

Teodora Andreea Madgearu (Petrușe)

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Personal information

Nationality: Romanian

Date of [REDACTED]

Gender: Female

Education

PhD, Nuclear Astrophysics

Politehnica University of Bucharest, Faculty of Applied Sciences 2017 - present

PhD topic: Development of ELISSA detector array and $^{19}\text{F}(p, \alpha_0, \pi, \gamma)^{16}\text{O}$ cross section measurement in the astrophysical region of interest

Overview:

- 1st measurement of the $^{19}\text{F}(p, \alpha_0)^{16}\text{O}$ cross section was conducted at INFN-LNS Tandem accelerator in 2018
- 2nd measurement of the $^{19}\text{F}(p, \alpha_{\pi, \gamma})^{16}\text{O}$ cross section was conducted at IFIN-HH Tandem accelerator in 2022
- ELISSA detection array tested in beam for the first time with one ring of X3 detectors and one end-cap of YY1 detectors with both analog and digital electronic chains at IFIN-HH Tandem accelerator in 2022

Master, Nuclear Physics

University of Bucharest, Faculty of Physics 2015 - 2017

Relevant coursework: Nuclear Physics, Atomic Physics, Elementary Particles Physics, Astrophysics, Detectors and electronics.

Bachelor, Physics

Babes-Bolyai University, Faculty of Physics 2012 - 2015

Relevant coursework: Mathematics, Electronics, Nuclear Physics

Work Experience

Doctoral Research Assistant

Horia Hulubei National Institute for R&D in Physics and Nuclear Engineering (IFIN-HH)/Extreme Light Infrastructure - Nuclear Physics (ELI-NP) , Magurele, Romania 2018 - present

During my employment at IFIN-HH/ELI-NP, I:

- Conducted experiments in nuclear astrophysics
- Developed and optimized silicon strip detector setups for precise measurements of charged particles
- Implemented both analog and digital electronic chains for experimental setups
- Analyzed data using ROOT, performed simulations using LISE++ and GEANT4
- Collaborated with a multidisciplinary team for successful project outcomes

Skills

- Experiment planning, experimental setup development and electronics
- Data Analysis and Programming (ROOT, LISE++)
- Collaboration and Teamwork

Some experiments

$^{19}F(p, \alpha_0, \pi, \gamma)^{16}O$ measured with ELISSA detection array

My role: Co-spokesperson

Responsible with the setup, data acquisition and data analysis.

Study of dipole strength below particle separation energy in ^{56}Fe

Responsible with the S5 ΔE -E silicon strip detectors.

The photodisintegration of $^{112}Sn / ^{102}Pd$ in the astrophysical p-process

Part of the team dedicated to the two YY1 lamp shape ΔE -E silicon strip detectors and part of the on-line analysis.

Direct measurement of the $^7Li(p, \alpha)^4He$ reaction at astrophysical energies using ELISSA array

In charge of the ELISSA setup.

$p - ^{11}B$ fusion reaction cross section measured with ELISSA

My role: spokesperson

Responsible with the setup, data acquisition, on-line and off-line analysis.

Publications

1. P.-A. Soderstrom, L. Capponi, E. Aciksoz, D. L. Balabanski, G. L. Guardo, D. Lattuada, C. Matei, D. Nichita, A. Pappalardo, **T. Petruse**, G. V. Turturica, *Source commissioning of the ELIGANT-GG setup for γ -ray coincidence measurements at ELI-NP*, Romanian Reports in Physics 71(3):206, 2019. **IF=2.0147; AIS=0.269**
2. P.-A. Soderstrom, L. Capponi, V. Iancu, D. Lattuada, A. Pappalardo, G.V. Turturica, E. Açıksoz, D.L. Balabanski, P. Constantin, G.L. Guardo, M. Ilie, S. Ilie, C. Matei, D. Nichita, **T. Petruse** and A. Spataru, *Unfolding of sparse high-energy γ -ray spectra from $LaBr_3:Ce$ detectors*, Journal of Instrumentation 14(11):T11007-T11007, 2019. **IF=1.454; AIS=0.412**
3. **T. Petruse**, G.L.Guardo, D. Lattuada, D.Choudhury, C.Matei, D.L.Balabanski, A.Obersted, *Test bench for silicon strip detectors: front-end electronics and DAQ*, U.P.B. Sci. Bull., Series A, Vol. 82, Iss. 3, 2020. **IF=0.903; AIS=0.160**
4. G. V. Turturica, V. Iancu, A. Pappalardo, P.-A. Soderstrom, E. Aciksoz, D. L. Balabanski, L. Capponi, P. Constantin, V. Fugaru, G. L. Guardo, M. Ilie, S. Ilie, M. Iovea, D. Lattuada, D. Nichita, **T. Petruse**, A. Spataru, C. A. Ur, *Effective Z evaluation using monoenergetic gamma rays and neural networks*, The European Physical Journal Plus 135(2), 2020. **IF=3.911; AIS=0.557**
5. P.-A. Soderstrom, L. Capponi, E. Aciksoz, T. Otsuka, N. Tsoneva, Y. Tsunoda, D. L. Balabanski, N. Pietralla, G. L. Guardo, D. Lattuada, H. Lenske, C. Matei, D. Nichita, A. Pappalardo, **T. Petruse**, *Electromagnetic character of the competitive $\gamma\gamma$ γ -decay from ^{137m}Ba* , Nature Communications 11(1):3242, 2020. **IF=14.919; AIS=5.565**
6. S. Palmerini, M. La Cognata, F. Hammache, L. Acosta, R. Alba, V. Burjan, E. Chavez, S. Cherubini, A. Cvetinovic, G. D'Agata, N. de Sereville, A. Di Pietro, P. Figuera, Z. Fulup, K. Gaitan De Los Rios, G. L. Guardo, M. Gulino, S. Hayakawa, G. G. Kiss, M. La Commara, L. Lamia, C. Maiolino, G. Manico, C. Matei, M. Mazzocco, J. Mrazek, T. Parascandolo, **T. Petruse**, D. Pierrousakou, R. G. Pizzone, G. G. Rapisarda, S. Romano, D. Santonocito, M. L. Sergi, R. Sparta, A. Tumino, H. Yamaguchi, *The $^{27}Al(p, \alpha)^{24}Mg$ reaction at astrophysical energies studied by means of the Trojan Horse Method applied to the $^2H(^{27}Al, \alpha^{24}Mg)n$ reaction*, The European Physical Journal Plus 136(9):898, 2021. **IF=3.758; AIS=0.544**
7. G. L. Guardo, **T. Petruse**, D. Lattuada, M. La Cognata, D. L. Balabanski, E. Aciksoz, L. Acosta, L. Capponi, D. Carbone, S. Cherubini, D. Choudhury, G. D'Agata, A. Di Pietro, P. Figuera, M. Gulino, A. I. Kilik, M. La Commara, L. Lamia, C. Matei, S. Palmerini, R. G. Pizzone, G. G. Rapisarda, S. Romano, M. L. Sergi, P.-A. Soderstrom, R. Sparta, A. Tumino, S. Vinals, *Direct measurement of the $^{19}F(p, \alpha_0)^{16}O$ reaction at $E_{cm} = 0.4-0.9$ MeV using the LHASA detector array*, European Physical Journal A 59(3), 2023. **IF=2.6; AIS=0.758**
8. A. Tamii, L. Pellegri, P.-A. Soderstrom, D. Allard, S. Goriely, T. Inakura, E. Khan, E. Kido, M.

Kimura, E. Litvinova, S. Nagataki, P. von Neumann-Cosel, N. Pietralla, N. Shimizu, N. Tsoneva, Y. Utsuno, S. Adachi, P. Adsley, A. Bahini, D. Balabanski, B. Baret, J. A. C. Bekker, S. D. Binda, E. Boicu, A. Bracco, I. Brandherm, M. Brezeanu, J. W. Brummer, F. Camera, F. C. L. Crespi, R. Dalal, L. M. Donaldson, Y. Fujikawa, T. Furuno, H. Haoning, R. Higuchi, Y. Honda, A. Gavrilescu, A. Inoue, J. Isaak, H. Jivan, P. Jones, S. Jongile, O. Just, T. Kawabata, T. Khumalo, J. Kiener, J. Kleemann, N. Kobayashi, Y. Koshio, A. Kusoglu, K. C. W. Li, K. L. Malatji, R. E. Molaeng, H. Motoki, M. Murata, A. A. Netshiya, R. Neveling, R. Niina, S. Okamoto, S. Ota, O. Papst, E. Parizot, **T. Petruse**, M. S. Reen, P. Ring, K. Sakanashi, E. Sideras-Haddad, S. Siem, M. Spall, T. Suda, T. Sudo, Y. Taniguchi, V. Tatischeff, H. Utsunomiya, H. Wang, V. Werner, H. Wibowo, M. Wiedeking, O. Wieland, Y. Xu, Z. H. Yang, and PANDORA Collaboration, *PANDORA Project for the study of photonuclear reactions below $A = 60$* , European Physical Journal A 59(9), 2023. **IF=2.6; AIS=0.758**

9. O. Wieland, A. Bracco, F. Camera, S. Aogaki, D. L. Balabanski, E. Boicu, R. Borcea, M. Boromiza, I. Burducea, S. Calinescu, A. Coman, P. Constantin, C. Costache, M. Ciemala, Gh. Ciocan, C. Clisu, F. C. L. Crespi, M. Cuciuc, A. Dhal, N. Djourellov, N. M. Florea, I. Gheorghe, A. Giaz, D. Iancu, D. M. Kahl, M. Kmiecik, A. Kusoglu, R. Lica, N. Mvarginean, A. Maj, R. Marginean, C. Mihai, R. E. Mihai, B. Million, C. Neacsu, D. Nichita, C. Nitva, H. Pai, A. Pappalardo, **T. Petruse**, A. Rotaru, A. B. Serban, P.-A. Soderstrom, C. O. Sotty, L. Stan, A. N. State, I. Stiru, A. Stoica, D. A. Testov, S. Toma, T. Tozar, A. Turturica, G. V. Turturica, S. Ujeniuc, V. Vasilca, Y. Xu, *Extra yield in hot Ni isotopes below the Giant Dipole Resonance*, Nuovo Cimento-Societa Italiana di Fisica Sezione C, 47C(02):24, 2024. **IF=0.3; AIS=0.064**

10. G. L. Guardo, Giuseppe G. Rapisarda, Dimiter L. Balabanski, Giuseppe D'Agata, Alessia Di Pietro, P.P. Figuera, M. La Cognata, M. La Commara, L. Lamia, D. Lattuada, C. Matei, M. Mazzocco, A. Oliva, S. Palmerini, **T. Petruse**, R. G. Pizzone, S. Romano, M. L. Sergi, R. Sparta, X. D. Su, A. Tumino, N. Vukman, *Direct and Indirect Measurements of the $^{19}F(p,\alpha)^{16}O$ Reaction at Astrophysical Energies Using the LHASA Detector and the Trojan Horse Method*, Universe 10(7):304, 2024. **IF=2.5; AIS=0.69**

11. P.-A. Soderstrom, A. Kusoglu, D.L. Balabanski, M. Brezeanu, D. Choudhury, A. Gavrilescu, R.A. Gutoiu, S. Ioannidis, G. Lorusso, M. Markova, R. Roy, D. Testov, S. Adachi, S. Aogaki, R. Borcea, F. Camera, P. Constantin, C. Costache, M. Cuciuc, F.C.L. Crespi, N.M. Florea, Y. Fujikawa, T. Furuno, A. Giaz, T. Kawabata, C. Mihai, R.E. Mihai, B. Million, D. Nichita, R. Niina, S. Okamoto, K. Sakanashi, L. Stan, A. Tamii, A. Turturica, S. Ujeniuc, O. Wieland, R.S. Ban, M. Ciemala, G. Ciocan, C. Clisu, I. Dinescu, D. Iancu, M. Kmiecik, V. Lelasseux, R. Lica, N.M. Marginean, C. Neacsu, H. Pai, P. Parlea, **T. Petruse**, A. Rotaru, C.O. Sotty, A. Spataru, A.N. State, M. Straticiu, D. Tofan, S. Toma, T. Tozar, G. Turturica, C.A. Ur, *From implementation to operation and the first measurements with the ELIGANT detectors from ELI-NP*, Nuovo Cimento-Societa Italiana di Fisica Sezione C, 47(02):58, 2024. **IF=0.3; AIS=0.064**

12. A. Kusoglu, D. L. Balabanski, R. Z. Hu, S. Q. Fan, F. R. Xu, P. Constantin, P.-A. Soderstrom, M. Cuciuc, S. Aogaki, R. S. Ban, R. Borcea, A. Coman, R. Corbu, C. Costache, A. Covali, I. Dinescu, N. M. Florea, V. Iancu, A. Ionescu, N. M. Marginean, C. Mihai, R. E. Mihai, C. V. Nedelcu, **T. Petruse**, H. Pai, A. Pappalardo, O. A. Sirbu, C. O. Sotty, L. Stan, A. N. State, D. A. Testov, T. Tozar, A. Turturica, G. Turturica, S. Ujeniuc, C. A. Ur, V. Vasilca, F. Zhu, *Direct Observation of Competing $M1$ and $M3$ Transitions in ^{10}B* , Phys. Rev. Lett. 133, 072502, 2024. **IF=8.1; AIS=3.010**

13. **T. Petruse**, G.L. Guardo, D. Lattuada, M. La Cognata, D.L. Balabanski, E. Aciksoz, L. Acosta, L. Capponi, D. Carbone, S. Cherubini, D. Choudhury, G. D'Agata, A. Di Pietro, P. Figuera, M. Gulino, A. I. Kilik, M. La Commara, L. Lamia, C. Matei, S. Palmerini, R. G. Pizzone, S. Romano, P.-A. Soderstrom, R. Sparta, A. Tumino, S. Vinals, *Direct measurement of the $^{19}F(p,\alpha)^{16}O$ reaction using the LHASA detector array*, under review at European Physical Journal A.

14. **T. Petruse**, G.L. Guardo, C. Matei, D. Lattuada, D.L. Balabanski, I. Kuncser, H. Pai, A. Lupoe and S. Niculae *A complete characterisation of ELISSA detector array using in-beam data for the first time*, ready for submission at Nuclear Inst. and Methods in Physics Research A.

Articles published in non-ISI journals

1. G. L. Guardo, D. Balabanski, S. Chesneyskaya, M. La Cognata, D. Lattuada, C. Matei, **T. Petruse**, Rosario Gianluca Pizzone, G. G. Rapisarda, S. Romano, C. Spitaleri, Aurora Tumino, Y. Xu, *Nuclear AstroPhysics at ELI-NP: Preliminary Experiments with ELISSA Detector*, Part of the book series: Springer Proceedings in Physics (volume 219), pp 219–223, 2019

2. **T. Petruse**, G. L. Guardo, I. Indelicato, M. La Cognata, C. Matei, D. Balabanski, B. Becherini, S. Cherubini, M. Gulino, S. Hayakawa, L. Lamia, D. Lattuada, R. G. Pizzone, G. G. Rapisarda, S. Romano, C. Spitaleri, O. Trippella, S. Palmerini, A. Tumino, *Calibration of detectors for studying the $^{19}F(p,\alpha)^{16}O$*

reaction at astrophysical energies via the Trojan Horse Method, AIP Conf. Proc. 2076, 060005, 2019

3. T. Petruse, G. L. Guardo, M. La Cognata, D. Lattuada, C. Spitalieri, D. L. Balabanski, E. Aciksoz, L. Acosta, L. Capponi, D. Carbone, S. Cherubini, D. Choudhury, G. D'Agata, A. Di Pietro, P. Figuera, M. Gulino, A. I. Kilik, M. La Commara, L. Lamia, C. Matei, S. Palmerini, R. G. Pizzone, S. Romano, P.-A. Soderstrom, R. Sparta, A. Tumino, S. Vinales Onses, *Preliminary results for the $^{19}\text{F}(p,\alpha)^{16}\text{O}$ reaction cross section measured at INFN-LNS*, EPJ Web of Conferences 227, 02009, 2020

4. G.L. Guardo, D. Lattuada, **T. Petruse**, *Developing system arrays for new experimental approach in nuclear astrophysics*, Journal of Physics Conference Series 2619(1):012009, 2023

5. R. Roy, D. Choudhury, D. A. Testov, D. L. Balabanski, A. Kusoglu, G. Lorusso, P.-A. Soderstrom, S. Aogaki, S.-R. Ban, M. Brezeanu, I. Burducea, R. Corbu, M. Cuciuc, A. Dhal, N. Djourelou, N. Florea, A. Gavrilesco, C. Gheorghiu, G. L. Guardo, D. Iancu, V. Lelasseux, C.V. Nedelcu, H. Pai, P. Parlea, **T. Petruse**, A. Rotaru, S. Singh, A.N. State, M. Straticiuc, V. Toma and T. Tozar, *Impact of C Contamination on Neutron Yield Measurement in the $\text{Al}(\alpha, n)$ Reaction*, The European Physical Journal Conferences 297:02007, 2024

6. T. Petruse, G. L. Guardo, D. Lattuada, D. Choudhury, C. Matei, and A. Oberstedt, *Characterization of double-sided silicon strip detectors*, Extreme Light Infrastructure - Nuclear Physics Reports, RA4 2018/19RA4 Nuclear Physics and Applications with High-Brilliance Gamma Beams

7. T. Petruse, G.L. Guardo, D. Lattuada, M. La Cognata, D.L. Balabanski, C. Spitaleri, C. Matei, E. Acksoz, L. Acosta, L. Capponi, D. Carbone, S. Cherubini, D. Choudhury, G. D'Agata, A. Di Pietro, P. Figuera, M. Gulino, A. I. Kilik, M. La Commara, L. Lamia, S. Palmerini, R.G. Pizzone, S. Romano, P.-A. Soderstrom, R. Sparta, A. Tumino, S. Vinales Onses, *The $^{19}\text{F}(p,\alpha_0)^{16}\text{O}$ direct reaction cross section measured at INFN-LNS using the LHASA detection array*, INFN-LNS internal report

8. T. Petruse, G.L. Guardo, D. Testov, A. Tumino, D. Lattuada, S. Aogaki, J.P. Fernandez, H. Pai, I. Kuncser, N. Szegedi, T. Tozar, A. Lupoae, A. Dahl, R. Ban, G. D'Agata, A. Kusoglu, R. Corbu, P.A. Soederstrom, A. Cassisa, L. Lamia, A. Nurmukhanbetova, M. Gulino, D. Kahl, M. Cuciuc, C. Matei, D.L. Balabanski, G.R. Pizzone, M. LaCognata, *Direct measurement of the $^{19}\text{F}(p,\alpha_\pi)^{16}\text{O}$ and $^{19}\text{F}(p,\alpha_\gamma)^{16}\text{O}$ reaction cross section*, INFN-LNS internal report

International conferences

1. Carpathian Summer School of Physics, Sinaia – “Preliminary results of the $^{19}\text{F}(p,\alpha)^{16}\text{O}$ reaction at astrophysical energies via the Trojan Horse Method”, July 2018, oral presentation

2. Nuclear Physics in Stellar Explosions, Atomki – “Preliminary results of the $^{19}\text{F}(p,\alpha)^{16}\text{O}$ reaction at astrophysical energies via the Trojan Horse Method”, September 2018, oral presentation

3. Indirect methods in nuclear astrophysics - Trento, November 2018

4. 10th European summer school on experimental nuclear astrophysics (Santa Tecla school), Catania - “The $^{19}\text{F}(p,\alpha)^{16}\text{O}$ reaction cross section measured at INFN-LNS”, June 2019, oral presentation

5. Nuclear Physics in Astrophysics, Mainz - “Direct measurement of the $^{19}\text{F}(p,\alpha)^{16}\text{O}$ reaction cross section using the LHASA detector array”, September 2019, poster presentation

6. PANDORA Workshop, Online - “Status of the ELI-NP instruments for PANDORA experiments”, June 2020, oral presentation

7. “Schools on Nuclear Astrophysics Questions”, “Direct measurement of the $^{19}\text{F}(p,\alpha)^{16}\text{O}$ reaction”, 9 February 2022; oral presentation - awarded 1st place

8. “Direct measurement of the $^{19}\text{F}(p,\alpha)^{16}\text{O}$ reaction cross section”, “Nuclear Physics in Astrophysics -X”, September 2022, Geneva, Elvetia, poster presentation

9. Direct measurement of the $^{19}\text{F}(p,\alpha)^{16}\text{O}$ reaction cross section” poster, Euroschool on Exotic Beams” August-September 2023, poster presentation

International competitions

1. PAC 2019, 12 days at 3 MV Tandatron accelerator of IFIN-HH, “The $^{19}\text{F}(p,\alpha_\pi)^{16}\text{O}$ and $^{19}\text{F}(p,\alpha_\gamma)^{16}\text{O}$ direct measurement at energies of astrophysical relevance using the ELISSA detection array”

2. PAC 2023, 14 days at 3 MV Tandatron accelerator of IFIN-HH, “p- ^{11}B fusion reaction cross section measured with ELISSA detection array”

Internal competition

1. Direct measurement of the $^{19}\text{F}(p,\alpha)^{16}\text{O}$ reaction”, Young Reserachers Day”, February 2023; - awarded 1st place