Daniel Stephen Slaughter

Contact Information

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Research Interests in Brief

Investigating the electronic and nuclear dynamics of atoms and molecules following electron impact, photoexcitation and photoionization; Transient states of molecules such as resonant anions and excited vibronic states; Chemical reaction dynamics; Atomic and molecular interactions with electrons and positrons; Multi-parameter particle detection; charged-particle optics design.

Education

Flinders University, Adelaide, SA, Australia

PhD (2002-2007)

Thesis: "Superelastic Electron Scattering from Caesium"
Supervisors: P.J.O. Teubner, M.J. Brunger
- thesis available online through the Australian Digital Theses Program
http://catalogue.flinders.edu.au/local/adt/public/adt-SFU20071009.100421/

Flinders University, Adelaide, SA, Australia

BSc (Hons 1st class), Physics, 2001.

Thesis: "Caesium Ultranarrow Bandwidth Excited Atomic Line Optical Filter"
Supervisors: P.J.O. Teubner, V. Karaganov.

Academic and Research Experience

Lawrence Berkeley National Laboratory, Chemical Sciences Division,
Berkeley, CA, USA

Staff Scientist **May 2014 - present**

Principal Investigator (PI) for the electron-driven molecular dynamics projects in the Atomic, Molecular and Optical Sciences (AMOS) group of the Chemical Sciences Division, and PI for the Laboratory Directed Research and Development project probing molecular excited state dynamics with multi-color, multi-pulse laser and synchrotron photons. Supervision of graduate students and postdocs and development of safe work practices and safe laboratory environments.

Project Scientist **Feb 2013 - May 2014**

Investigation of detailed dynamical description of the dynamics of transient anion resonances for polyatomic molecules and key aspects of the dynamics in larger transient anions of biological significance. Initiating and building collaboration with experiment and theory groups both within and outside LBNL. With co-workers in LBNL Chemical Sciences, initiated a Laboratory Directed Research and Development project to probe molecular excited state dynamics with multi-color, multi-pulse laser and synchrotron photons. Supervision of graduate students and postdocs and development of safe work practices and a safe laboratory environment for the AMOS Experimental group at LBNL.

Postdoctoral Research Fellow **Apr 2010 - Feb 2013**
Performing experimental investigations of the dynamics of dissociative electron attachment to polyatomic molecules. Developing scientific apparatus to enable momentum imaging of dissociative electron attachment to large molecules. Collaboration with experiment and theory groups both within and outside of LBNL. Supervision of graduate students.

Centre for Antimatter-Matter Studies, Australian National University,
Canberra, Australia

Postdoctoral Research Fellow **Jan 2008 - Apr 2010**
Design and development of a new apparatus for multi-parameter charged particle detection of reaction products in positron-atom ionising collisions. Detailed measurements of low-energy positron interactions with atoms and molecules, including elastic and total interaction cross sections, positronium formation, direct ionisation cross sections and state-resolved electronic excitation cross sections.

Flinders University, Adelaide, Australia.

Associate Lecturer **2006**
Teaching of undergraduate courses. Primary responsibilities were tutorial preparation and delivery, shared responsibilities for creating exams and other student assessment tasks.

Postgraduate Student **2001 - 2007**
Undergraduate physics tutoring (classes and consulting) and laboratory teaching.

Recent Awards

- LBNL Spot Award (2011), *For excellent contribution and team spirit in representing the Chemical Sciences Division at the October 2011 Lab Open House.*

Community Outreach

- Industry Initiatives for Science and Math Education (IISME, 2013), *Hosting and mentoring Alameda High School teacher Rupika Malik during her 6-week internship with the AMO Experimental group at LBNL.*
- Berkeley Lab Open House (2011), *Representing the Chemical Sciences Division.*

Recent Invited Talks

- "Momentuim Imaging of the Dynamics of Dissociative Electron Attachment to Molecules of Biological Significance", APS Meetiong of the Division of Atomic Molecular and Optical Physics (DAMOP), Madison, Wisconsin, USA, June 3, 2014.
- "Exploring Free Electron - Driven Chemistry Using Synchrotron Radiation", Workshop on Current and Future Directions for AMO and Chemical Physics Research, ALS User Meeting, Berkeley, CA, USA, October 8-9, 2013.
- "3-D Momentum Imaging of Dissociative Electron Attachment Dynamics in Polyatomic Molecules", XVIII International Symposium on Electron-Molecule Collisions and Swarms (POSMOL), Kanazawa, Japan, July 19-20, 2013.
- "Low-Energy Free Electron Driven Chemistry in Polyatomic Molecules", Colloquium, Faculty of Science and Engineering, Sophia University, Tokyo, July 2013.

Peer-Reviewed Publications

2013

20. A. Moradmand, D. S. Slaughter, D. J. Haxton, T. N. Rescigno, C. W. McCurdy, Th. Weber, S. Matsika, A. L. Landers, A. Belkacem, and M. Fogle
Dissociative electron attachment to carbon dioxide via the $^2\Pi_u$ shape resonance
Phys. Rev. A **88** 032703

19. A. Moradmand, D. S. Slaughter, A. L. Landers, and M. Fogle
Dissociative-electron-attachment dynamics near the 8-eV Feshbach resonance of CO_2
Phys. Rev. A **88** 022711

18. D. S. Slaughter, D. J. Haxton, H. Adaniya, T. Weber, T. N. Rescigno, C. W. McCurdy, and A. Belkacem
Ion-momentum imaging of resonant dissociative-electron-attachment dynamics in methanol
Phys. Rev. A **87** 052711

2012

17. D. S. Slaughter, H. Adaniya, T. N. Rescigno, D. J. Haxton, C. W. McCurdy, A. Belkacem, Å. Larson and A. E. Orel
Resonant enhanced electron impact dissociation of molecules
J. Phys.: Conf. Ser. **388** 012016

16. H. Adaniya, D. S. Slaughter, T. Osipov, T. Weber, and A. Belkacem
A momentum imaging microscope for dissociative electron attachment
Rev. Sci. Instrum. **83** 023106

2011

15. J. R. Machacek, C. Makochekanwa, A. C. L. Jones, P. Caradonna, D. S. Slaughter, R. P. McEachran, J. P. Sullivan, S. J. Buckman, S. Bellm, B. Lohmann, D. V. Fursa, I. Bray, D. W. Mueller and A. D. Stauffer
Low-energy positron interactions with xenon
New J. Phys. **13** 125004.

14. D. S. Slaughter, H. Adaniya, T. N. Rescigno, D. J. Haxton, A. E. Orel, C. W. McCurdy and A. Belkacem
Dissociative electron attachment to carbon dioxide via the 8.2 eV Feshbach resonance
J. Phys. B: At. Mol. Opt. Phys. **44** 205203.

13. D. J. Haxton, H. Adaniya, D. S. Slaughter, B. Rudek, T. Osipov, T. Weber, T. N. Rescigno, C. W. McCurdy, and A. Belkacem

Observation of the dynamics leading to a conical intersection in dissociative electron attachment to water
Phys. Rev. A **84** 030701(R)

12. C. Makochekanwa, J. R. Machacek, A. C. L. Jones, P. Caradonna, D. S. Slaughter, R. P. McEachran, J. P. Sullivan, and S. J. Buckman, S. Bellm and B. Lohmann, D. V. Fursa and I. Bray, D. W. Mueller, A. D. Stauffer, M. Hoshino
Low-energy positron interactions with krypton
Phys. Rev. A **83** 032721

11. A. C. L. Jones, C. Makochekanwa, P. Caradonna, D. S. Slaughter, J. R. Machacek, R. P. McEachran, J. P. Sullivan, S. J. Buckman, A. D. Stauffer, I. Bray and D. V. Fursa
Positron scattering from neon and argon
Phys. Rev. A **83** 032701

10. J. P. Sullivan, C. Makochekanwa, A. Jones, P. Caradonna, D. S. Slaughter, J. Machacek, R. P. McEachran, D. W. Mueller, and S. J. Buckman
Forward angle scattering effects in the measurement of total cross sections for positron scattering
J. Phys. B: At. Mol. Opt. Phys. **44** 035201

9. T. Pflger, M. Holzwarth, A. Senftleben, X. Ren, A. Dorn, J. Ullrich, L. R. Hargreaves, B. Lohmann, D. S. Slaughter, J. P. Sullivan, J. C. Lower, and S. J. Buckman
Kinematically complete experiments for positron-impact ionization of helium atoms at the NEPOMUC facility
J. Phys.: Conf. Ser. **262** 012047

2010

8. A. C. L. Jones, P. Caradonna, C. Makochekanwa, D. S. Slaughter, R. P. McEachran, J. R. Machacek, J. P. Sullivan, and S. J. Buckman (2010).
Observation of Threshold Effects in Positron Scattering from the Noble Gases,
Phys. Rev. Lett. **105** 073201.

2009

7. Casten Makochekanwa, Ana Bankovic, Wade Tattersall, Adric Jones, Peter Caradonna, Daniel Slaughter, Kate Nixon, Michael J Brunger, Zoran Lj Petrovic, James P Sullivan and Stephen J Buckman (2009).
Total and positronium formation cross sections for positron scattering from H2O and HCOOH,
New J. Phys. **11** 103036.

6. Peter Caradonna, James P. Sullivan, Adric Jones, Casten Makochekanwa, Daniel Slaughter, Dennis W. Mueller and Stephen J. Buckman (2009).
Excitation of the n=2 States of Helium by Positron Impact,
Phys. Rev. A **80** 060701.

5. P. Caradonna, A. Jones, C. Makochekanwa, D. S. Slaughter, J. P. Sullivan, S. J. Buckman, I. Bray and D. V. Fursa (2009).
High Resolution Positron Scattering from Helium: Grand Total and Positronium Formation Cross Sections,
Phys. Rev. A **80** 032710.

4. A. Jones, P. Caradonna C. Makochekanwa, D. Slaughter, D. Mueller, J. P. Sullivan and S. J. Buckman (2009).
High Resolution Positron Interactions,
J. Phys.: Conf. Proc. **194**012033.

3. J. P. Sullivan, S. J. Buckman, A. Jones, P. Caradonna, C. Makochekanwa, D. Slaughter, Z. Lj Petrovic, A. Bankovic, S. Dujko, J. P. Marler, R. D. White (2009).
Low energy positron interactions - trapping, transport and scattering,
J. Phys.: Conf. Ser. **162** 012002.

2008

2. S.J Buckman, T. Maddern, J. Francis-Staite, L. Hargreaves, M.J. Brunger, G. Garcia, J.C. Lower, S. Mondal, J.P. Sullivan, A. Jones, P. Caradonna, D. Slaughter, C. Mackochekanwa and R.P. McEachran (2008).
Low energy lepton scattering: recent results for electron and positron interactions,
J. Phys.: Conf. Ser. **133** 12001.

2007

1. D.S. Slaughter, V. Karaganov, M.J. Brunger, P.J.O. Teubner, I. Bray and K. Bartschat (2007).
Superelastic electron scattering from laser-excited cesium atoms,
Phys. Rev. A **75 (6)** 2717.