

Hilding R. Neilson

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Citizenship: Canadian

Profile

I am an interdisciplinary scientist, working on astrophysics and on the intersection of science, astronomy and Indigenous knowledge. As a Mi'kmaw person, I strive to embrace and integrate Indigenous knowledges and methodologies to better understand the physics of stars and the Universe and our place in it. More specifically, I probe the physics of stars, from the nuclear-burning core out to the circumstellar medium where stellar winds interact with the interstellar medium to understand connections between stars and planets; stars and cosmology; and stars and us. I exploit theoretical and numerical tools to compare with observational data sets to reveal the hidden physics of stars. I excel at and enjoy teaching at the undergraduate and graduate level as well as participating in public outreach and science communication.

Experience

ASSISTANT PROFESSOR (CLTA), UNIVERSITY OF TORONTO 2014 - PRESENT

Contract limited-term appointment faculty in the Department of Astronomy & Astrophysics at the University of Toronto.

ADJUNCT FACULTY, EAST TENNESSEE STATE UNIVERSITY 2014 - 2015

Adjunct faculty position in the Department of Physics & Astronomy at East Tennessee State University.

RESEARCH ASSISTANT PROFESSOR, EAST TENNESSEE STATE UNIVERSITY 2013 - 2014

Research scientist position in the Department of Physics & Astronomy at East Tennessee State University.

POSTDOCTORAL RESEARCH SCIENTIST, EAST TENNESSEE STATE UNIVERSITY 2012 - 2013

Postdoctoral research position in the Department of Physics & Astronomy at East Tennessee State University with Prof. Richard Ignace.

ALEXANDER VON HUMBOLDT FELLOW, ARGELANDER INSTITUTE FOR ASTRONOMY 2010 - 2012

Independent postdoctoral research fellowship (funded by the Alexander von Humboldt Foundation) in the Stellar Physics Research Group at the Argelander Institute for Astronomy led by Prof. Norbert Langer.

ARGELANDER FELLOW, ARGELANDER INSTITUTE FOR ASTRONOMY 2009 - 2010

Postdoctoral research fellowship in the Stellar Physics Research Group at the Argelander Institute for Astronomy supervised by Prof. Norbert Langer.

SESSIONAL INSTRUCTOR, UNIVERSITY OF TORONTO MISSISSAUGA JAN - MAY 2009

Lecturer for Astronomy 201: Introduction to Stars & Galaxies for non-science students.

TEACHING ASSISTANT, UNIVERSITY OF TORONTO MISSISSAUGA SEPT 2005 - DEC 2008

Laboratory teaching assistant for Astronomy 101/201 for non-science students

TEACHING ASSISTANT, UNIVERSITY OF TORONTO SEPT 2003 - DEC 2008

Teaching assistant for a number of astronomy courses. Responsibilities include grading, tutorials, and lectures.

TEACHING ASSISTANT, SAINT MARY'S UNIVERSITY SEPT 2002 - MAY 2003

Grader for courses in Mathematics, Physics and Astronomy.

Education

University of Toronto, PhD in Astronomy & Astrophysics, Toronto, 2009

Dissertation: *The Dynamic Atmospheres of Classical Cepheids: Studies of Atmospheric Extension, Mass Loss, & Shocks*

Supervisor: Professor John B. Lester

St. Mary's University, BSc Honours in Mathematics & Astrophysics, Halifax, 2003

Pasadena Academy High School, Diploma, Pasadena, 1998

Teaching Experience

- Graduate Minicourse: Astronomy & Colonization University of Toronto - 2020 - This is an eight lecture mini course for graduate students in astronomy on the intersections between astronomy and colonization of Indigenous lands. This course explores the ethics of astronomy with respect to current and future facilities and how we as a field can begin to create space for Indigenous knowledges in our teaching and research.
- AST121: Origin and Evolution of the Universe University of Toronto - 2020 - The origin of the Universe and all that it contains, from the chemical elements, stars and galaxies, and life. The course is intended for students who are enrolling in science and engineering courses.
- AST198: Great Astronomical Issues (Focus on Indigenous Astronomy) University of Toronto - 2019 - an introductory seminar course for first-year students. The course explored various topics in astronomy where students researched questions in each lecture and presented results to other students. In this course, topics focused on understanding Indigenous perspectives of astronomy and the role of the night sky in Indigenous knowledge and science.
- PMU199: Physics and Math of the Universe (Focus on Indigenous Astronomy) University of Toronto - 2017, 2018, 2019 - an introductory seminar course for first-year students. The course explored various topics in astronomy where students researched questions in each lecture and presented results to other students. In this course, topics focused on understanding Indigenous perspectives of astronomy and the role of the night sky in Indigenous knowledge and science.
- AST251: Life on other worlds, University of Toronto - 2015, 2016, 2017 - science elective course for science students about the prospects for finding life beyond the Earth.

- PMU199: Physics and Math of the Universe, University of Toronto 2014, 2015, 2017 - an introductory seminar course for first-year students. The course explored various topics in astronomy where students researched questions in each lecture and presented results to other students.
- AST222: Galaxies and Cosmology, University of Toronto 2015 - core astrophysics course for second-year students introducing the study of galaxies from the Milky Way and beyond, including topics on galactic structure and evolution. The second part introduces cosmology with discussion about the Big Bang, cosmic microwave background and questions about dark matter and dark energy.
- Participated in workshop “2014 ETSU STEM Conference”, May 29-30, 2014
- Participated in teaching workshop “Teaching Every Student: ASTRO 101 Approaches for Diverse Audiences” at the 221st Meeting of the AAS, January 2013
- Teaching assistant for Graduate Astronomy Course in Science Writing led by Prof. Rob Izzard at the University of Bonn, Spring 2012
- Guest Lecturer for Graduate Astronomy Course on Stellar Evolution at the University of Bonn, Fall 2010 & Fall 2011
- Lecturer for Astronomy 201 (Introductory Astronomy for non-science students) at University of Toronto at Mississauga, Winter 2009
- Teaching Assistant at University of Toronto at Mississauga, 2006 - 2008
- Teaching Assistant at University of Toronto, 2003 - 2008
- Teaching Assistant at St. Mary’s University, 2002 - 2003

Student Supervision

- Zhihang Zhang, University of Toronto, 2019 - 2020: “*Probing exoplanetary transit light curves through synthetic models*”
- Haley Blinn, University of Toronto, 2018 - 2019: “*Precision modelling of the evolution of the North Star and its binary companion*”
- Elaria Fahmy (co-supervised with John B. Lester), University of Toronto, 2017 - 2018: “*Testing planetary transit measurements by fitting realistic model stellar atmospheres*”
- Taniesha Stoll, University of Toronto, 2017 - 2018: “*Population synthesis of Cepheid variable stars to refine the calibration of fundamental standard candles*”
- Michael Primrose (co-supervised with Chris Matzner), University of Toronto, 2016 - 2017: “*Generating X-ray flux in Cepheids by shock breakout*”
- Yaakov Spivak, University of Toronto, 2016 - 2017: “*The future of stars: stellar evolution of metal-rich stars*”
- Cassandra Miller, University of Toronto, 2016 - 2017: “*Cepheid period change and distances: calibrating the physics of stellar evolution along the Cepheid instability strip*”

- Mateus Santos, University of Toronto, Summer 2016: “*Stars that eat planets: predicting spectral signatures of planet accretion from model stellar atmospheres*”
- Yuan (Chris) Ni, University of Toronto, 2015 - 2016: “*Pulsation and Evolution of the Ultra-Long-Period Cepheids*”
- J.T. McNeil, East Tennessee State University, 2013 - 2015: “*Testing Model Stellar Atmospheres with Planetary Transit Observations*”
 - poster presented at the 223rd meeting of the AAS, Washington D.C., USA, 5 - 9 January 2014

Research & Education Grants

- NSERC PromoScience Grant 2019 - 2020, \$23,300. **Neilson, H.R. (P.I.)**, Chapman, D. & Jameson, R. *Embracing Mi'kmaw Skies: Intertwining western astronomy and Mi'kmaw*

knowledge

- NSERC Discovery Grant 2020 - 2024, \$23,000 / year, **Neilson, H.R. (P.I.)** *Stellar atmospheres in the era of big surveys.*
- Chandra Space Telescope Cycle 21 2019, Moschou, S. (P.I.), Drake, J., Evans, N.R., Vlahakis, N., **Neilson, H.R. (co-I)**, & Guzik, J. *Modeling Chandra observations of Cepheid activity*, accepted
- Learning and Education Advancement Fund at the University of Toronto 2018, **Neilson, H.R. (P.I.)**, Carlberg, R.; & Gaensler, B. *Diversifying astronomy continued: Introducing Indigenous astronomy and sky lore into the astronomy classroom* - \$47,500 CAD,
- Canada150 grant 2016, Reino, H. (P.I), **Neilson, H.R. (Co-I)**, Tamayo, D., Silburt, A., Rachkov, A., & LeBlanc, R. *1867: a point in space and time* - \$10,000 CAD
- Learning and Education Advancement Fund at the University of Toronto 2016, **Neilson, H.R. (P.I.)**, Carlberg, R.; & Gaensler, B. *Diversifying Astronomy: Introducing Indigenous astronomy and sky lore into the astronomy classroom* - \$7,000 CAD
- National Science Foundation Astronomy & Astrophysics Program 2016, accepted, Baron, F. (P.I.) Baines, E., **Neilson, H.R. (Co-I)**, Kloppenborg, B., Aufdenberg, J., Chiavassa, A., & Muirhead, P. *Picturing the faces of stars: limb-darkening models vs interferometric measurements* - \$122,435.00 USD
- Alexander von Humboldt Fellowship 2010 - Grant - 73,200€

Observing Proposals

- CHARA Interferometer for period Feb 1 - July 31, 2018, White, T. (P.I.), Huber, D., Baron, F., Vrijmoet, E., Ireland, M., Tuthill, P., Bedding, T., Aufdenberg, J., Baines, E., Collet, R., & **Neilson, H.R. (Co-I)** *Measuring limb darkening at visible wavelengths with PAVO*
- XMM-Newton X-ray Observatory 2017, Evans, N.R. (P.I.), Engle, S., Guinan, E., Wolk, S.J., Pillitteri, I., Mortiz-Guenther, H., Molnar, L., Szabados, L., Szabo, R., Plachy, E., **Neilson, H.R. (Co-I)**, Marengo, M., Matthews, L.D., Drake, J., & Moschou, S.P. *X-rays from Cepheids: hints of mass loss?*

- CHARA Interferometer for period Feb 1 - July 31, 2018, Nardetto, N. (P.I.), Mourard, D., Hocdé, V., Kervella, P., Mérand, A., Gallenne, A., Trahin, B., Borgniet, S, **Neilson, H.R. (Co-I)**, et al. *The environment of Cepheids in the visible domain*
- CHARA Interferometer for period Feb 1 - July 31, 2018, White, T. (P.I.), Huber, D., Baron, F., Vrijmoet, E., Ireland, M., Tuthill, P., Bedding, T., Aufdenberg, J., Baines, E., Collet, R., & **Neilson, H.R. (Co-I)** *Measuring limb darkening at visible wavelengths with PAVO*
- Chandra Space Telescope Cycle 19, 2017, Engle, S. (P.I.), Guinan, E., **Neilson, H.R. (Co-I)**, et al. *Secret Lives of Cepheids: beta Dor as a test of Cepheid X-ray heating mechanisms*
- Chandra Space Telescope Cycle 19, 2017, Evans, N.R. (P.I.), **Neilson, H.R. (Co-I)**, Marengo, M., Engle, S., Guinan, E., Wolk, S.J., Matthews, L.D., Winston, E.M., Drake, J., & Moschou, S.P. *Cepheids: A new class of X-ray variable: Part I: l Car*
- Hubble Space Telescope Cycle 25, 2017 Engle, S. (P.I.), Guinan, E., **Neilson, H.R. (Co-I)**, Harper, G., & Evans, N.R. *The secret lives of Cepheids: Completing the picture with HST-COS observation of the nearest classical Cepheids, Polaris & δ Cephei*
- Canada-France-Hawaii Telescope 2017B, Wade, G. (P.I.), & **Neilson, H.R. (Co-I)** *Understanding radio, IR, and X-ray emission of classical Cepheids: Pulsation modulation of the magnetic field of η Aql.*
- CHARA Interferometer for period Feb 1 - July 31, 2017, Nardetto, N. (P.I.), Mourard, D., Mérand, A., Kervella, P., Anderson, R. I., Fouqué, P., Gallenne, A., Gieren, W., Graczyk, D., Mathias, P., **Neilson, H.R. (Co-I)**, et al. *The visible environment of Cepheids with VEGA/CHARA: T Vul*
- Gemini Telescope 2016B, **Neilson, H.R. (P.I.)**, Engle, S., Evans, N.R., Guinan, E., Hoffman, J., Ignace, R., Lester, J.B. Marengo, M., Matthews, L.D., Millar-Blanchaer, M., Shrestha, M., & Welch, D. *The Gemini Planet Imager Classical Cepheid Survey (GPICCS): Resolving the inner circumstellar medium of Cepheids.*
- Chandra Space Telescope Cycle 18, 2016, Evans, N.R. (P.I.), **Neilson, H.R. (Co-I)**, Marengo, M., Engle, S., & Guinan, E. *Cepheids: The first rung on the cosmic distance ladder: Part II: Polaris*
- CHARA Interferometer for period May 16 - December 23, 2016, Nardetto, N. (P.I.), Mérand, A., Mourard, D., Kervella, P., Gallenne, A., Breitfelder, J., Poretti, E., **Neilson, H.R. (Co-I)**, et al. *The visible environment of Cepheids with VEGA/CHARA*
- Kepler K2 Space Observatory 2015, Molnár, L. (P.I.), Szabó, R., **Neilson, H.R. (Co-I)**, Evans, N.R., & Szabados, L., + KASC WG#7 members, *Sampling the Cepheid instability strip with K2*
- XMM-Newton X-ray Observatory 2014, Guinan, E. (P.I.), Engle, S., **Neilson, H.R. (Co-I)**, Harper, G., & Evans, N.R. *Exposing the secret X-ray lives of Cepheids with XMM-Newton*
- XMM-Newton X-ray Observatory 2014, Oskinova, L. (P.I.), Balona, L., Hamann, W.-R., Hubrig, S., Huemoerder, D., Ignace, R., **Neilson, H.R. (Co-I)**, & Todt, H. *X-ray pulsations of massive stars: XMM opens a new door to stellar physics*
- Kepler K2 Space Observatory 2014, Molnár, L. (P.I.), Szabó, R., Kolenberg, K., Plachy, E., Moskalik, P., Ngeow, C.-C., Kuehn, C., Jeon, Y.-B., Evans, N.R., **Neilson, H.R. (Co-I)**, Derekas, A., + KASC WG#7 members, *Classical and Type II Cepheids in the C4 and C5 fields of the K2 mission*
- Chandra X-ray Observatory Cycle 16 2014, Huenemoerder, D.P. (P.I.), Oskinova, L., Hamann, W.-R., Ignace, R., Schulz, N., & **Neilson, H.R. (Co-I)**, *A Deep X-ray Look at a Very Massive Star: HETGS Spectroscopy of the Blue Hypergiant HIP 101364 - \$56,366*

- Very Large Array 2014 Semester B, Matthews, L. (P.I), **Neilson, H.R. (Co-I)**, Marengo, M., & Evans, N.R. *A Search for Mass Loss from Cepheid Variables*
- Lulin Optical Telescope 2013, **Neilson, H.R. (P.I.)**, Ngeow, C.-C., Ignace, R., Henson, G., Adams, A., & Luttermoser, D. *Polarization of Mira Variable Stars: Constraints on stellar structure*
- Lulin Optical Telescope 2013, **Neilson, H.R. (P.I.)**, Ngeow, C.-C., Guinan, E., Engle, S., & Ignace, R. *What drives a Cepheid wind -- Constraints from polarization observations*

Awards

- Alexander von Humboldt Fellowship (2010)
- Michael Fieldus Memorial Award (2008)
- Walter John Helm Government of Ontario Graduate Scholarship in Science & Technology (2005, 2006)
- Walter C. Sumner Memorial Fellowship (2005, 2006)
- University of Toronto Fellowship (2003, 2004, 2005, 2006)
- C.A. Chant Fellowship (2003)
- St. Mary's University Undergraduate Academic Scholarship (2000, 2001, 2002)
- Canadian Millennium Scholarship (2000, 2001, 2002)
- National Science & Engineering Research Council Undergraduate Summer Research Scholarship (2002)

Selected Scientific Activities and Community Service

- Served as Editor of the proceedings of the conference RRL/Cep 2019 - Frontiers of classical pulsators: theory and observations held in October 2019
- Member of the Canadian Astronomical Societies Equity & Inclusion Committee 2019 - 2020
- Served on Canadian Time Allocation Committee for CFHT and Gemini, 2017 - 2020
- Served on the University of Toronto Faculty of Kinesiology and Physical Education task force on race and Indigeneity, 2017 - 2018
- Served on TESS Cycle 1 review panel, Dec 10 - 13, 2017
- Organized First workshop on Indigenous Astronomy at the University of Toronto, Nov 2-3, 2017
- Served as reviewer for Kepler K2 space telescope science panel, February 2017
- Serving on the science review panel for NRAO 2016-2017
- Member of the Kepler Space Telescope working group on Cepheids and RR Lyrae Stars
- Served on review panel for NASA Astrophysics Data Analysis Program, 2015

- Served as referee for the journals: Astronomy & Astrophysics, the Astronomical Journal, the Astrophysical Journal Letters, the Astrophysical Journal, Monthly Notices of RAS and Astrophysics & Space Science
- Served on review panel for NASA graduate fellowships, 2013
- Member of the American Astronomical Society (AAS), 2011 - 2015
- Member of the Canadian Astronomical Society (CASCA), 2005 - present
- President of the Graduate Astronomy Student Association at the University of Toronto, 2006 - 2007
- Treasurer for the Graduate Astronomy Student Association at the University of Toronto, 2004 - 2006

Selected Public Outreach Talks

- Talk given to Astronomy & Space Exploration Society at University of Toronto, November 24, 2016
- Talk given at “Astronomy on Tap” Toronto, February 11, 2016
- Volunteer for the Total Lunar Eclipse event hosted at University of Toronto, September 27, 2015
- Talk given at “Astronomy on Tap” Toronto, September 24, 2014
- Invited talk at Bays Mountain StarFest, Oct. 12 - 14, 2012 on “*Watching the North Star Age*”
- I have given many popular lectures for the monthly astronomy tour at the University of Toronto (2003 - 2009)

Refereed Publications

1. **Neilson, H.R.**; Lester, J.B.; & Baron, F. *Limb darkening and planetary transits II: Intensity profile correction factors for a grid of model stellar atmospheres*, 2019, submitted to A&A
2. Moschou, S.-P.; Vlahakis, N.; Drake, J.J.; Evans, N.R.; **Neilson, H.R.**; Guzik, J.A.; & ZuHone, J. *Phase-modulated X-ray Emission from Cepheids due to Pulsation-Driven Shocks*, 2020, ApJ accepted
3. Miller, C.; **Neilson, H.R.**; Remage Evans, N.; Engle, S.; & Guinan, E. *Rotation, convective core overshooting, and period changes in classical Cepheid stellar evolution models*, 2020, ApJ, 896, 128
4. Evans, N.R.; Pillitteri, I.; Molnar, L.; Szabados, L.; Plachy, E.; Szabo, R.; Engle, S.; Guinan, E.; Wolk, S.; Günther, H.M.; **Neilson, H.R.**; Marengo, M.; Matthews, L.D.; Moschou, S.; Drake, J.J.; Kashyap, V.; Kervella, P.; Tordai, T.; Somogyi, P.; & Burki, G. *X-ray observations of the peculiar Cepheid V473 Lyr identify a low-mass companion*, 2020, AJ, 159, 121
5. Wade, G.A.; Pigulski, A.; Begy, S.; Shultz, M.; Handler, G.; Sikora, J.; **Neilson, H.R.**; Cugier, H.; Erba, C.; Moffatt, A.F.J.; Pablo, B.; Popowicz, A.; Weiss, W.; & Zwintz, K. *Evolving pulsation of the slowly rotating magnetic β Cep star ξ^1 CMa*, 2020, MNRAS, 492, 2762
6. **Neilson, H.R.** *Astronomy must respect rights of Indigenous peoples*, 2019, Nature, 572, 312

7. Armstrong, J.T.; Jorgensen, A.M.; Mozurkewich, D.; **Neilson, H.R.**; Baine, E.K.; Schmidt, H.R.; & van Belle, G.T. *Interferometric fringe visibility null as a function of spatial frequency: a probe of stellar atmospheres*, 2019, *Journal of Astronomical Instrumentation*, 8, 4
8. Nardetto, N.; Poretti, E.; Gallenne, A.; Rainer, M.; Anderson, R.; Fouqué, P.; Gieren, W.; Graczyk, D.; Kervella, P.; Mathias, P.; Mérand, A.; Mourard, D.; **Neilson, H.R.**; Pietrzynski, G.; Pilecki, B.; Storm, J.; Borgniet, S.; Chiavassa, A.; Hocdê, V.; & Trahin, B. *CRILES high-resolution infrared spectroscopy of the long-period Cepheid ι Carinae*, 2018, *A&A*, 616, 92
9. Shrestha, M.; **Neilson, H.R.**; Hoffman, J.L.; & Ignace, R. *Polarization simulations of stellar wind bow shocks I. The case of electron scattering*, 2018, *MNRAS*, 477, 1365
10. **Neilson, H.R.**; McNeil, J.T.; Ignace, R.; & Lester, J.B. *Limb darkening and planetary transits: testing centre-to-limb intensity variations and limb darkening directly from model stellar atmospheres*, 2017, *ApJ*, 845, 65
11. Antoniadis, J.; Moon, D.-S.; Ni, Y.Q.; Kim, D.-J.; Lee, Y.; & **Neilson, H.R.** *Discovery of a rapid, luminous nova in NGC 300 by the KMTNet supernova program*, 2017, *ApJ*, 844, 160
12. Engle, S.G.; Guinan, E.F.; Harper, G.M.; Evans, N.R.; Cuntz, M.; **Neilson, H.R.**; & Fawzy, D.E. *The secret lives of Cepheids: δ Cep, the prototype of a new class of pulsating x-ray variables*, 2017, *ApJ*, 838, 67
13. Lester, J.B.; Khatu, V.C.; & **Neilson, H.R.** *Indicators of stellar mass in the photometric H-band*, 2017, *PASP*, 129, 972
14. Nardetto, N.; Poretti, E.; Rainer, M.; Fokin, A.; Mathias, P.; Anderson, R.; Gallenne, A.; Gieren, W.; Graczyk, D.; Kervella, P.; Mérand, A.; Mourard, D.; **Neilson, H.R.**; Pietrzynski, G.; Pilecki, B.; & Storm, J. *HARPS-N high spectral resolution observations of Cepheids I. The Baade-Wesselink projection factor of δ Cep revisited*, 2017, *A&A*, 597, 73
15. **Neilson, H.R.**; Percy, J.; & Smith, H. *Period changes and evolution in pulsating variable stars*, 2016, *JAAVSO*, 44, 179
16. He, M.Y.; Moon, D.-S.; **Neilson, H.R.**; Lee, J.-J.; Kim, S.C.; Pak, M.; Park, H.S.; Kim, D.-J.; Lee, Y.; Kim, S.-L.; & Lee, C.-U. *KMTNet supernova program variable objects I. NGC 2784 field*, 2016, *JKAS*, 49, 209
17. **Neilson, H.R.**; Baron, F.; Norris, R.; Kloppenborg, B.; & Lester, J.B. *Stellar atmospheres, atmospheric extension & weighing stars using the stellar mass index*, 2016, *ApJ*, 830, 103
18. Nardetto, N.; Mérand, A.; Mourard, D.; Storm, J.; Gieren, W.; Fouqué, P.; Gallenne, A.; Kervella, P.; **Neilson, H.R.**; Pietrzynski, G.; Pilecki, B.; Breifelder, J.; Berio, P.; Challouf, M.; Clause, J.-M.; Ligi, R.; Mathias, P.; Meilland, A.; Perraut, K.; Poretti, E.; Reiner, M.; Spang, A.; Stee, P.; Tallon-Bosc, I.; & ten Bummelaar, T. *VEGA/CHARA interferometric observations of Cepheids I. A resolved structure around the prototype classical Cepheid δ Cep in the visible spectral range*, 2016, *A&A*, 593, 45
19. **Neilson, H.R.**; Bisol, A.C.; Guinan, E.; Engle, S.G.; & Butterworth, X. *The secret lives of Cepheids: evolution, mass loss and ultraviolet observations of the long-period classical Cepheid ι Carinae*, 2016, *ApJ*, 824, 1
20. **Neilson, H.R.**; & Ignace, R. *Period change and evolution of β Cephei stars*, 2015, *A&A*, 584, 58

21. **Neilson, H.R.**; Izzard, R.I.; Langer, N.; & Ignace, R. *The strange evolution of the Large Magellanic Cloud Cepheid OGLE-LMC-CEP1812*, 2015, A&A, 581, 1
22. **Neilson, H.R.**; Schneider, F.R.N.; Izzard, R.G.; Evans, N.R.; & Langer, N. *The occurrence of classical Cepheids in binary systems*, 2015, A&A, 574, 2
23. Lomax, J.R.; Nazé, Y.; Hoffman, J.L.; Russell, C.M.P.; De Becker, M.; Corcoran, M.F.; Davidson, J.W.; **Neilson, H.R.**; Owocki, S.; Pittard, J.M.; & Pollock, A.M.T. *V444 X-ray and polarimetric variability: radiative and coriolis forces shape the wind collision region*, 2015, A&A, 573, 43
24. Engle, S.G.; Guinan, E.F.; Harper, G.M.; **Neilson, H.R.**; & Evans, N.R. *The secret lives of Cepheids: evolutionary changes and pulsation-induced shock heating in the prototype classical Cepheids δ Cep*, 2014, ApJ, 794, 80
25. Mackey, J.; Mohamed, S.; Gvaramadze, V.; Kotak, R.; Langer, N.; Meyer, D.M.-A.; Moriya, T.; & **Neilson, H.R.** *Interacting supernovae from photoionization-confined shells around red supergiants*, 2014, Nature, 512, 282
26. **Neilson, H.R.**; Ignace, R.; Smith, B.J.; Henson, G.; & Adams, A.M. *Evidence of a Mira-like tail and bow shock about the semi-regular variable V CVn from four decades of polarization measurements*, 2014, A&A, 568, 88
27. **Neilson, H.R.**; & Ignace, R. *Convection, granulation and period jitter in classical Cepheids*, 2014, A&A, 563, 4
28. **Neilson, H.R.** *Revisiting the fundamental properties of the Cepheid Polaris using detailed stellar evolution models*, 2014, A&A, 563, 48
29. Baron, F.; Monnier, J.D.; Kiss, L.L.; **Neilson, H.R.**; Zhao, M.; Anderson, M.; Aarnio, A.; Pedretti, E.; Thureau, N.; ten Brummelaar, T.A.; Ridgway, S.T.; McAlister, H.A.; Sturmman, J.; Sturmman, L.; & Turner, N. *CHARA/MIRC observations of two M supergiants from the Perseus double cluster: temperature, bayesian modeling and compressed sensing imaging*, 2014, ApJ, 785, 46
30. **Neilson, H.R.**; & Lester, J.B. *Spherically-symmetric model stellar atmospheres and limb darkening II: limb-darkening laws, gravity-darkening coefficients and angular diameter corrections for FGK dwarf stars*, 2013, A&A, 556, 86
31. **Neilson, H.R.**; & Lester, J.B. *Spherically-symmetric model stellar atmospheres and limb darkening I: limb-darkening laws, gravity-darkening coefficients and angular diameter corrections for red giant stars*, 2013, 554, 98
32. Lester, J.B.; Dinshaw, R.; & **Neilson, H.R.** *Indicators of mass in spherical stellar atmospheres*, 2013, PASP, 125, 335
33. **Neilson, H.R.**; Langer, N.; Engle, S.G.; Guinan, E.; & Izzard, R. *Classical Cepheids require enhanced mass loss*, 2012, ApJ, 760L, 18
34. Lebzelter, T.; Heiter, U.; Abia, C.; Eriksson, K.; Ireland, M.; **Neilson, H.R.**; Nowotny, W.; Maldonado, J.; Merle, T.; Peterson, R.; Plez, B.; Short, C.I.; Wahlgren, G.M.; Worley, C.; Aringer, B.; Bladh, S.; de Laverny, P.; Goswami, A.; Mora, A.; Norris, R.P.; Recio-Blanco, A.; Scholz, M.; Thevenin, F.; Tsuji, T.; Kordopatis, G.; Montesinos, B.; & Wing, R.F. *Comparative modelling of the spectra of cool giants*, 2012, A&A, 547, 108

35. **Neilson, H.R.**; & Lester, J.B. *Using limb darkening to measure fundamental parameters of stars*, 2012, A&A, 544, 117
36. Ngeow, C.-C.; **Neilson, H.R.**; Nardetto, N.; & Marengo, M. *Calibrating the projection factor for Galactic Cepheids*, 2012, A&A, 543, 55
37. Mackey, J.; Mohamed, S.; **Neilson, H.R.**; Langer, N.; & Meyer, D.M.-A. *Double bow shocks around young, runaway red supergiants: application to Betelgeuse*, 2012, ApJ, 751L, 10
38. **Neilson, H.R.**; Nardetto, N.; Ngeow, C.-C.; Fouqué, P.; & Storm, J. *Cepheid limb darkening, angular diameter corrections and projection factor from static spherical model stellar atmospheres*, 2012, A&A, 541, 134
39. **Neilson, H.R.**; Engle, S.G.; Guinan, E.; Langer, N.; Wasatonic, R.P.; & Williams, D.B. *The period change of the Cepheid Polaris suggest enhanced mass loss*, 2012, ApJ, 745L, 32
40. **Neilson, H.R.**; & Langer, N. *Is there a mass discrepancy in the Cepheid binary OGLE-LMC-CEP0227?*, 2012, A&A, 537, 26
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42. **Neilson, H.R.** & Lester, J.B. *Limb darkening in spherical stellar atmospheres*, 2011, A&A, 530, 65
43. **Neilson, H.R.**; Cantiello, M.; & Langer, N. *The Cepheid mass discrepancy and pulsation-driven mass loss*, 2011, A&A, 529L, 9
44. Ngeow, C.-C.; Ita, Y.; Kanbur, S.M.; **Neilson, H.R.**; Onaka, T.; & Kato, D. *Cepheid period-luminosity relation from the AKARI observations*, 2010, MNRAS, 408, 983
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47. **Neilson, H.R.**; Ngeow, C.-C.; Kanbur, S.M.; & Lester, J.B. *Testing mass loss in Large Magellanic Cloud Cepheids using infrared and optical observations*, 2009, ApJ, 692, 81
48. **Neilson, H.R.** & Lester, J.B. *On the enhancement of mass loss in Cepheids due to radial pulsation II. the effect of metallicity*, 2009, ApJ, 690, 1829
49. Lester, J.B. & **Neilson, H.R.** *SATLAS: spherical versions of the ATLAS stellar atmosphere program*, 2008, A&A, 491, 633
50. **Neilson, H.R.** & Lester, J.B. *Determining parameters of cool giant stars by modeling spectrophotometric and interferometric observations using the SATLAS program*, 2008, A&A, 490, 807

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Non-Refereed Publications

1. **Neilson, H.R.**; & Blinn, H. *The Curious Case of the North Star: the continuing tension between evolution models and measurements of Polaris*, Astronomical Society of the Pacific Conference Series "RRLyrae/Cepheid2019: Frontiers of Classical Pulsators: Theory and Observations", Cloudcroft, NM, USA October 13-18, 2019
2. Guzik, J.A.; Farag, E.; Osrowski, J.; Evans, N.R.; **Neilson, H.R.**; Moschou, S.; & Drake, J.J. *Investigating Opacity Modifications and Reaction Rate Uncertainties to Resolve the Cepheid Mass Discrepancy*, Astronomical Society of the Pacific Conference Series "RRLyrae/Cepheid2019: Frontiers of Classical Pulsators: Theory and Observations", Cloudcroft, NM, USA October 13-18, 2019
3. Kahanamoku, S.; 'Anolani Alegado, R.; Kagawa-Viviani, A.; Leimomi Kamelamela, K.; Kamai, B.; Walkowicz, L.M.; Prescod-Weinstein, C.; Alexa de los Reyes, M.; **Neilson, H.R.** *A Native Hawaiian-led summary of the current impact of constructing the Thirty Meter Telescope on Maunakea*, Submitted to the National Academy of Sciences Decadal Survey on Astronomy and Astrophysics (Astro2020) Panel on the State of the Profession and Societal Impacts (SoP); doi:10.6084/m9.figshare.c.4805619
4. Prescod-Weinstein, C.; Walkowicz, L.M.; Tuttle, S.; Nord, B.; & **Neilson, H.R.** *Reframing astronomical research through an anticolonial lens -- for TMT and beyond*, Submitted to the National Academy of Sciences Decadal Survey on Astronomy and Astrophysics (Astro2020) Panel on the State of the Profession and Societal Impacts (SoP)
5. **Neilson, H.R.**; & Lawler, S.; *Canadian astronomy on Maunakea: on respecting Indigenous rights*, 2019, White Paper for the Canadian Long Range Plan 2020
6. **Neilson, H.R.**; Rousseau-Nepton, L.; Lawler, S.; & Spekkens, K. *Indigenizing the next decade of astronomic Canada*, 2019, White Paper for the Canadian Long Range Plan 2020
7. The MSE Team (including **Neilson, H.R.**) *The detailed science case for the Maunakea Spectroscopic Explorer, 2019 edition*, 2019, ArXiv:190404907
8. Bergemann, M.; Huber, D.; Adibekyan, V.; + 70 authors (including **Neilson, H.R.**) *Stellar astrophysics and exoplanet science with the Maunakea Spectroscopic Explorer (MSE)*, 2019, ArXiv:190303157
9. Evans, N.R.; Engle, S.; Guinan, E.; **Neilson, H.R.**; Marengo, M.; Matthews, L.; & Guenther, H.M. *Outward from Cepheids*, 2018, Proceedings of the Polish Astronomical Society, 6, 253
10. Nardetto, N.; Poretti, E.; Anderson, R.; Fokin, A.; Gallenne, A.; Gieren, W.; Graczyk, D.; Kervella, P.; Mathias, P.; Mérand, A.; Mourard, D.; **Neilson, H.R.**; Pietrzyński, G.; Pilecki, B.; Rainer, M.; & Storm, J. *The p and k-factors of the classical Cepheid δ Cep*, 2018, Proceedings of the Polish Astronomical Society, 6, 2217
11. Nardetto, N.; Poretti, E.; Mérand, A.; + 14 authors including **Neilson, H.R.**, *The atmosphere, the p-factor and the bright visible circumstellar environment of the prototype of classical Cepheids δ Cep*, 2017, EPJWC, 150207003

12. Evans, N.R.; Engle, S.; Guinan, E.; **Neilson, H.R.**; Marengo, M.; Matthews, L.D.; & Guenther, M. *Between Cepheids and the cosmos*, 2017, EPJWC, 15203009
13. Huenemoerder, D.; Oskinova, L.; Ignace, R.; Hamann, W.-R.; Schulz, N.S.; **Neilson, H.R.**; & Shenar, T. *A Deep X-ray look at a very massive star: HETGS spectroscopy of the blue hypergiant Cyg OB2-12 (HIP 101364)*, 2016, HEAD, 1511702
14. **Neilson, H.R.**; Bisol, A.C.; Guinan, E.; & Engle, S.G. *Pulsation period change & classical Cepheids: probing the details of stellar evolution*, 2015, IAUS, 307, 224
15. Mackey, J.; Langer, N.; Meyer, D.M.-A.; Gvaramadze, V.V.; Mohamed, S.; **Neilson, H.R.**; & Mignone, A. *The circumstellar medium of massive stars in motion*, 2014, NIC Symposium, ArXiv: 1406.0878
16. Mackey, J.; Langer, N.; Mohamed, S.; Gvaramadze, V.V.; **Neilson, H.R.**; & Meyer, D.M.-A. *Effects of stellar evolution and ionizing radiation on the environments of massive stars*, 2014, ASTRA proceedings, 1, 61
17. **Neilson, H.R.**; Biesiada, M.; Remage Evans, N.; Marconi, M., Ngeow, C.-C.; & Reese, D.R. *Asteroseismology, standard candles, and the Hubble Constant: what is the role asteroseismology in the era of precision cosmology?*, 2014, IAUS, 301, 233
18. **Neilson, H.R.**; Ignace, R.; & Henson, G.D. *Long-term polarization observations of Mira variable stars suggest asymmetric structures*, 2014, IAUS, 301, 463
19. **Neilson, H.R.** *Pulsation and mass loss across the HR diagram: from OB stars to Cepheids to red supergiants*, 2013, 2014, IAUS, 301, 205
20. **Neilson, H.R.**; Ignace, R.; Shrestha, M.; Hoffman, J.L.; & Mackey, J. *Modeling near-IR polarization to constrain stellar wind bow shocks*, 2013, MSAO.confE.172
21. Mackey, J.; Mohamed, S.; **Neilson, H.R.**; Langer, N.; & Meyer, D.M.-A. *Numerical models for the circumstellar medium around Betelgeuse*, 2013, EAS Publication Series, 60, 253
22. Ngeow, C.-C.; **Neilson, H.R.**; Nardetto, N.; & Marengo, M. *Wesenheit function for Galactic Cepheids: application to the projection factors*, 2013, IAUS, 289, 134
23. Armstrong, J.T.; Jorgensen, A.M.; **Neilson, H.R.**; Mozurkewich, D.; Baines, E.K.; & Schmitt, H.R. *Precise stellar diameters from coherently averaged visibilities*, 2012, SPIE, 8445, 3K
24. **Neilson, H.R.** *Comparison of limb-darkening laws from plane-parallel and spherically-symmetric model stellar atmospheres*, 2012, IAUS, 282, 243
25. **Neilson, H.R.**; Ngeow, C.-C.; & Lester, J.B. *Constructing a Cepheid period p -factor relation from static model stellar atmospheres*, 2012, ArXiv:1201.0802
26. **Neilson, H.R.**; Langer, N.; Cantiello, M. *Stellar evolution with pulsation-driven mass loss: the case of LMC Cepheids*, 2011, ASPC, 451, 327

27. **Neilson, H.R.**; Lester, J.B.; & Haubois, X. *Weighing Betelgeuse: measuring the mass of α Orionis from stellar limb-darkening*, 2011, ASPC, 451, 117
28. **Neilson, H.R.**; Cantiello, M.; & Langer, N. *Convective core overshoot and mass loss in classical Cepheids: a solution to the mass discrepancy?*, 2011, ASPC, 448, 155
29. **Neilson, H.R.**; & Lester, J.B. *Using limb-darkening to measure the masses of red giants*, 2011, ASPC, 445, 165
30. **Neilson, H.R.**; Ngeow, C.-C.; Kanbur, S.M.; & Lester, J.B. *The connection between pulsation, mass loss and circumstellar shells in classical Cepheids*, 2009, AIPC, 1170, 141
31. Ngeow, C.-C.; Kanbur, S.M.; Ghobrial, L.; **Neilson, H.R.**; & Macri, L. *IRAC band period-luminosity relation from LMC Cepheids: application to three nearby galaxies*, 2009, AIPC, 1170, 37
32. **Neilson, H.R.**; & Lester, J.B. *Modeling stellar atmospheres with a spherically-symmetric version of the ATLAS code: testing the code by comparisons to interferometric observations and PHOENIX models*, 2009, AIPC, 1094, 804
33. **Neilson, H.R.**; Ngeow, C.-C.; Kanbur, S.M.; & Lester, J.B. *Modeling mass loss and infrared excess in Large Magellanic Cloud Cepheids*, 2008, ArXiv:0808.3995

Popular Articles

1. **Neilson, H.R.** *Looking for the Christmas Star: A brilliant case of where religion and science are brought together in wonder*, Downhome Magazine, December 2014
2. **Neilson, H.R.** *Maunakea and the Need to Indigenize Astronomy*, 2019, Guest post on the Blog of the Union of Concerned Scientists, <https://blog.ucsusa.org/science-blogger/maunakea-and-the-need-to-indigenize-astronomy>

Invited Talks

- *Indigenous astronomies, stories of the sky and learning about the Universe*, Space Matters Teacher Workshop 2020, Western University, 5 August 2020.
- *Indigenous Astronomy*, the Canadian Space Summit 2019, Ottawa, 21 November 2019
- *Indigenous Sky knowledge in the classroom*, the Space Educators Institute, Western University, 14 August 2019
- *Pulsation and Mass Loss across the Hertzsprung-Russell Diagram: From OB stars to Cepheids to Red Supergiants* invited review talk presented at IAU Symposium 301: Precision Asteroseismology, Celebration of the Scientific Opus of Wojtek Dziembowski, Wrocław, Poland, 19-23 August 2013 (invited)

Selected Talks

- *Integrating Indigenous Knowledge and Astronomy*, dotAstronomy 11, 22 October 2019
- *The Curious Case of the North Star: the continuing tension between evolution models and measurements of Polaris*, RRL/Cep 2019 - Frontiers of classical pulsators: theory and observations, 15 October 2019

- *Period Change, Evolution and Atmospheres of Cepheids: new insights into fundamental standard candles*, colloquium presented at Royal Military College, 16 November 2017 (invited)
- *The impact of binarity on stellar evolution along the Cepheid instability strip* presented at The Physics of Evolved Stars II: The role of binarity, Nice France, 10-13 July 2017
- *Classical Cepheids and real-time stellar evolution* presented at the 230th meeting of the AAS, Austin, USA, 5 - 9 June 2017
- *Classical Cepheids and real-time stellar evolution*, seminar presented at the Leiden Observatory, 24 April 2017
- *Stellar limb darkening: unsung hero or just another nuisance?*, colloquium presented at Georgia State University, 4 June 2015
- Organized splinter session *Asteroseismology & the Hubble Constant* at IAU Symposium 301: Precision Asteroseismology, Celebration of the Scientific Opus of Wojtek Dziembowski, Wrocław, Poland, 19-23 August 2013
- *A Better Understanding of Classical Cepheids: stellar evolution, mass loss and the infrared period-luminosity relation* colloquium presented at the University of Denver, Denver USA, February 2013 and at the University of Toledo, Toledo USA, September 2013
- *The Life & Times of the North Star: what evolution models are telling us about Polaris and other Cepheids* presented at the AAS meeting #220, Anchorage USA, June 2012