

Kelsey L. Hoffman – Curriculum Vitae

CONTACT INFORMATION

E-mail: khoffman@seti.org

CITIZENSHIP

Canadian

RESEARCH INTERESTS

Molecular dynamics and its application to extreme matter: neutron stars, white dwarfs, and planetary interiors; neutron star crusts; micro-lensing effects in transiting systems; white dwarf structure and populations; planet structure/equation of state; Exo-planet populations

EDUCATION

Ph.D., Astronomy – University of British Columbia, Vancouver, British Columbia, Canada (October 2011)

Thesis Title: “Neutron Star Metallurgy”

- Advisor: Dr. Jeremy Heyl
- Research: High performance computing of molecular dynamics (LAMMPS) applied to theoretical studies of the neutron star crust focused on composition and crustal yielding.

M.Sc., Physics – McGill University, Montreal, Quebec, Canada (October 2006)

Thesis Title: “A study of X-ray observations of Aquila X-1”

- Advisor: Dr. Robert Rutledge
- Research: Data analysis of 11 observations, from the space telescopes Chandra and XMM, of Aql X-1 in order to determine the neutron star radius.

B.Sc., Physics – University of Alberta, Edmonton, Alberta, Canada (April 2004)

Undergraduate Project Title: “Photon Orbits around a Neutron Star”

- Advisor: Dr. Sharon Morsink
- Research: Computer modelling of photon orbits around a rapidly rotating neutron star, written in C.

EXPERIENCE

Kepler Participating Scientist Program:, January 2014 - present

- Begin a molecular dynamics study of high density materials in order to study the structure and equation of state for rocky planets.
- Calculate photometric transit models for the *Kepler* planet catalogues.

Co-I: NASA-ROSES NNH15ZDA001N: March 2017 - present

- PI: J. Rowe (SETI)
- Search of Kepler field data for gravitationally bound micro-lensing systems, for example a white dwarf acting as a lens and a main sequence star acting as the light source.

Kepler Science Office: September 2015 - March 2017

- Calculate photometric transit models for DR25 *Kepler* planet catalogue.

CITA Postdoctoral Fellow: October 2011 to December 2013

- Use molecular dynamics to calculate shear induced melting of the neutron star crust. This work was in collaboration with Dr. Chris Thompson and University of Toronto student Fangda Li.
- Investigate the micro-lensing effects in the transiting system KOI-81. This work involved supervision of undergraduate student Britta Hansen as was in collaboration with Dr. Jason Rowe.

AWARDS

- NASA-Ames Honor Award, 09/2017
- CITA Postdoctoral Fellowship, 10/2011 - 12/2013 (55000/year)
- Four Year Fellowship, University of British Columbia, 05/2010 - 08/2010 (16000/year)

- NSERC PGS, University of British Columbia, 05/2008 - 04/2010 (21000/year)
- JA Jacobs Prize in Physics, University of Alberta, 04/2004 (250)
- NSERC USRA, University of Alberta, 05/2003 - 08/2003 (7000)

SUPERVISORY EXPERIENCE

Supervised undergraduate student Britta Hansen for a summer project, May - August 2012, on the effects of micro-lensing in transiting systems, such as KOI-81. Britta is currently a graduate student at the University of Toronto in the Department of Astronomy.

TEACHING

Teaching Assistant

- ASTR303: Extragalactic Astronomy, September 2008 to December 2008 (marking)
- ASTR311: Exploring the Universe: Stars and Galaxies, September 2006 to December 2006, September 2007 to December 2007, and September 2008 to December 2008 (tutorials)
- ASTR310: Exploring the Universe: The Solar System, January 2007 to April 2007 (tutorials)
- PHYS102: Introductory Physics - Electromagnetism, January 2005 to April 2005 (labs) and January 2006 to April 2006 (tutorials)
- PHYS521: Astrophysics, September 2005 to December 2005 (marking, graduate level)
- PHYS101: Introductory Physics - Introductory Physics - Mechanics, September 2004 to December 2004 (Labs)

ACADEMIC ACTIVITIES

- Served on NASA-ROSES panel (2015)
- Chair, Graduate Student Committee for the Canadian Astronomical Society, June 2007 - June 2009
- Astrophysics Officer for the McGill Graduate Association of Physics Students, September 2004 - April 2006

PROFESSIONAL AFFILIATIONS

- Canadian Astronomical Society
- American Astronomical Society and High Energy Division

PUBLICATIONS

Refereed:

- DeVore, J., Rappaport, S., Sanchis-Ojeda, R., **Hoffman, K.**, and Rowe, J. (2016) On the detection of non-transiting exoplanets with dusty tails. *Monthly Notices of the Royal Astronomical Society* 461:2453.
- Kunitomo, M., Matthews, J. M., Rowe, J. F., and **Hoffman, K.** (2018) Lifting Transit Signals from the Kepler Noise Floor. I. Discovery of a Warm Neptune. *The Astronomical Journal* 155:43.
- Rowe, J., Coughlin, J., Antoci, V., Barclay, T., Batalha, N., Borucki, W., Burke, C., Bryson, S., Caldwell, D., Campbell, J., Catanzarite, J., Christiansen, J., Cochran, W., Gilliland, R., Girouard, F., Haas, M., Helminiak, K., Henze, C., **Hoffman, K.**, Howell, S., Huber, D., Hunter, R., Jang-Condell, H., Jenkins, J., Klaus, T., Latham, D., Li, J., Lissauer, J., McCauliff, S., Morris, R., Mullally, F., Ofir, A., Quarles, B., Quintana, E., Sabale, A., Seader, S., Shporer, A., Smith, J., Steffen, J., Still, M., Tenenbaum, P., Thompson, S., Twicken, J., Van Laerhoven, C., Wolfgang, A., and Zamudio, K. (2015) Planetary Candidates Observed by Kepler. V. Planet Sample from Q1-Q12 (36 Months). *The Astrophysical Journal Supplement Series*, 217:16.
- **Hoffman, K.** and Heyl, J. (2012) Mechanical properties of non-accreting neutron star crusts. *Monthly Notices of the Royal Astronomical Society* 426:2404-2412.
- Charbonneau, J., **Hoffman, K.**, and Heyl, J. (2010) Large pulsar kicks from topological currents. *Monthly Notices of the Royal Astronomical Society* 404:119-123.
- **Hoffman, K.**, and Heyl, J. (2009) Compositional freeze-out of neutron star crusts. *Monthly Notices of the Royal Astronomical Society* 400:1986-1991.
- **Hoffman, K.L.**, Chow, K.H., Keifl, R.F., Hitti, B., Estele, T.L., Lichti, R.L. (2003) Frequency shifts and local spin susceptibility of muon in heavily-doped Si and GaAs. *Physica B*. 326:175.

Conference Proceedings, non-refereed

- **Hoffman, K.L.** and Heyl, J.S. (2008) Neutron Star Crustal Mass Fractions, to appear in the proceedings of "40 Years of Pulsars: Millisecond Pulsars, Magnetars and More", held in Montreal,

Quebec, Canada

Presented Work, non-refereed

- *Poster:* **Hoffman, K.** and Rowe, J. (2017) Using Molecular Dynamics to Study the Material Properties of Exoplanet Interiors: Kepler and K2 Science Conference IV, Mountain View CA
- *Poster:* **Hoffman, K.** and Rowe, J. (2017) A Search for Microlensing Signals in the Kepler Field: Canadian Astronomical Society Meeting, Edmonton AB
- *Talk:* **Hoffman, K.** (2016) Using Molecular Dynamics to Study the Material Properties of Exoplanet Interiors: Canadian Astronomical Society Meeting, Winnipeg MB
- *Poster:* **Hoffman, K.**, Rowe, J., and Henze, C. (2015) A Transit Inversion Search of the Kepler Field: IAU General Assembly, Meeting, Honolulu, Hawaii
- *Poster:* **Hoffman, K.**, Rowe, K. and Henze, C. (2015) A Search for Microlensing Signals in the Kepler Field: American Astronomical Society Meeting, Seattle WA.
- *Talk:* **Hoffman, K.L.**, Rowe, J., and Hansen, B. (2013) The Effect of Micro-lensing in Eclipsing Binary-star Systems: Canadian Astronomical Society Meeting, Vancouver BC. [Also presented as a poster contribution at the High Energy Astrophysics Division meeting, Monterey California 2013]
- *Poster:* **Hoffman, K.L.** and Heyl, J.S. (2012) Mechanical properties of non-accreting neutron star crusts: American Astronomical Society meeting, Long Beach CA 2013
- *Talk:* **Hoffman, K.L.** and Heyl, J.S. (2011) MUFFINS: Metallurgy Uncovers Forced Fractures Inside Neutron Stars: American Astronomical Society meeting, Seattle Washington 2011
- *Talk:* **Hoffman, K.L.**, and Heyl, J.S. (2010) The Repulsive Force Within: Understanding Neutron Star Crusts: Canadian Astronomical Society Meeting, Halifax NS. Oral presentation
- *Talk:* **Hoffman, K.L.**, and Heyl, J.S. (2010) Crustal Freeze-out and Surface Composition of Neutron stars: Kavli Institute for Theoretical Physics Neutron Star workshop, University of California at Santa Barbara.
- *Talk:* **Hoffman, K.L.**, and Heyl J.S. (2009) Compositional Freeze-out of Neutron Star Crusts: Canadian Astronomical Society Meeting, Toronto ON. [Also presented as a poster contribution at the High Energy Astrophysics Division meeting, Big Island Hawaii 2010 and American Astronomical Society Meeting, Washington DC 2010]
- *Poster:* **Hoffman, K.L.**, and Heyl, J.S. (2008) Neutron Star Crustal Mass Fractions. 40 years of Pulsars: Millisecond Pulsars, Magnetars and More, Montreal QC. [Also presented as a poster contribution at the Canadian Astronomical Society Meeting, Victoria, BC.]
- *Poster:* **Hoffman, K.L.**, Rutledge, R.E., Bildsten, L., Brown, E.F., Pavlov, G., and Zavlin, V. (2006) Radius Measurements of Aql X-1. In Heaven and on Earth 2006: The Nuclear Equation of State in Astrophysics, Montreal QC.
- *Talk:* **Hoffman, K.L.** (2006) Radius Measurements of Neutron Stars. OMM Rencontre Annuelle, Laval QC.
- *Poster:* **Hoffman, K.L.**, Rutledge, R.E., Bildsten, L., Brown, E.F., Pavlov, G., and Zavlin, V. (2005) XMM Observations of Aql X-1: American Astronomical Society Meeting #206, Minneapolis MN. [Also presented as a poster at the Canadian Astronomical Society Meeting, Montreal QC]
- *Talk:* **Hoffman, K.L.** (2005) XMM Observations of Aql X-1. OMM Rencontre Annuelle, Mont Gabriel QC.