Philip Adsley

Research Interests

Exotic structures in nuclei especially those relevant to nuclear astrophysics and clustering. Inclusive and exclusive measurements with magnetic spectrometers and separators, silicon detectors and γ-ray detectors.

Education

University of York, York, U.K.

Ph.D., Nuclear Physics, 2009-2013

- Thesis Topic: "Testing indirect methods of calculating the $^{15}O(\alpha,\gamma)^{19}Ne$ reaction rate"
- Advisor: Brian R. Fulton

Peterhouse, University of Cambridge, Cambridge, U.K.

M.Sci., Natural Sciences, 2005-2009

Professional Experience

August 2021-: Assistant Professor, Department of Physics & Astronomy, and Cyclotron Institute, Texas A&M University, USA

May 2019-July 2021: Claude Leon Fellow, University of the Witwatersrand and iThemba LABS, South Africa

January 2019-April 2019: Research visitor, iThemba LABS, South Africa

October 2016-December 2018: Postdoctoral Researcher, IJCLab Orsay, France

March 2014-August 2016: Postdoctoral Fellow, iThemba LABS and Stellenbosch University, South Africa

Graduate Students

Students I've advised during graduate studies. Names in italics are current students.

PhD

Kevin C. W. Li - Stellenbosch University
J. Wiggert Brümmer - Stellenbosch University
Anne Meyer - IJCLab
Sarah Harrouz - IJCLab
John Santucci - Texas A&M University
Ryan Amberger - Texas A&M University
Benjamin Wellons - Texas A&M University
Sifundo Binda - University of the Witwatersrand

MSc

Kevin C. W. Li - Stellenbosch University
J. Wiggert Brümmer - Stellenbosch University
Wade Erasmus - Stellenbosch University
Jacob Bekker - University of the Witwatersrand
Mozhdeh Rashidazad - Texas A&M University

Publications

The publications listed first as those in which I played a leading or significant role, as the PI, co-PI, lead on collecting or analysing the data, calculations or interpretation of the data.

My current or former undergraduate students are listed in *italics* and postgraduate students are listed in **bold**.

Reviewed conference proceedings have been omitted from this list.

1. A Best, P Adsley, R Amberger *et al.*, The European Physical Journal A **61** 99 (2025)
   The ^{22}Ne$(\alpha, n)^{25}$Mg reaction - state of the art, astrophysics, and perspectives
2. M La Cognata, S Palmerini, F Dell'Agli, P Ventura, P. Adsley, *et al.*, The Astrophysical Journal **982** 91 (2025)
   A new reaction rate of the ^{27}Al$(p, \gamma)^{28}$Si reaction based on indirect low-energy cross-section measurements
3. F. Hammache, P. Adsley, L. Lamia *et al.*, Physical Review Letters **132** 182701 (2024)
   Experimental determination of α widths of ^{21}Ne levels in the region of astrophysical interest: new ^{17}O+α reaction rates and impact on the weak s-process
4. C. Angus, J. Frost-Schenk, A.M. Laird, P. Adsley, R. Longland *et al.*, Physical Review C **109** 044323 (2024)
   ^{21}Ne energy levels approaching the α-particle threshold.
5. **K. C. W. Li**, R. Neveling, P. Adsley *et al.*: Physical Review C **109** 015806 (2024)
   Understanding the total width of the 3^-_1 state in ^{12}C
6. *D. P. Carrasco-Rojas*, M. Williams, P. Adsley *et al.*: Physical Review C **108** 045802 (2023)
   Searching for possible resonance states in ^{22}Ne$(p, \gamma)^{23}$Na
7. **J. W. Brümmer**, P Adsley *et al.* Physical Review C **107** 055802 (2023)
   Proton decays from α-unbound states in ^{22}Mg and the ^{18}Ne$(\alpha, p_0)^{21}$Na cross section
8. A. M. Laird *et al.* Journal of Physics G: Nuclear and Particle Physics 50 033002 (2023)
   Progress on nuclear reaction rates affecting the stellar production of ^{26}Al
9. **K. C. W. Li**, P. Adsley, F.D. Smit *et al.*: Phys. Rev. C **105** 024308 (2022)
   Multiprobe study of excited states in ^{12}C: Disentangling the sources of monopole strength between the energy of the Hoyle state and $E_x = 13$ MeV
10. *D. S. Harrouz*, N de Séréville, P. Adsley *et al.*: Phys. Rev. C **105** 015805 (2022)
    Experimental study of the ^{30}Si(^{3}He,d)^{31}P reaction and thermonuclear reaction rate of ^{30}Si$(p, \gamma)^{31}$P
11. M. Williams *et al.*: Phys. Rev. C **105** 065805 (2022)
    Constraints on key ^{17}O$(\alpha, \gamma)^{21}$Ne resonances and impact on the weak process
12. P. Adsley *et al.*: Phys. Rev. Lett. **129** 112501 (2022)
    Extending the Hoyle-state paradigm to ^{12}C+^{12}C fusion
13. **K. C. W. Li**, F. D. Smit, P. Adsley *et al.*: Phys. Lett. B **827** 136928 (2022)
    Investigating the predicted breathing-mode excitation of the Hoyle state
14. M. La Cognata, S. Palmerini, P. Adsley *et al.*: Phys. Lett. B **826** 136917 (2022)
    Exploring the astrophysical energy range of the ^{27}Al$(p, \alpha)^{24}$Mg reaction: A new recommended reaction rate
15. J. Frost-Schenk, P. Adsley *et al.*: Monthly Notices of the Royal Astronomical Society **514** (2) 2650-2657 (2022)
    The impact of ^{17}O+α reaction rate uncertainties on the s-process in rotating massive stars

16. P. Adsley *et al.*: Phys. Rev. C **103**, 015805 (2021)
Re-evaluation of the astrophysically important ^{22}Ne$(\alpha,\gamma)^{26}$Mg and ^{22}Ne$(\alpha,n)^{25}$Mg reaction rates
17. P. Adsley *et al.*: Phys. Rev. C **103** 044315 (2021)
Isoscalar monopole and dipole transitions in ^{24}Mg, ^{26}Mg, and ^{28}Si
18. P. Adsley *et al.*: Phys. Rev. C **103** 035804 (2021)
Spectroscopy of excited states in ^{19}F and implications for the production of ^{15}N in core-collapse supernovae
19. M. Williams, P. Adsley *et al.*: Phys. Rev. C **103** 055805 (2021)
New measurement of the $E_{\mathrm{c.m.}} = 323$-keV resonance in the ^{19}F$(p,\gamma)^{20}$Ne reaction
20. J. E. Riley *et al.*: Phys. Rev. C **103** 015807 (2021)
Sub-threshold states in ^{19}Ne relevant to ^{18}F$(p,\alpha)^{15}$O
21. P. Adsley, A. M. Laird, Z. Meisel: Phys. Rev. C **102**, 015801 (2020)
Re-analysis of the ^{24}Mg$(\alpha,\gamma)^{28}$Si reaction rate at stellar temperatures
22. P. Adsley *et al.*: Phys. Rev. C **97**, 045807 (2018),
High-resolution study of levels in the astrophysically important nucleus ^{26}Mg and resulting updated level assignments.
23. P. Adsley *et al.*: Phys. Rev. C **96**, 055802 (2017),
Re-examining the ^{26}Mg $(\alpha,\alpha')^{26}$Mg reaction - probing astrophysically important states in ^{26}Mg
24. P. Adsley *et al.*: J. Instrum. **12**, T02004 (2017),
CAKE: the coincidence array for K600 experiments
25. P. Adsley *et al.*: Phys. Rev. C **95**, 024319 (2017),
α clustering in ^{28}Si probed through the identification of high-lying 0^+ states
26. **K. C. W. Li**, R. Neveling, P. Adsley *et al.*: Phys. Rev. C **95** 031302(R) (2017), Characterisation of the proposed $4-\alpha$ cluster state candidate in ^{16}O

Publications listed after this point, I played a lesser role in. Typically assisting in data collection, or helping to interpret the results.

27. C. Angus, A. M. Laird, T. L. Tang *et al.*, Physical Review C **112** 025803 (2025)
Inverse kinematics study of the energy levels of ^{21}Ne populated with the ^{20}Ne+d reaction
28. A Bahini, P von Neumann-Cosel, J Carter, IT Usman *et al.*, Nuclear Physics A **1059** 123078 (2025)
Damping mechanism of the isoscalar giant monopole resonance in ^{58}Ni
29. J Nippert, S Courtin, M Heine, DG Jenkins *et al.*, Physical Review C **111** 065804 (2025)
Refining the deep sub-barrier ^{12}C+^{12}C fusion excitation function with the STELLA apparatus,
30. CV Mehl, JN Orce, C Ngwetsheni *et al.*, Physical Review C **111** 054318 (2025)
Large quadrupole deformation in ^{20}Ne challenges rotor model and modern theory
31. H Fujita, Y Fujita, P Adsley *et al.*, Physical Review C **111** 014317 (2025)
Asymmetry in the analogous spin–isospin-flip excitations of the $[J^\pi,T] = [2^+,1]_1$ and $[J^\pi,T] = [2^+,1]_2$ states in ${}^{14}_{6}\mathrm{C}_8$, ${}^{14}_{7}\mathrm{N}_7$ and ${}^{14}_{8}\mathrm{O}_6$ from the $[J^\pi,T] = [1^+,0]_1$ ground state of ^{14}N
32. EC Vyfers, V Pesudo, S Triambak, M Kamil, P Adsley *et al.* Physical Review C **110** 035803 (2024)
Proton-unbound states in ^{24}Al relevant for the ^{23}Mg(p,γ) reaction in novae
33. A Bahini *et al.*: Physical Review C **109** 014325 (2024)
Fine structure of the isoscalar giant monopole resonance in ^{58}Ni, ^{90}Zr, ^{120}Sn and ^{208}Pb

34. D. Gjestvan *et al.*: Physical Review C **109** 014325 (2023)
Examination of how properties of a fissioning system impact isomeric yield ratios of the fragments

35. C Agodi *et al.*: The European Physical Journal Plus **138** 1038 (2023)
Nuclear physics midterm plan at LNS

36. A Tamii *et al.*: The European Physical Journal A **59** 208 (2023)
PANDORA Project for the study of photonuclear reactions below $A = 60$

37. J Deary *et al.*: The European Physical Journal A **59** 198 (2023)
Photo-response of the $N = Z$ nucleus ^{24}Mg

38. BM Rebeiro *et al.*: Physical Review Letters **131** 052501 (2023)
^{138}Ba(d, α) Study of States in ^{136}Cs: Implications for New Physics Searches with Xenon Detectors

39. D Thisse *et al.*: The European Physical Journal A **59** 153 (2023)
Study of $N = 50$ gap evolution around $Z = 32$: new structure information for ^{82}Ge

40. A Bahini *et al.*: Physical Review C **107** 034312 (2023)
Isoscalar giant monopole strength in ^{58}Ni, ^{90}Zr, ^{120}Sn and ^{208}Pb

41. S. D. Olorunfunmi *et al.*: Phys. Rev. C **105** 054319 (2022)
Evolution of the isoscalar giant monopole resonance in the Ca isotope chain

42. V. Girard-Alcindor *et al.*: Phys. Rev. C **105** L051301 (2022)
New narrow resonances observed in the unbound nucleus ^{15}F

43. E. Monpribat *et al.*: Astronomy & Astrophysics **660** A47 (2022)
A new ^{12}C+^{12}C nuclear reaction rate: Impact on stellar evolution

44. A. Bahini *et al.*: Phys. Rev. C **105** 024311 (2022)
Isoscalar giant monopole resonance in ^{24}Mg and ^{28}Si: Effect of coupling between the isoscalar monopole and quadrupole strength

45. A. Shrivastava *et al.*: Phys. Rev. C **105** 014605 (2021)
Occupation probabilities of valence orbitals relevant to neutrinoless double β decay of ^{124}Sn

46. J. N. Orce *et al.*: Phys. Rev. C **104** L061305 (2021)
Reorietation-effect measurement of the $\langle 2_1^+ || \hat{E}2 || 2_1^+ \rangle$ matrix elemment in ^{36}Ar

47. M. Kamil *et al.*: Phys. Rev. C **104** L061303 (2021)
Isospin mixing and the cubic isobaric multiplet mass equation in the lowest $T = 2, A = 32$ quintet

48. L Morris *et al.*: Phys. Rev. C **104** 054323 (2021)
Search for inband transitions in the candidate superdeformed band in ^{28}Si

49. S.V. Szwec *et al.*: Phys. Rev. C **104** 054308 (2021)
Neutron occupancies and single-particle energies across the stable tin isotopes

50. B.M. Rebeiro *et al.*: Phys. Rev. C **104** 034309 (2021)
Spectroscopy of states in ^{136}Ba using the ^{138}Ba$(p, t)^{136}$Ba reaction

51. G. Häfner *et al.*: Phys. Rev. C **104** 014316 (2021)
First lifetime investigations of $N > 82$ iodine isotopes: The quest for collectivity

52. V. Girard-Alcindor *et al.*: The European Physical Journal A **57** 1-7 (2021)
Probing nuclear foces beyond the nuclear drip line: the cases of ^{16}F and ^{15}F: A Tribute to Mahir Hussein

53. JN Wilson *et al.*: Nature **590** 7847 566-570 (2021)
Angular momentum generation in nuclear fission

54. L. M. Donaldson *et al.*: Phys. Rev. C **102** 064327 (2020)
Fine Structure of the Isovector Giant Dipole Resonance in $^{142-150}$Nd and ^{152}Sm

55. K. A. Chipps *et al.* Phys. Rev. C **102**, 035806 (2020)
Evaluation of experimental constraints on the ^{44}Ti$(\alpha,p)^{47}$V reaction cross section relevant for supernovae
56. G. Fruet *et al.*: Phys. Rev. Lett. **124**, 192701 (2020)
Advances in the Direct Study of Carbon Burning in Massive Stars
57. M. Heine *et al.*: Nuclear Instruments and Methods in Physics Research Section A **903** 1 (2018),
The STELLA apparatus for particle-γ coincidence fusion measurements with nanosecond timing
58. L. M. Donaldson *et al.*: PLB **776**, 113 (2018),
Deformation dependence of the isovector giant dipole resonance: The neodymium isotopic chain revisited
59. A. Parikh *et al.*, Phys. Rev. C. **92**, 055806 (2015),
Spectroscopy of ^{19}Ne for the thermonuclear ^{15}O$(\alpha,\gamma)^{19}$Ne and ^{18}F$(p,\alpha)^{15}$O reaction rates
60. D. Smalley *et al.*, Phys. Rev. C **89**, 024602 (2014),
Two-neutron transfer reaction mechanisms in ^{12}C$(^{6}$He,^{4}He$)^{14}$C using a realistic three-body ^{6}He model
61. S. K. L. Sjue *et al.*, Nucl. Instrum. Methods Phys. Res. A **700**, 179 (2013),
Beam suppression of the DRAGON recoil separator for ^{3}He$(\alpha,\gamma)^{7}$Be.
62. C. Aa. Diget *et al.*, J. Instrum. **6**, P02005 (2011),
SHARC: Silicon Highly-segmented Array for Reactions and Coulex used in conjunction with the TIGRESS gamma-ray spectrometer.

Publications Under Review

1. S. Jongile *et al.* Under review in Physical Review Letters
Fingerprint of the tensor interaction in atomic nuclei
2. *A. Salinas*, P. Adsley *et al.* Under review in Physics Letters B
Are shell effects reflected in photoabsorption cross sections?

Publications In Preparation

1. P. Adsley *et al.*
Probing historic pollution of globular clusters and nucleosynthesis in classical novae: a direct measurement of the ^{39}K$(p,\gamma)^{40}$Ca reaction rate with the DRAGON
2. **S. D. Binda**, P. Adsley *et al.* To be submitted to Physical Review C
Spectroscopy of ^{39}Ca by the ^{40}Ca$(p,d)^{39}$Ca reaction and implications for nucleosynthesis in classical novae
3. A.R.F.G. De Sousa, J. Frost-Schenk, R. Longland, P. Adsley
Searching for evidence for an Efimov state in ^{12}C

Grants

TAMU National Laboratory Office Fellowship for my graduate student (Ryan Amberger) (US$75,000)

Co-PI of the Cyclotron Institute Research Cluster on Nuclear Astrophysics (CIRCoNA) (US$1,000,000 over 3 years)

Department of Energy Early Career Award 2023-2028 (US$875,000)

Co-PI of CENTAUR grant from the National Nuclear Security Agency (US$12.5 million in total among a number of faculty)

Claude Leon Postdoctoral Research Fellowship 2019-2021 (ZAR 275,000 pa/US$18,000 pa)

Co-PI of PROTEA grant (bilateral South Africa-France funding) relating to X17 and dark-sector physics (ZAR 300,000 plus €20,000/US$19,500 + 23,000)

Accepted Proposals

2023

P. Adsley, B. S. Wellons: Constructing a photoabsorption calibration standard, part 2 (accepted at HZDR, Dresden)

2022

P. Adsley, L. M. Donaldson, B. Bastin, K. Malatji the NewJEDI collaboration: Studying conventional physics explanations for the X17 anomaly and searching for the 2γ decay of the X17 (accepted and performed at the iThemba LABS tandetron).

P. Adsley, B. S. Wellons: Constructing a photoabsorption calibration standard (accepted and performed at HZDR, Dresden)

2021

K. C. W. Li, P. Adsley: Studying the astrophysically pivotal ^{12}C$(\alpha,\gamma)^{16}$O reaction with ^{15}N(^{3}He,$d)^{16}$O (accepted at Orsay)

M. Williams, P. Adsley: How did the first stars make calcium? Studying ^{19}F+p in stars with the ^{19}F(^{3}He,$d)^{20}$Ne transfer reaction (accepted at Orsay)

2019

L. M. Donaldson, P. Adsley: Spectroscopy of ^{39}Ca using the ^{40}Ca$(p,d)^{39}$Ca reaction (iThemba LABS PR333), Wits PhD student Sifundo Binda analysing the data.

P. Adsley: Spectroscopy of resonances for hydrogen-burning nucleosynthesis in globular clusters and classical novae (iThemba LABS PR337)

2018

L. M. Donaldson, P. Adsley *et al.*: The photoabsorption cross sections of ^{90}Zr and ^{159}Tb: resolving discrepancies between (p,p') and (γ,xn) reactions (iThemba LABS PR320)

P. Adsley, N. de Séréville (IJCLab): Constraining the origin of pollution in globular clusters by measuring important proton radiative-capture reactions using the DRAGON (TRIUMF S1805)

J. Henderson (Surrey, UK), P. Adsley: Isospin symmetry in loosely bound states: Mirrored transfer reactions; using TIGRESS and EMMA at TRIUMF (TRIUMF S1801)

F. Hammache (IJCLab), P. Adsley: Constraining the ^{22}Ne$(\alpha,\gamma)^{26}$Mg and ^{22}Ne$(\alpha,n)^{25}$Mg reaction rates using the ^{22}Ne(^{7}Li,t) reaction and the Orsay SplitPole spectrograph.

F. Hammache (IJCLab), P. Adsley: High-resolution spectroscopy of ^{19}F using the Munich Q3D (MLL Munich). Project completed with publication.

2017

P. Adsley *et al.*: High-resolution inelastic scattering reactions from ^{26}Mg - clarifying levels in the astrophysically important reactions ^{22}Ne$(\alpha,n)^{25}$Mg and ^{22}Ne$(\alpha,\gamma)^{26}$Mg (MLL, Munich - July 2017). Project completed with publication.

2015

P. Adsley, J. W. Brümmer (Stellenbosch, iThemba LABS) *et al.*: Measuring decays of excited states in ^{22}Mg to improve Type I X-ray burst light curve predictions (iThemba LABS PR254 - experiment took place May-June 2016) - South African PhD student J. W. Brümmer has analysed the data and defended his PhD. Paper is published.

A. Long (Notre Dame, USA), P. Adsley *et al.*: Study of the ^{44}Ti$(\alpha,p)^{47}$V reaction rate using high-precision ^{50}Cr$(p,t)^{48}$Cr measurements (iThemba LABS PR242 - experiment took place in September-October 2015). Wits PhD student Sifundo Binda analysing the data.

2014

P. Adsley *et al.*: Cluster structures of ^{24}Mg, ^{27}Al and ^{28}Si (iThemba LABS PR244 - experiment took place in May and July 2015) - three resulting publications, one in Physical Review Letters, two in Physical Review C.

Conference, School and Workshop Talks

Invited to lecture on stellar nucleosynthesis and experimental methods at the IReNA-IANNA Summer School on Beaver Island, Lake Michigan - July 2025

Invited to give Ohio University Seminar - November 2024

Invited speaker at the Division of Nuclear Physics APS Meeting - October 2024

Invited speaker at Nuclear Physics in Astrophysics - September 2024

Invited Speaker at NNSA workshop on nuclear reactions involving fission fragments - December 2023

Invited to give Livermore National Laboratory Nuclear Physics Seminar - November 2023

Invited to give FRIB Colloquium - October 2023

Invited talk at the APS April Meeting - April 2023

Invited to teach on experimental methods at the 11th European Summer School on Nuclear Astrophysics in Catania, Italy - July 2022

Invited to give Notre Dame Seminar - March 2022

African Nuclear Physics School 2021 - lectures on application of equipment at iThemba LABS to the topics of the school.

IAEA working group on (α, n) reactions

Service

Faculty advisor for the 2026 Center for Nuclear Astrophysics of Multimessengers Frontiers Meeting

Chair of the 3rd Nuclear Target Development Summer School 2025 in the Cyclotron Institute, Texas A&M University target laboratory

Member of the Nuclear Physics Advisory Committee of the Los Alamos Neutron Science Center (LANSCE)

Paper reviewer for Nature, Physics Letters B, Physical Review Letters, Physical Review C, European Physical Journal A

Proposal reviewer for the Department of Energy, Royal Society, Polish Academy of Sciences

Milestone reviewer for Lawrence Livermore National Laboratory projects

Faculty representative on the Texas A&M University Cyclotron Institute community committee (2021-)

Faculty mentor for MAGIC graduate-student peer-mentoring scheme in the Texas A&M University Department of Physics and Astronomy (2022-)

Faculty mentor for REU students at the Cyclotron Institute, including the normal REU programme and Texas Researchers Enhancing Nuclear Diversity (TREND) (2022-)

Faculty advisor for the Texas A&M University Unicycle Club

Reviewer of research activities for the National Research Foundation of South Africa (2023-)

Department of Physics & Astronomy Space Committee (2021-)

Department of Physics & Astronomy Colloquium Committee (2024-)