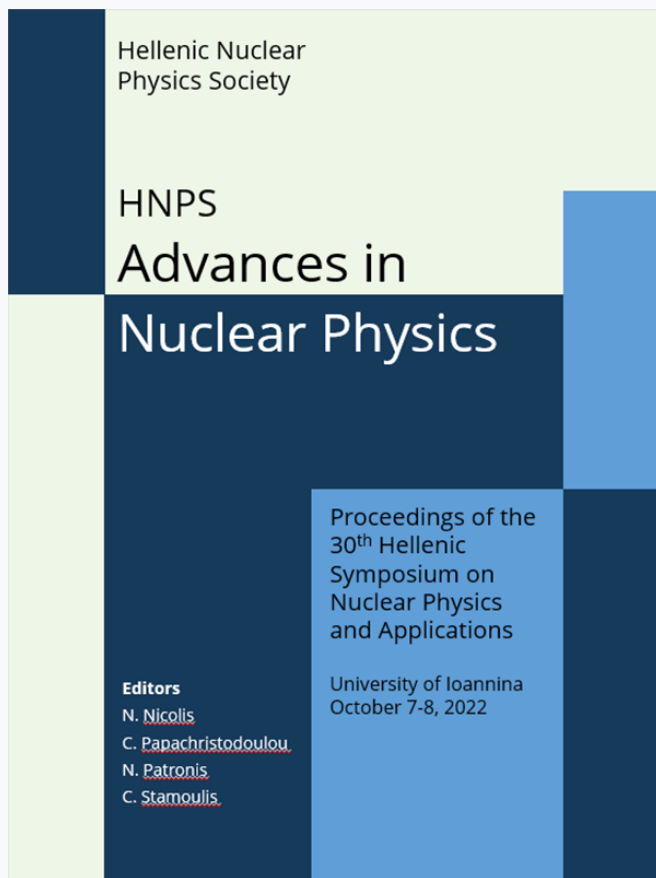


# HNPS Advances in Nuclear Physics

Vol 29 (2023)

HNPS2022



## HNPS2022 Front Matter

*Christina Papachristodoulou*

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### To cite this article:

Papachristodoulou, C. (2023). HNPS2022 Front Matter . *HNPS Advances in Nuclear Physics*, 29, i - ix. Retrieved from <https://eproceedings.epublishing.ekt.gr/index.php/hnps/article/view/5200>

HELLENIC NUCLEAR PHYSICS SOCIETY

# PROCEEDINGS

of the

30<sup>th</sup> ANNUAL SYMPOSIUM

◀ HNPS2022 ▶

October 7-8, 2022

UNIVERSITY OF IOANNINA, Ioannina, Greece



## ORGANIZING COMMITTEE

Nikolaos Nicolis  
Christina Papachristodoulou  
Nikolas Patronis  
Konstantinos Stamoulis

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## **PREFACE**

HNPS2022, the 30<sup>th</sup> Annual Symposium of the Hellenic Nuclear Physics Society, took place on October 7-8, 2022, at the University of Ioannina, Ioannina, Greece. The Symposium continued the tradition of a series of scientific meetings organized annually since 1990 by different Greek Academic and Research Institutions. The aim of the HNPS Symposia is to offer the opportunity to scientists from Greece and abroad to present and discuss their latest activities in theoretical and experimental nuclear physics, and to provide a unique ground for the early-stage scientists to present their work and interact with their peers.

This year, the Symposium was dedicated to the memory of Dr. Franz Käppeler, from Karlsruhe Institute for Technology (KIT), one of the leading experimentalists in the field of nuclear astrophysics, who is dearly missed by the entire community.

Over 100 participants joined HNPS2022, mostly young scientists and post-graduate students. A total of 35 oral and 22 poster contributions were included in the agenda, covering topics related to Nuclear Structure, Nuclear Reactions, Nuclear Astrophysics, Nuclear Physics Applications and Accelerator Physics & Instrumentation. We are grateful to all the speakers and participants for their overwhelming response and participation in HNPS2022. Special thanks go to our invited colleagues, Prof. Agatino Musumarra and Prof. Cristian Massimi, who came from abroad to share their work and experience.

Articles based on most of the contributions were submitted for publication, were subject to a peer review process and are collected together in the present volume of proceedings. We express our appreciation to the authors and the anonymous reviewers; it is their engagement that made this edition possible.

We thank the Rector of the University of Ioannina, Prof. Triantafyllos Albanis, and the Head of the Department of Physics, Prof. Samouel Cohen, for their kind presentations in the opening session. The untiring efforts of Prof. Xenophon Aslanoglou and Dr. Zinovia Eleme towards the successful organization of the Symposium are warmly acknowledged. Finally, we are grateful to the University of Ioannina, for hosting the Symposium, and to our sponsors – ANTISEL, MIRION Technologies, NORM Instruments, VECTOR Technologies Ltd and Epirus Chemicals – for providing financial support.

Ioannina, February 2023

The HNPS2022 Organizing Committee

Nikolaos Nicolis  
Christina Papachristodoulou  
Nikolas Patronis  
Konstantinos Stamoulis

► OPENING CEREMONY

09:30 ▶ Introduction/Welcome addresses

► Session 1 | Chair: Michael KOKKORIS

09:50 ▶ **Agatino MUSUMARRA**, University of Catania/INFN, Italy  
Ion traps for nuclear decay studies: a design for a handheld Electron Beam Ion Trap (EBIT)

10:20 ▶ **Cristian MASSIMI**, University of Bologna/INFN, Italy  
Nuclear astrophysics at n\_TOF: focus on neutron sources in stars

10:50 - 11:30 | COFFEE BREAK

► Session 2 | Chair: Anastasios LAGOYANNIS

11:30 ▶ **Michael KOKKORIS**, National Technical University of Athens  
Measurement and theoretical investigation of differential cross sections of elastically backscattered protons from natO in the energy range E=4-6 MeV

11:45 ▶ **Georgios GKATIS**, CEA - National Technical University of Athens  
Cross section measurements of neutron elastic scattering on <sup>54</sup>Fe

12:00 ▶ **Nikolas PATRONIS**, University of Ioannina  
Nuclear astrophysics at NEAR/n\_TOF: Feasibility study of MACS measurements

12:15 ▶ **Sotiris CHASAPOGLOU**, National Technical University of Athens  
Cross section measurements of (n,x) reactions in the energy range between 16.4 and 18.9 MeV using highly enriched Ge isotopes

12:30 ▶ **Veatriki MICHALOPOULOU**, CERN/National Technical University of Athens  
Preliminary results of the cross section measurement of the <sup>235</sup>U(n,f) reaction relative to the <sup>10</sup>B(n,α) reaction at the CERN n\_TOF facility

12:45 ▶ **Maria PEOVITI**, University of Ioannina  
First results from the <sup>63</sup>Cu(α,g) reaction study for nuclear astrophysics purposes

13:00 ▶ **Thanos STAMATOPOULOS**, Los Alamos National Laboratory, USA  
Preparation for the indirect measurement of <sup>88</sup>Zr(n,γ) at DICER at LANSCE

13:15 - 14:30 | SYMPOSIUM PHOTO - LUNCH BREAK

► Session 3 | Chair: Roza VLASTOU

14:30 ▶ **Anastasios LAGOYANNIS**, NCSR "Demokritos"  
Recent upgrades at the Tandem Laboratory of NCSR Demokritos

14:45 ▶ **Magda SATRAZANI**, University of Liverpool, UK  
Shape studies in neutron-rich Ce isotopes

15:00 ▶ **Olga FASOULA**, National and Kapodistrian University of Athens  
Momentum distribution studies of projectile fragments from peripheral collisions below the Fermi energy: Investigating a pathway to the nuclear chart limits

15:15 ▶ **Stergios KOULOURIS**, National and Kapodistrian University of Athens  
Towards the identification of neutron-rich nuclei: recent progress in the study of the reaction <sup>70</sup>Zn (15 MeV/nucleon)+<sup>64</sup>Ni with the MAGNEX Spectrometer

15:30 ▶ **Konstantina PALLI**, University of Ioannina/National and Kapodistrian University of Athens  
Elastic scattering measurements of <sup>7</sup>Be+<sup>90</sup>Zr at sub- and near-barrier energies

15:45 ▶ **Kalliopi KAPERONI**, National Technical University of Athens  
Semiconductor detector study for detecting fusion neutrons with Geant4 simulations

16:00 - 16:30 | COFFEE BREAK

#### ► Session 4 | Chair: Theo MERTZIMEKIS

- 16:30 ▶ **Antigoni KALAMARA**, NCSR "Demokritos"  
FRINGE Project Overview
- 16:45 ▶ **Vasileios CHATZIKOS**, NCSR "Demokritos"/University of Ioannina  
Positron annihilation investigation of defects in neutron irradiated tungsten materials
- 17:00 ▶ **Anastasia MILIONI**, National Technical University of Athens/NCSR Demokritos  
True coincidence effect studies in HPGe detectors
- 17:15 ▶ **Ilias SAVVIDIS**, Aristotle University of Thessaloniki  
Development of a spherical proportional counter as antineutrino detector for nuclear reactor monitoring
- 17:30 ▶ **Emmanouil BENIS**, University of Ioannina  
The APAPES installation at the tandem accelerator laboratory of NCSR "Demokritos". Current status and future perspectives
- 17:45 ▶ **Stefanos NANOS**, University of Ioannina  
Single electron capture in fast collisions of He-like ions with gas targets

► 18:00 | HNPS GENERAL ASSEMBLY

21:00 | DINNER ◀

S A T U R D A Y , O C T O B E R 8

#### ► Session 5 | Chair: Nikolaos NICOLIS

- 09:00 ▶ **Theodoros GAITANOS**, Aristotle University of Thessaloniki  
Baryons and antibaryons in compressed nuclear matter
- 09:15 ▶ **Charalampos MOUSTAKIDIS**, Aristotle University of Thessaloniki  
Investigating the possible existence of hyper-heavy nuclei in a neutron-star environment
- 09:30 ▶ **Alkiviadis KANAKIS-PEGIOS**, Aristotle University of Thessaloniki  
The role of temperature on the tidal deformability of an inspiraling binary neutron star system
- 09:45 ▶ **Pavlos LASKOS-PATKOS**, Aristotle University of Thessaloniki  
Universal relations and finite temperature neutron stars
- 10:00 ▶ **Dimitrios PAPOULIAS**, National and Kapodistrian University of Athens  
The neutrino floor: a data-driven analysis
- 10:15 ▶ **Stylianios NIKAS**, University of Jyväskylä, FINLAND  
Nuclear isomers in the r-process nucleosynthesis
- 10:30 ▶ **Theodora PAPAVALSIOU**, University of Western Macedonia  
Radiation emission and absorption by astrophysical jets from XRBs
- 10:45 ▶ **Vaia PRASSA**, University of Thessaly  
Microscopic analysis of octupole shape phase transitions and critical points in neutron rich actinides within the density functional framework

► 11:30 - 12:30 | POSTER SESSION

11:00 - 11:30 | COFFEE BREAK ◀

#### ► Session 6 | Chair: Alexandra IOANNIDOU

- 12:30 ▶ **Ion STAMATELATOS**, NCSR "Demokritos"  
Clean and abundant energy for the Mankind: The way of fusion
- 12:45 ▶ **Theodora VASILOPOULOU**, NCSR "Demokritos"  
NCSR contribution to the realization of fusion energy
- 13:00 ▶ **Nick PETROPOULOS**, National Technical University of Athens  
Nuclear power as part of the Greek energy mix: Far better to be cost effectively proactive than unconditionally inactive
- 13:15 ▶ **John KALEF-EZRA**, University of Ioannina  
Chernobyl and Fukushima nuclear accidents: Similarities and differences
- 13:30 ▶ **Georgios SILTZOVALIS**, National and Kapodistrian University of Athens  
Characterization of a novel CdZnTe spectrometer for measuring radioactivity in the marine environment
- 13:45 ▶ **Christos TSABARIS**, Hellenic Centre for Marine Research  
Surveillance of the seashore using the KATERINA II geo-referenced detection system
- 14:00 ▶ **Filothei PAPPA**, Hellenic Centre for Marine Research  
Radioactivity measurements at eastern Lesvos, Greece
- 14:15 ▶ **Georgios ELEFThERIOU**, Hellenic Centre for Marine Research  
Assessment of marine radiological impact after an hypothetical nuclear accident in Eastern Mediterranean Sea

14:15 | CLOSURE OF THE SYMPOSIUM ◀

# POSTER SESSION

11:30-12:30 | Saturday, October 8

- PP1 **Anastasia ZIAGKOVA**, National Technical University of Athens  
Study of the cross section biasing technique using the GEANT4 toolkit for the determination of parasitic neutrons at N.C.S.R "Demokritos"
- PP2 **Stavros PATAS**, National Technical University of Athens  
Activation cross section measurement of the (n,2n) reaction on  $^{203}\text{Tl}$  at 16.4 MeV, 18.9 MeV and theoretical calculations via the EMPIRE code
- PP3 **Vasiliki ANAGNOSTOPOULOU**, NCSR Demokritos/National Technical University of Athens  
Characterization of Compton suppression system performance using VERDI multi-foil detectors
- PP4 **Sotirios Alexandros KOPANOS**, National Technical University of Athens  
MCNP simulations for the n\_TOF NEAR station
- PP5 **Christoforos FRANTZIS**, National Technical University of Athens  
Neutron flux determination for NEAR station at the CERN n\_TOF facility using the SAND II unfolding code
- PP6 **Styliani GOULA**, University of Ioannina  
The new annular double-sided silicon detector dedicated to light particles' discrimination at n\_TOF/CERN
- PP7 **Dimitrios PAPANIKOLAOU**, University of Ioannina  
Study of HPGe detector shielding for use in inelastic neutron scattering experiments at the n\_TOF/CERN facility
- PP8 **Eleni MITSIS**, NCSR Demokritos  
Resistivity recovery of Fe after high dose proton irradiation
- PP9 **Konstantinos KOUTSOMITIS**, National and Kapodistrian University of Athens  
Using SRIM to evaluate athermal recombination corrected displacement damage (ARC-dpa)
- PP10 **Margarita EFSTATHIOU**, National and Kapodistrian University of Athens  
Gamma spectroscopy of even-even Ytterbium isotopes
- PP11 **Athanassios CHATZIKOTELIS**, University of Ioannina  
Development of a simple algorithm for pre-fragment formation in proton-nucleus spallation reactions
- PP12 **Georgios TSITSIS**, University of Ioannina  
A study of the reaction  $^{55}\text{Mn}(p,4n)^{52}\text{Fe}$ : excitation function and medical applications
- PP13 **Georgia ZAFIRI**, University of Ioannina  
A study of proton-induced reactions on natural Silicon targets
- PP14 **Michael VIKIARIS**, Aristotle University of Thessaloniki  
The effects of Dark Matter upon neutron stars' properties
- PP15 **Polychronis KOLIOGIANNIS**, Aristotle University of Thessaloniki  
Probing the nuclear equation of state from the existence of a  $\sim 2.6 M_{\odot}$  neutron star: The GW190814 Puzzle
- PP16 **Nikolaos KYRITSIS**, National Technical University of Athens  
Theoretical study of the  $^{13}\text{C} + d$  system, in the framework of the R-Matrix model
- PP17 **Pantelis TAIGANIDIS**, Aristotle University of Thessaloniki  
Dosimetric characterization by thermoluminescence of dental zirconia based materials
- PP18 **Eleni NTALLA**, NCSR Demokritos  
In situ method development for the oil based mud (OBM) radiological characterization originating from oil Industry by using a  $\text{LaBr}_3(\text{Ce})$  scintillator
- PP19 **Nick PETROPOULOS**, National Technical University of Athens  
Measuring radon concentrations in air using radon adsorption materials or air grab sampling at the progeny non-secular equilibrium time frame
- PP20 **Filothei PAPPA**, Hellenic Centre for Marine Research  
NORM measurements at Kalloni and Gera Gulfs, Lesbos Island, Greece
- PP21 **Chrysoula BETSOU**, Aristotle University of Thessaloniki  
Radionuclides concentrations in moss bags close to a coal fired power plant in Northern Greece
- PP22 **Eleftheria IOANNIDOU**, Aristotle University of Thessaloniki  
Air pollution in Helsinki using Lead-210 as a tracer

# LIST OF PARTICIPANTS

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