Curiculum Vitae

Athanasios Psaltis, Ph.D.

Postdoctoral Researcher

Technische Universität Darmstadt Institut für Kernphysik (Theoriezentrum) SchlossgartenstraSSe 2 64289 Darmstadt, Germany psaltis@theorie.ikp.physik.tu-darmstadt.de
 https://psaltisa.github.io/
 +49 177 8537585

Research Interests

nuclear astrophysics • experimental studies with stable and radioactive ion beams • large-scale nuclear impact studies • radiative capture reactions with recoil separators • charged particle spectroscopy • inbeam and activation γ -ray spectroscopy • nuclear reaction networks

Education

McMaster University • Hamilton, ON, Canada

September 2015 – August 2020

Ph.D. in Physics

Advisor: Prof. Alan Chen

Thesis title: "Radiative alpha capture on ⁷Be with DRAGON at \(\nu_p\)process nucleosynthesis energies" \(\nabla_p\)

National and Kapodistrian University of Athens • Athens, Greece

October 2010 – September 2014

 $\operatorname{B.Sc.}$ in Physics

Advisor: Assoc. Prof. Theodoros Mertzimekis

Minored in astrophysics. Thesis title: "Experimental studies of cross sections and angular distributions of $^{112}\text{Cd}(p,\gamma)^{113}\text{In}$ with application in nucleosynthesis"

Research Positions

Technische Universität Darmstadt – Postdoctoral Researcher

September 2020 – Present

Darmstadt, Germany

Working with Prof. Almudena Arcones on nuclear and astrophysical uncertainties in core–collapse supernovae and neutron star mergers using large–scale impact studies with reaction networks. [Pubs. A009, A010, A012, A014, A019–A022, B013]

McMaster University - Research Assistant

September 2015 – August 2020

Hamilton, ON, Canada

Worked with Prof. Alan Chen in the nuclear astrophysics group. Participated in experiments at major nuclear physics laboratories worldwide as a visiting graduate researcher (TRIUMF, RIKEN, NSCL, Argonne National Laboratory, TUNL and Maier-Leibnitz-Laboratorium). [Pubs. A003–A008, A011, A013, A015, A016–A018, B001–B005, B007–B012, B014, B015]

Los Alamos National Laboratory - Visiting Graduate Researcher

 $May\ 2019$

Los Alamos, NM, USA

Worked with Drs. Samuel Jones and Chris Fryer on reaction network calculations for the νp -process with NuGrid. Code development on NuGrid's NuPPN nuclear reaction network to include neutrino reactions.

TRIUMF - Visiting Graduate Researcher

June 2017 – September 2017

Vancouver, BC, Canada

Worked with the DRAGON group during the preparations of my Ph.D. thesis project. Also assisted in other experiments carried by the DRAGON/TUDA group. [Pubs. B003, B007]

N.C.S.R. "Demokritos" - Undergraduate Researcher

November 2013 – March 2014

Athens, Greece

Worked in the Tandem Accelerator Lab of the Institute of Nuclear and Particle Physics for my undergraduate thesis, conducting the first cross section and angular distribution measurements of the astrophysically interesting reaction $^{112}\text{Cd}(p,\gamma)^{113}\text{In}$ for p-process nucleosynthesis. I also assisted in two more nuclear astrophysics experiments, studying cross sections and angular distributions of $^{\text{nat}}\text{Ag}(p,\gamma)^{108,109}\text{Cd}$ and $^{110}\text{Pd}(p,\gamma)^{111}\text{Ag}$. [Pubs. A002, A003, B006, C001, C002]

NuSTRAP - University of Athens - Database Contributor

November 2011 – September 2015

Athens, Greece

Completion and upgrade of the Electromagnetic Moment Resources online database. The database is currently hosted by International Atomic Energy Agency (IAEA) Nuclear Data Services. [Pub. A001]

Honours & Awards

The Frank Dennee Scholarship – McMaster University ComSciCon 2018 – National Science Communication Workshop Selection to attend the workshop from over 900 applicants. International Excellence Award – McMaster University 2018 The Bridge residency program – SciArt Center Four-month virtual residency program, where artists and scientists are paired to collaborate on a project of their choice.

Approved User Facility Proposals

- 5. "Determining the Site of Globular Cluster Potassium Enrichment via the ³⁸ Ar(p, γ)³⁹ K Reaction in Inverse Kinematics" Spokesperson: C. Marshall, Co-spokespersons: **A. Psaltis** and K. Chipps e21070 of FRIB PAC1 meeting (2021)
- 4. "Studying neutrinodriven wind nucleosynthesis with MUSIC: Measurement of the 93 Sr(α , xn) cross section" Spokespersons: **A. Psaltis** and W.J. Ong #1923 of the ATLAS PAC (2021)
- 3. "Studying supernova nucleosynthesis with CRIB: Measurement of the $^{13}N(\alpha,p)^{16}O$ reaction" Spokesperson: **A. Psaltis** AVF69 of the 21st Nuclear Physics PAC of RI Beam factory (2020)
- 2. "Studying stellar helium burning with DRAGON: Direct measurement of the ¹⁸O(α, γ)²²Ne reaction" Spokespersons: **A. Psaltis**, A.A. Chen, A. Lennarz and M. Williams S1928 of TRIUMF EEC 201906S meeting (2019)
- "Breakout reactions from the pp-chain and the νp-process:
 Measurement of the ⁷Be(α, γ)¹¹C reaction rate in inverse kinematics"
 Spokespersons: A. Psaltis, A.A. Chen and D.S. Connolly
 S1692 of TRIUMF EEC 201607S meeting (2016)

Teaching Experience

Technische Universität Darmstadt

September 2021 - February 2022

Darmstadt, Germany

Consulting students for their research projects (Stellar Structure and Explosive Nucleosynthesis) in the "Nuclear Astrophysics" seminar.

McMaster University - Teaching Assistant

September 2015 - May 2020

Hamilton, ON, Canada

Introduction to experiments, one-on-one lab assistance (~ 30 students), answering questions, test invigilation as well as marking quizzes, lab reports and exams.

Classes taught:

- PHYS 1A03: Introductory Physics
- PHYS 1E03: Waves, Electricity and Magnetic Fields
- PHYS 1AA3: Introduction to Modern Physics
- Astronomy/Origins 2B03: Big Questions
- Arts & Science 2D06: Physics
- iSCI 3A12: Light, the Universe, and Everything (LUE)

Mentoring

- Jan Kuske: Nucleosynthesis calculations for the r-process (M.Sc. student 2021 present)
- Liam Kroll: Core—Collapse Supernovae simulations using MESA (summer student 2018, 2019) Now graduate student at Dalhousie University (Halifax, NS, Canada)
- Physics & Astronomy Mentor-mentee program (2016 2020)

Science Communication

ComSciConCAN - Co-founder/ Organizing Committee Member

September 2018 - Present

ComSciCon is a workshop series organized by graduate students, for graduate students, focused on science communication skills. Our goal is to empower future leaders in technical communication to share the results from research in their field to broad and diverse audiences, not just practitioners in their fields. The event started in the US in 2013 and for the first time it was hosted in Canada in summer 2019.

ScienceSeeker – Science news editor

February 2016 - February 2022

Edited in one of the Top 100 Science Blogs on the Web. My role included picking interesting blog posts about Art, Physics and General Science out of a collection of 2,300 blogs and other science news sources from around the globe every week. Picks can be found in Twitter using the hashtag #SciSeekPicks.

William J. McCallion Planetarium – Producer/Presenter

November 2015 - August 2020

Hamilton, ON, Canada

Production and live presentation of educational shows. Presented in thousands of people, mostly students and the general public. Produced three full-dome interactive public shows:

- "Rust and stardust: The lives of the stars and the origin of the elements" 2016
- "Star Wars: The Science Awakens" 2017
- "The golden dance of death" 2019

Pint of Science - City Coordinator

January 2018 - August 2020

Hamilton, ON, Canada

Pint of Science is a non-profit organization that brings some of the most brilliant scientists to your local pub to discuss their latest research and findings with you. Organization of the event in Hamilton.

Researchers' Night Hamilton - Coordinator

October 2015 - August 2020

Hamilton, ON, Canada

Researchers' Night is a European-based concept, which gives the public a unique opportunity to interact with scientists in a non-formal way for an evening. Coordination of the invited scientists, setup of the event and social media coverage.

SciCo - Science Ambassador

September 2015 - April 2019

Athens, Greece

SciCo is the first Non Profit Science Communication Organization in Greece. Part of the organizing team of the biggest Science Festival in Greece with more than 30,000 visitors every year - Athens Science Festival. Attended trainings on creative writing, creative storytelling and science communication.

Professional Service

ELEMENTS – Member	March 2022 – Present
Universe – Reviewer	December 2021 – Present
NuGrid Collaboration – PI Team	February 2021 – Present
SFB 1245 – Member	$September\ 2020-Present$
IReNA Online Seminar Series – Committee Member	$September\ 2020-Present$
Chair since October 2021.	
"Virtual workshop on (α, n) reactions for astrophysics" – Chair	14-15 July 2021
JINA Horizons – Twitter Team	30 November – 4 December 2020

Publications

© ORCID iD: 0000-0003-2197-0797

Journal Publications: 7 first/second author, 15 Nth author Conference Proceedings: 4 first author, 11 Nth author In the publications noted with a \star , I led the nucleosynthesis calculations

A Journal Publications

- [A022] A. Psaltis and F. Montes, (α, n) reactions for astrophysics, J. Phys. G: Nucl. Part. Phys., Invited Topical Review expected Q4 2022
- [A021] H. Schatz et al. (including A. Psaltis), Horizons: Nuclear Astrophysics in the 2020s and Beyond, J. Phys. G: Nucl. Part. Phys., Submitted (2022)
- [A020] A. Psaltis et al., Constraining nucleosynthesis in neutrinodriven winds: observations, simulations and nuclear physics, Astrophys. J, Submitted (2022) ★
- [A019] A. Psaltis et al., First inverse kinematics measurement of resonances in ${}^{7}Be(\alpha, \gamma)^{11}C$ relevant to neutrinodriven wind nucleosynthesis using DRAGON, Phys. Rev. C, Submitted (2022)
- [A018] A. Psaltis et al., Direct measurement of resonances in ${}^{7}Be(\alpha, \gamma)^{11}C$ relevant to νp -process nucleosynthesis, Phys. Rev. Lett., Submitted (2022)
- [A017] L. Lombardo et al. (including A. Psaltis), Chemical Evolution of R-process Elements in Stars (CERES) I. Stellar parameters and chemical abundances from Na to Zr, A&A, Accepted (2022), © 10.1051/0004-6361/202243932
- [A016] T. Budner et al. (including **A. Psaltis**), Constraining the $^{30}P(p,\gamma)^{31}S$ reaction rate in ONe novae via the weak, low-energy, β -delayed proton decay of ^{31}Cl , Phys. Rev. Lett., **128**, 182701 (2022), 60 10.1103/PhysRevLett.128.182701
- [A015] J. Hooker et al. (including A. Psaltis), Use of Bayesian Optimization to Understand the Structure of Nuclei, Nucl. Instr. Meth. Phys. Res. B, 512 6 (2022), 10.1016/j.nimb.2021.11.014
- [A014] J. S. Randhawa et al. (including **A. Psaltis**), First direct measurement of ⁵⁹Cu(p, α)⁵⁶Ni: A step towards constraining the Ni-Cu cycle in the Cosmos, Phys. Rev. C, **104** L042801 (2021), ⁵⁰ 10.1103/PhysRevC.104.L042801
- [A013] M. Witt, A. Psaltis et al., Post-explosion evolution of core-collapse supernovae, Astrophys. J, 921 19 (2021), 5 10.3847/1538-4357/ac1a6d \star
- [A012] J. Hu et al. (including **A. Psaltis**), Advancement of Photospheric Radius Expansion and Clocked Type-I X-Ray Burst Models with the New ²²Mg(α, p)²⁵Al Reaction Rate Determined at the Gamow Energy, Phys. Rev. Lett., **127**, 172701 (2021), ²⁰10.1103/PhysRevLett.127.172701
- [A011] M. Holl et al. (including A. Psaltis), Proton inelastic scattering reveals deformation in ⁸He, Phys. Lett. B, 822, 136710 (2021), © 10.1016/j.physletb.2021.136710
- [A010] P. Mohr et al. (including **A. Psaltis**), Astrophysical reaction rates of α -induced reactions for nuclei with $26 \geq Z \geq 83$ from the new Atomki-V2 α -nucleus potential, At. Data Nucl. Data Tables, **142**, 101453 (2021), **101016/j.adt.**2021.101453

- [A009] T. N. Szegedi et al. (including **A. Psaltis**), Activation thick target yield measurement of ¹⁰⁰Mo(α, n) ¹⁰³Ru for studying the weak r-process nucleosynthesis, Phys. Rev. C, **104**, 035804 (2021), ¹⁰⁰ 10.1103/PhysRevC.104.035804 ★
- [A008] G. Lotay et al. (including A. Psaltis), First direct measurement of an astrophysical p process reaction cross section using a radioactive ion beam, Phys. Rev. Lett., 127, 112701 (2021), 10.1103/PhysRevLett.127.112701
- [A007] M. Lovely et al. (including A. Psaltis), Proton capture on ³⁴S in the astrophysical energy regime of ONe novae, Phys. Rev. C, 103, 055801 (2021), ⁴⁰ 10.1103/PhysRevC.103.055801
- [A006] A. Psaltis et al., Beyond the acceptance limit of DRAGON: the case of the $^6Li(\alpha, \gamma)^{10}B$ reaction, Nucl. Instr. Meth. Phys. Res. A, 987, 164828 (2021), $^{\odot}$ 10.1016/j.nima.2020.164828
- [A005] M. Williams et al. (including **A. Psaltis**), First inverse kinematics study of the ²²Ne(p, γ)²³Na reaction and its role in AGB star and classical nova nucleosynthesis, Phys. Rev. C, **102**, 035801 (2020), ⁴⁰ 10.1103/PhysRevC.102.035801
- [A004] A. Lennarz et al. (including **A. Psaltis**), First inverse kinematics measurement of key resonances in the ²²Ne(p, γ)²³Na reaction at stellar temperatures, Phys. Lett. B **807**, 135539 (2020), ⁶⁰ 10.1016/j.physletb.2020.135539
- [A003] A. Psaltis et al., Cross-section measurements of radiative proton-capture reactions in ¹¹²Cd at energies of astrophysical interest, Phys. Rev. C 99 (6), 065807 (2019), © 10.1103/PhysRevC.99.065807
- [A002] A. Khaliel et al. (including **A. Psaltis**), First cross-section measurements of the reactions $^{107,109}Ag(p,\gamma)^{108,110}Cd$ at energies relevant to the p process, Phys. Rev. C **96**, 035806 (2017), $^{100,103}PhysRevC.96.035806$ Academy of Athens award on Experimental Physics
- [A001] T.J. Mertzimekis, K.Stamou and A. Psaltis, An online database of nuclear electromagnetic moments, Nucl. Instr. Meth. Phys. Res. A, 807, 56 (2016), 60 10.1016/j.nima.2015.10.096

B Conference Proceedings (Peer–Reviewed)

- [B015] T. Wheeler et al. (including **A. Psaltis**), Measuring the $^{15}O(\alpha, \gamma)^{19}Ne$ Reaction in Type I X-ray Bursts using the GADGET II TPC: Hardware, EPJ Web of Conferences **260** 11046 (2022), $^{\bullet}$ 10.1051/epjconf/202226011046
- [B014] R. Mahajan et al. (including **A. Psaltis**), Measuring the $^{15}O(\alpha, \gamma)^{19}Ne$ Reaction in Type I X-ray Bursts using the GADGET II TPC: Software, EPJ Web of Conferences **260** 11034 (2022), 6 10.1051/epjconf/202226011034
- [B013] **A. Psaltis** et al., Exploring the uncertainties of (α, xn) reactions for the weak r-process, EPJ Web of Conferences **260** 07003 (2022), 5 10.1051/epjconf/202226007003
- [B012] J. Hu et al. (including **A. Psaltis**), First measurement of $^{25}Al+p$ resonant scattering relevant to the astrophysical reaction $^{22}Mg(\alpha,p)^{25}Al$, EPJ Web of Conferences **260** 05001 (2022), 69 10.1051/epjconf/202226005001
- [B011] H. Yamaguchi et al. (including A. Psaltis), Experimental studies on astrophysical reactions at the low- energy RI beam separator CRIB, EPJ Web of Conferences 260 03003 (2022), 10.1051/epjconf/202226003003
- [B010] J. Liang et al. (including **A. Psaltis**), Spectroscopic Study of ³⁹Ca for Endpoint Nucleosynthesis in Classical Novae, J. Phys.: Conf. Ser. **1668** 012025 (2020), ⁴⁰ 10.1088/1742-6596/1668/1/012025
- [B009] **A. Psaltis** et al., Study of the ${}^{7}Be(\alpha, \gamma)^{11}C$ reaction with DRAGON for ν pprocess nucleosynthesis, J. Phys.: Conf. Ser. **1668** 012035 (2020), ${}^{\odot}$ 10.1088/1742-6596/1668/1/012035
- [B008] H. Shimizu et al. (including **A. Psaltis**), Study on $^{26m}Al(p,\gamma)$ Reaction at the SNe Temperature, JPS Conf. Proc. **31**, 011073 (2020), 60 10.7566/JPSCP.31.011073
- [B007] A. Psaltis et al., Radiative alpha capture on ⁷Be with DRAGON at energies relevant to the νp-process, Springer Proceedings in Physics NIC XV (2018), 425-428, ⁶9 10.1007/978-3-030-13876-9_81
- [B006] A. Psaltis et al., First radiative proton-capture cross-section measurements in mid-weight nuclei relevant to the p−process, Springer Proceedings in Physics NIC XV (2018), 421-424, № 10.1007/978-3-030-13876-9_80
- [B005] J. Liang et al. (including **A. Psaltis**), Spectroscopic study on ³⁹Ca using the ⁴⁰K(d,t)³⁹Ca reaction for classical nova endpoint nucleosynthesis, Springer Proceedings in Physics NIC XV (2018), 397-400, ⁴⁰ 10.1007/978-3-030-13876-9_74

- [B004] H. Shimizu et al. (including A. Psaltis), Isomeric ²⁶Al beam production with CRIB, EPJ Web of Conferences 184, 02013 (2018), ⁶⁰ 10.1051/epjconf/201818402013
- [B003] N. Vukman et al. (including A. Psaltis), Examining the Helium Cluster Decays of the ¹²Be Excited States by Triton Transfer to the ⁹Li Beam, RÁBIDA 2018: Basic Concepts in Nuclear Physics: Theory, Experiments and Applications pp 257-258, 60 10.1007/978-3-030-22204-8 43
- [B002] D. Kahl et al. (including **A. Psaltis**), Impact of the $^{26m}Al(p,\gamma)$ reaction to galactic ^{26}Al yield, AIP Conference Proceedings **1947**, 020003 (2018), 0 10.1063/1.5030807
- [B001] D. Kahl et al. (including **A. Psaltis**), Isomer beam elastic scattering: ^{26m}Al(p,p) for Astrophysics, EPJ Web of Conferences **165**, 01030 (2017), ³⁰ 10.1051/epjconf/201716501030

C Conference Proceedings (Non-Peer-Reviewed)

- [C002] A. Khaliel et al. (including A. Psaltis), Experimental Investigation of radiative proton-capture reactions relevant to Nucleosynthesis, HNPS2016 Proceedings, 69 10.12681/hnps.1861
- [C001] E. Batziou et al. (including A. Psaltis), Modeling radiative proton-capture reactions in mid-heavy nuclei, HNPS2015 Proceedings, 10.12681/hnps.1893

D Books

- [D003] Galactic and Stellar Physics by A.G.W. Cameron, Based on a course lecture given at Yale University 1964-1965, Compiled by W.D. Arnett, C.J. Hansen and J.W. Truran, re-typeset in LaTeX by D. Kahl, A. Psaltis and J. Liang (in preparation)
- [D002] Physics of the Solar System by A.G.W. Cameron, Based on a course lecture given at Yale University 1963-1964, Compiled by W.D. Arnett, C.J. Hansen and J.W. Truran, re-typeset in LaTeX by D. Kahl, A. Psaltis and J. Liang (in preparation)
- [D001] Nuclear Astrophysics by A.G.W. Cameron, Based on a course lecture given at Yale University 1962-1963, Assisted by W.D. Arnett, C.J. Hansen and J.W. Truran, re-typeset in LaTeX by D. Kahl, A. Psaltis and J. Liang (in preparation)

Academic Presentations

FRIB Theory Seminar – invited oral (East Lansing, MI, USA)	June 2022
2022 JINA-CEE Frontiers in Nuclear Astrophysics – poster (South Bend, IN, USA)	May 2022
ELEMENTS Annual Conference 2022 – oral (Frankfurt, Germany)	May 2022
ELEMENTS Kick-off WA3 workshop – invited oral (Virtually)	February 2022
Advisory Committee On TRIUMF (ACOT) meeting – invited poster (Virtually)	November 2021
28th Symposium of the Hellenic Nuclear Physics Society – oral (Athens, Greece)	September 2021
XVI Nuclei in the Cosmos – oral & poster (Virtually)	September 2021
DPG Matter and Cosmos Section – oral (Virtually)	August 2021
TRIUMF Science Week – poster (Virtually)	August 2021
2021 CAP Virtual Congress – oral (Virtually)	June 2021
IKP Seminar – invited oral (Darmstadt, Germany)	August 2020
Advisory Committee On TRIUMF (ACOT) meeting – invited oral (Vancouver, BC, Canada)	November 2019
7th p–process workshop 2019 – oral (Serralunga d' Alba, Italy)	September 2019
Nuclear Physics in Astrophysics IX – oral (Mainz, Germany)	September 2019
CNLS Astrophysics Friday Meeting – invited oral (Los Alamos, NM, USA)	May 2019
5th Joint Meeting of the APS DNP and the Physical Society of Japan – oral (Waikoloa, HI, USA	October 2018
15th International Symposium on Nuclei in the Cosmos – posters (Assergi, Italy)	June 2018

15th Russbach School on Nuclear Astrophysics – oral (Russbach, Austria)	March 2018
Nuclear Astrophysics at Rings and Recoil Separators Workshop – oral (Darmstadt, Germany)	March 2018
TRIUMF Science Week – poster (Vancouver, BC, Canada)	July 2017
2017 JINA-CEE Frontiers in Nuclear Astrophysics – oral (Lansing, MI, USA)	February 2017
McMaster Physics & Astronomy Symposium Day – oral (Hamilton, ON, Canada)	October 2016
École Joliot-Curie: "Origin of Nuclei in the Universe" – poster (Le Barcarès, France)	September 2016
p-process Workshop 2015: Status and Outlook – oral (Limassol, Cyprus)	June 2015
24th Symposium of the Hellenic Nuclear Physics Society – poster (Ioannina, Greece)	May 2015
23th Symposium of the Hellenic Nuclear Physics Society – oral (Thessaloniki, Greece)	June 2014
Charged Particle Optics: Theory and Simulation (CPOTS 2013) – oral (Heraklion, Greece)	August 2013
21st Symposium of the Hellenic Nuclear Physics Society – poster (Athens, Greece)	May 2012

References

Almudena Arcones Professor Institut für Kernphysik Technische Universität Darmstadt +49 6151 16 21547 a.arcones@gsi.de Alan A. Chen Professor Department of Physics & Astronomy McMaster University +1 (905) 525.9140 x27096 chenal@mcmaster.ca Chris Ruiz
Head, Department of Nuclear Physics
Physical Sciences Division
TRIUMF
+1 (604) 222.7666
ruiz@triumf.ca