

Alan N. Heays

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Employment

PSL fellow, October 2016 – .

Observatoire de Paris, LERMA, UMR 8112 du CNRS, 92195 Meudon, France

Description of duties: CO spectroscopy and PDR modelling.

Postdoctoral researcher, April 2016 – June 2016.

Faculty of Sciences, Vrije Universiteit, Amsterdam, The Netherlands.

Supervisor: Prof. Wim Ubachs

Description of duties: Spectroscopy and astrochemistry.

Postdoctoral researcher, July 2012 – March 2016.

Leiden Observatory, Leiden University, P.O. Box 9513, 2300 RA Leiden, The Netherlands.

Supervisor: Prof. Ewine van Dishoeck.

Description of duties: The theoretical and experimental spectroscopy of astrophysically-important molecules, and the application of their photoabsorption and dissociation to astrochemical systems. Updating and maintaining a database of astrophysically-important photoprocesses, home.strw.leidenuniv.nl/~ewine/photo. Supervision of graduate students.

Postdoctoral researcher, October 2011 – April 2012.

Department of Physics, Wellesley College, MA, USA.

Supervisor: Prof. Glenn Stark.

Description of duties: Theoretical modelling of molecular photoabsorption of N₂ and CO.

Postdoctoral researcher, April 2011 – October 2011.

Faculty of Sciences, Vrije Universiteit, Amsterdam, The Netherlands.

Supervisor: Prof. Wim Ubachs

Description of duties: The analysis of molecular photoabsorption spectra of ¹⁴N¹⁵N.

Education

Ph.D. Physics, The Australian National University. Awarded 2011.

Thesis title: Photoabsorption and photodissociation in molecular nitrogen.

Supervisory committee: Prof. Brenton Lewis, Dr. Stephen Gibson, and Dr. Ken Baldwin.

Electronic access: hdl.handle.net/1885/7360

M.Sc. (1st class honours) Physics, The University of Auckland. Awarded 2005.

Thesis title: Characteristics of mesoscale forecast error: sources of initial condition sensitivity.

Supervisor: Prof. Geoff Austin.

B.Sc. Physics, The University of Auckland. Awarded 2002.

Contact referees

Prof. Ewine van Dishoeck, Leiden Observatory, The Netherlands.

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Prof. Wim Ubachs, VU University, The Netherlands.

Ph: +31 2 0598 7948.

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Em. Prof. Brenton Lewis, Australian National University.

Ph: +61 2 6125 53075.

Email: brenton.lewis@anu.edu.au

Refereed publications

7 first author papers

31 co-authorship papers

Teaching experience

Lecturer for summer school course at University of Antioquia, Medellin, Colombia. Topic “*Introduction to astrochemistry*”,

Co-promoter of PhD student Xiaohu Li (2015, Leiden University) topic: “*Molecules during stellar formation and death*”

Supervision of MSc minor-project Arthur Bosman (2014, Leiden University) “*Cosmic-ray induced photodissociation*”.

Mentoring of undergraduate, MSc, and PhD level students. Leiden University, 2012–ongoing.

Undergraduate laboratory demonstration. The University of Auckland. 2003–2004.

Undergraduate tutoring. The University of Auckland. 2002–2003.

Invited conference talks

August 2015 “*General meeting of the COST action: Molecules in Motion*” Paris, France

June 2015 “*30 years of photodissociation regions*” Monterey, CA

March 2015 “*Laboratory astrophysics for beyond Hubble: fundamental processes from the NIR to the FUV*”, Callaway Gardens, GA

June 2013 “*Dissociative Recombination conference 2013*” Paris, France

Seminars and colloquia

Aug 2016 “*Laboratory astrochemistry: UV photodestruction of molecules and its observable isotope effects*”, Academia Sinica, institute of astronomy and astrophysics

May 2016 “*UV photoprocessing in astrochemistry*” Paris Observatory

Nov 2015 “*Molecular structure and isotope selection*” Leiden Observatory

June 2015 “*The importance of N_2 and CO photodissociation to astrochemistry*” UC Davis, CA

February 2015 “*Ultraviolet photodissociation of N_2 and CO in astrochemistry*” Victoria University, New Zealand

June 2014 “*Isotopic fractionation of nitrogen in space by ultraviolet radiation*” University of Auckland, New Zealand

Outreach

Jun 2016, Public lecture at the Planetario de Medellin, Colombia

Awards

LKBF travel grant. NWO. 2014.

LKBF travel grant. NWO. 2013.

Australian Postgraduate Award. The Australian National University. 2005.

Summer research scholarship. The University of Auckland. 2003.

Administrative and service experience

February 2015, organiser of international workshop “*Photodissociation in astrochemistry*”.

2015, Co-organiser of the “Observatory Seminar” series at Leiden Observatory.

2013–2014, co-organiser of several topical meetings of the Dutch Astrochemical Network.

Advisory expert to the Kinetic Database for Astrochemistry (kida.obs.u-bordeaux1.fr).

Refereed publications and proposals submitted to *Astrophys. J.*, *J. Chem. Phys.*, and the Czech Science Foundation.

Publication list

1. R. Hakalla, M. Niu, et al. 2017, “Fourier-transform spectroscopy of $^{13}\text{C}_{17}\text{O}$ and deperturbation analysis of the $A^1\Pi(v = 03)$ levels”. *J. Quant. Spectrosc. Radiat. Transfer* 189:312
2. Kama, M., Pinilla, P, et al. 2016, “Spirals in protoplanetary disks from photon travel time”. *Astron. Astrophys.* 593:L20
3. M. L. Niu, R. Hakalla, et al. 0, “Spectroscopy and perturbation analysis of the $A^1\Pi(v = 0)$ state of $^{13}\text{C}^{16}\text{O}$ ”. *Mol. Phys.* 0:1
4. R. Hakalla, M. L. Niu, et al. 2016, “VIS and VUV spectroscopy of $^{12}\text{C}^{17}\text{O}$ and deperturbation analysis of the $A^1\Pi$, $v = 1 - 5$ levels”. *RSC Adv.* 6:31588
5. Li, Xiaohu, Millar, Tom J., et al. 2016, “Chemistry and distribution of daughter species in the circumstellar envelopes of O-rich AGB stars”. *Astron. Astrophys.* 588:A4
6. M. L. Niu, E. J. Salumbides, et al. 2016, “Spectroscopy and perturbation analysis of the $\text{CO } A^1\Pi X^1\Sigma^+$ (2, 0), (3, 0) and (4, 0) bands”. *Mol. Phys.* 114:627
7. A. N. Heays, B. R. Lewis, et al. 2015, “Indirect predissociation of highly excited singlet states of N_2 ”. *Eur. Phys. J. Web Conf.* 84:03004
8. P. Lavvas, R. Yelle, et al. 2015, “ N_2 state population in Titan’s atmosphere”. *Icarus* 260:29
9. M. L. Niu, A. N. Heays, et al. 2015, “VUV-synchrotron absorption studies of N_2 and CO at 900 K”. *J. Mol. Spectrosc.* 315:137
10. A. N. Heays, R. Visser, et al. 2014, “Isotope selective photodissociation of N_2 by the interstellar radiation field and cosmic rays”. *Astron. Astrophys.* 562:A61
11. A. N. Heays, J. M. Ajello, et al. 2014, “The high-resolution extreme-ultraviolet spectrum of N_2 by electron impact”. *Astrophys. J. Suppl. Ser.* 211:28
12. A. N. Heays, M. Eidelsberg, et al. 2014, “Observation of a new electronic state of CO perturbing $W^1\Pi(v = 1)$ ”. *J. Chem. Phys.* 141:144311
13. G. Stark, A. N. Heays, et al. 2014, “High-resolution oscillator strength measurements of the $v' = 0, 1$ bands of the $B - X$, $C - X$, and $E - X$ systems in five isotopologues of carbon monoxide”. *Astrophys. J.* 788:67

14. X. Li, T. J. Millar, et al. 2014, “*Photodissociation and chemistry of N_2 in the circumstellar envelope of carbon-rich AGB stars*”. *Astron. Astrophys.* 568:
15. X. Li, A. N. Heays, et al. 2013, “*Photodissociation of interstellar N_2* ”. *Astron. Astrophys.* 555:A14
16. L. Gavilan, J. L. Lemaire, et al. 2013, “*High-Resolution Study of $^{13}C^{16}O$ $A - X(v' = 0 - 9)$ Bands Using the VUV-FTS at SOLEIL: Revised Term Values*”. *J. Phys. Chem. A* 117:9644
17. K. Jessup, G. R. Gladstone, et al. 2013, “ *$^{14}N^{15}N$ detectability in Pluto’s atmosphere*”. *Icarus* 226:1514
18. A. N. Heays, B. R. Lewis, et al. 2012, “*Tuning out vibrational levels in molecular electron energy-loss spectra*”. *Phys. Rev. A* 85:012705
19. M. Eidelsberg, J. L. Lemaire, et al. 2012, “*High-resolution study of oscillator strengths and predissociation rates for $^{12}C^{16}O$. $W-X$ bands and Rydberg complexes between 92.9 and 93.4 nm*”. *Astron. Astrophys.* 543:A69
20. C. Y. R. Wu, D. L. Judge, et al. 2012, “*Experimental verification of strong rotational dependence of fluorescence and predissociation yield in the $b^1\Pi_u(v = 1)$ level of $^{14}N_2$* ”. *J. Chem. Phys.* 136:044301
21. K. E. Mandt, D. A. Gell, et al. 2012, “*Ion densities and composition of Titan’s upper atmosphere derived from the Cassini Ion Neutral Mass Spectrometer: Analysis methods and comparison of measured ion densities to photochemical model simulations*”. *J. Geophys. Res. – Planet.* 117:10006
22. A. N. Heays, G. D. Dickenson, et al. 2011, “*High-resolution Fourier-transform extreme ultraviolet photoabsorption spectroscopy of $^{14}N^{15}N$* ”. *J. Chem. Phys.* 135:244301
23. M. H. Stevens, J. Gustin, et al. 2011, “*The production of Titan’s ultraviolet nitrogen airglow*”. *J. Geophys. Res. – Space* 116:A05304
24. P. Lavvas, M. Galand, et al. 2011, “*Energy deposition and primary chemical products in Titan’s upper atmosphere*”. *Icarus* 213:233
25. X. Liu, A. N. Heays, et al. 2009, “*Analysis of terrestrial-thermospheric N_2 $c'_4^1\Sigma_u^+(0) \sim b'^1\Sigma_u^+(1) - X^1\Sigma_g^+$ by the Far Ultraviolet Spectroscopic Explorer*”. *J. Geophys. Res. – Space* 114:D07304
26. A. N. Heays, B. R. Lewis, et al. 2009, “*Oscillator strengths and line widths of dipole-allowed transitions in $^{14}N_2$ between 86.0 and 89.7 nm*”. *J. Chem. Phys.* 131:194308
27. G. Stark, B. R. Lewis, et al. 2008, “*Oscillator strengths and line widths of dipole-allowed transitions in $^{14}N_2$ between 89.7 and 93.5 nm*”. *J. Chem. Phys.* 128:114302
28. X. Liu, D. E. Shemansky, et al. 2008, “*Experimental and coupled-channels investigation of the radiative properties of the N_2 $c'_4^1\Sigma_u^+ - X^1\Sigma_g^+$ band system*”. *J. Geophys. Res. – Space* 113:A02304

29. B. R. Lewis, A. N. Heays, et al. 2008, "A coupled-channel model of the $^3\Pi_u$ states of N_2 : Structure and interactions of the $3s\sigma F_3^3\Pi_u$ and $3p\pi_u G_3^3\Pi_u$ Rydberg states". J. Chem. Phys. 129:164306
30. H. Ndome, M. Hochlaf, et al. 2008, "Sign reversal of the spin-orbit constant for the $C^3\Pi_u$ state of N_2 ". J. Chem. Phys. 129:164307
31. 2008, "Interactions of the $3p\pi_u c^1\Pi_u(v = 2)$ Rydberg-complex member in isotopic N_2 ". J. Chem. Phys. 128:134313
32. B. R. Lewis, K. G. H. Baldwin, et al. 2008, "Structure and predissociation of the $3p\sigma_u D^3\Sigma_u^+$ Rydberg state of N_2 : First extreme-ultraviolet and new near-infrared observations, with coupled-channels analysis". J. Chem. Phys. 129:204303
33. M.-C. Liang, A. N. Heays, et al. 2007, "Source of nitrogen isotope anomaly in HCN in the atmosphere of Titan". Astrophys. J. 664:L115

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