

Curriculum Vitae

Jonas Lippuner

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Fluent languages English, German

Research interests **Physics:** computational astrophysics, nuclear astrophysics, nucleosynthesis, core-collapse supernovae, radiation transport
Coding: programming for GPUs and FPGAs, large-scale parallel simulations, machine learning techniques, automation
Finance: quantitative trading algorithms, automated trading systems, Monte Carlo methods, Bayesian belief networks, cryptocurrencies

Last updated May 1, 2018, [download Resume](#)

Current Positions

since Apr 2018

Scientist

CCS-2, Los Alamos National Laboratory, Los Alamos, New Mexico, USA
Computational astrophysics, computational fluid dynamics, code infrastructure development

Education

Oct 2012 – Jun 2017

Ph.D. in Physics

California Institute of Technology, Pasadena, California, USA
Thesis advisor: Dr. Christian Ott
Thesis: r-Process Nucleosynthesis in Neutron Star Mergers with the New Nuclear Reaction Network SkyNet [doi:10.7907/Z9V40SCS](https://doi.org/10.7907/Z9V40SCS)

Sep 2008 – May 2012

B.Sc. (Hons.) in Mathematics and Physics

University of Manitoba, Winnipeg, Manitoba, Canada
Governor General's Silver Medal (for highest academic standing at the undergraduate level)
University Gold Medal in Science (for highest academic standing at the undergraduate level in the Faculty of Science)

Aug 2003 – Jul 2007

Schweizerische Maturität [Swiss federal university entrance diploma]

2003 – 2005: Kantonsschule Frauenfeld, Frauenfeld, Switzerland
2005 – 2007: Kantonsschule am Burggraben, St. Gallen, Switzerland
Special subject: Physics and Applied Mathematics
Complementary subject: Chemistry
Senior thesis: Simulation of the solar system (~10,000-word thesis and 3D graphical simulation of the solar system)

Professional Education

Jul 2014 – Aug 2014 **International Summer School on AstroComputing (ISSAC)** (Neutrino and Nuclear Astrophysics), University of California High Performance AstroComputing Center (UC-HiPACC) and San Diego Supercomputer Center (SDSC), La Jolla, California

Previous Positions

- Sep 2017 – Apr 2018 **Postdoc Research Associate**
CCS-2, Los Alamos National Laboratory, Los Alamos, New Mexico, USA
Computational astrophysics, computational fluid dynamics, code infrastructure development
- Sep 2017 – Apr 2018 **CNLS Fellow**
Center for Nonlinear Studies, Los Alamos National Laboratory, Los Alamos, New Mexico, USA
- Jul 2017 – Aug 2017 **Postdoctoral Scholar**
California Institute of Technology, Pasadena, California
Nucleosynthesis in core-collapse supernovae
- Jan 2017 – Sep 2017 **Part-time Affiliate** (Supervisor: Dr. Walid Majid)
Deep Space Tracking Systems Group, Jet Propulsion Laboratory, Pasadena, California
Radio astronomy data processing pipelines
- Jun 2016 – Sep 2016 **JPL Graduate Fellow** (Supervisor: Dr. Walid Majid)
Deep Space Tracking Systems Group, Jet Propulsion Laboratory, Pasadena, California
Pulsar search algorithms and radio astronomy time series analysis with GPUs
- Jun 2015 – Sep 2015 **CUDA DevTech Intern** (Supervisor: Cliff Woolley)
NVIDIA Corporation, Santa Clara, California
MPI-style collective communication between multiple GPUs
- Summer 2012 **Summer Research Student** (Supervisor: Dr. Shaun Lui)
Department of Mathematics, University of Manitoba, Winnipeg
Numerical analysis of PDEs
- Summer 2011 **Summer Research Student** (Supervisor: Dr. Shaun Lui)
Department of Mathematics, University of Manitoba, Winnipeg
Numerical analysis of PDEs
- Summer 2010 **Summer Research Student** (Supervisor: Dr. Idris Elbakri)
Department of Medical Physics, CancerCare Manitoba, Winnipeg
Parallel Monte Carlo photon transport with GPUs
- Summer 2009 **Summer Research Student** (Supervisor: Dr. Idris Elbakri)
Department of Medical Physics, CancerCare Manitoba, Winnipeg
Analytic x-ray scattering simulations with GPUs
- Sep 2008 – Sep 2009 **Freelance Programmer** (Supervisor: Dr. Manfred Linke)
City Clerk's Office, St. Gallen, Switzerland
Software engineering, web and database development, documentation
- Oct 2007 – Aug 2008 **Intern** (Supervisor: Dr. Manfred Linke)
City Clerk's Office, St. Gallen, Switzerland
Software engineering, web and database development, project management

Honors & Prizes

- 2014 **Best Talk** (14th Annual Theoretical Astrophysics in Southern California (TASC) Meeting, University of California, San Diego (UCSD))
- 2012 **Governor General's Silver Medal**, University of Manitoba (awarded for academic excellence to the undergraduate who achieves the highest standing in a Bachelor degree program)
University Gold Medal in Science, University of Manitoba (for highest standing in undergraduate Science)
Allen Medal in Physics, University of Manitoba (for highest standing in the final two years of Honours Physics or Honours Physics and Mathematics)
Dean's Honour List, University of Manitoba
- 2011 **Dean's Honour List**, University of Manitoba
Best Entry in Physics and Astronomy (Faculty of Science Poster Competition 2011, University of Manitoba)
- 2010 **University 1 Honour List**, University of Manitoba
Second Place in the Category of Computational Physics (Canadian Undergraduate Physics Conference (CUPC) 2010)
ACEnet Computational Physics Award (Canadian Undergraduate Physics Conference (CUPC) 2010)
Best Presentation (Summer Student Symposium 2010, CancerCare Manitoba)
- 2009 **Honourable Mention** (Canadian Undergraduate Physics Conference (CUPC) 2009)

Professional Service & Volunteer Experience

- Nov 2017 – present **Deputy Coordinator** of seminar series at LANL
- Mar 2015 – May 2017 **President of Student Club** at Caltech
- Jul 2016 – Feb 2017 **Chair of Organizing Committee** for 2017 Veritas Forum at Caltech
- Oct 2015 – Feb 2016 **Chair of Organizing Committee** for 2016 Veritas Forum at Caltech
- Aug 2014 – Apr 2015 **Organizing Committee** for 2015 Veritas Forum at Caltech
- Nov 2014 – Mar 2015 **Organizing Committee** for 2015 JINA-CEE Frontiers in Nuclear Astrophysics Meeting
- Apr 2013 – Jun 2014 **Accounting and Tax Compliance** for non-profit organization

Teaching Experience

- Feb 2016 – Jun 2016 **Private Tutor** for Math
- Sep 2014 – Dec 2014 **Teaching Assistant** for Caltech Physics course Ph 236A: Relativity
- Sep 2013 – Dec 2013 **Teaching Assistant** for Caltech Physics course Ph 2A: Waves, Quantum Mechanics, and Statistical Physics
- Jan 2013 – Mar 2013 **Teaching Assistant** for Caltech Physics course Ph 2B: Waves, Quantum Mechanics, and Statistical Physics
- Sep 2012 – Dec 2012 **Teaching Assistant** for Caltech Physics course Ph 2A: Waves, Quantum Mechanics, and Statistical Physics
- 2005 – 2007 **Private Tutor** for Math and Physics

Publications

View my publications on [ADS](#) and [arXiv](#).

- [19] Côté, B., Fryer, C. L., Belczynski, K., Korobkin, O., Chruślińska, M., Vassh, N., Mumpower, M. R., Lippuner, J., Sprouse, T. M., Surman, R., and Wollaeger, R. (Mar 2018), **The Origin of r-process Elements in the Milky Way**, *ApJ* 855, 99 [[arXiv](#) | [ADS](#) | [DOI](#)]
- [18] Lippuner, J. and Roberts, L. F. (Dec 2017), **SkyNet: A Modular Nuclear Reaction Network Library**, *ApJS* 233, 18 [[arXiv](#) | [ADS](#) | [DOI](#)]
- [17] Mösta, P., Roberts, L. F., Halevi, G., Ott, C. D., Lippuner, J., Haas, R., and Schnetter, E. (Dec 2017), **R-process Nucleosynthesis from Three-Dimensional Magnetorotational Core-Collapse Supernovae**, *submitted to ApJ* [[arXiv](#) | [ADS](#)]
- [16] Lippuner, J., Fernández, R., Roberts, L. F., Foucart, F., Kasen, D., Metzger, B. D., and Ott, C. D. (Nov 2017), **Signatures of hypermassive neutron star lifetimes on r-process nucleosynthesis in the disc ejecta from neutron star mergers**, *MNRAS* 472, 904 [[arXiv](#) | [ADS](#) | [DOI](#)]
- [15] Fernández, R., Foucart, F., Kasen, D., Lippuner, J., Desai, D., and Roberts, L. F. (Aug 2017), **Dynamics, nucleosynthesis, and kilonova signature of black hole–neutron star merger ejecta**, *CQG* 34, 15, 154001 [[arXiv](#) | [ADS](#) | [DOI](#)]
- [14] Vlasov, A. D., Metzger, B. D., Lippuner, J., Roberts, L. F., and Thompson, T. A. (Jun 2017), **Neutrino-heated winds from millisecond protomagnetars as sources of the weak r-process**, *MNRAS* 468, 1522 [[arXiv](#) | [ADS](#) | [DOI](#)]
- [13] Kidder, L. E., Field, S. E., Foucart, F., Schnetter, E., Teukolsky, S. A., Bohn, A., Deppe, N., Diener, P., Hébert, F., Lippuner, J., Miller, J., Ott, C. D., Scheel, M. A., and Vincent, T. (Apr 2017), **SpECTRE: A task-based discontinuous Galerkin code for relativistic astrophysics**, *J. Comp. Phys.* 335, 84 [[arXiv](#) | [ADS](#) | [DOI](#)]
- [12] Roberts, L. F., Lippuner, J., Duez, M. D., Faber, J. A., Foucart, F., Lombardi, J. C., Jr., Ning, S., Ott, C. D., and Ponce, M. (Feb 2017), **The influence of neutrinos on r-process nucleosynthesis in the ejecta of black hole–neutron star mergers**, *MNRAS* 464, 3907 [[arXiv](#) | [ADS](#) | [DOI](#)]
- [11] Majid, W. A., Pearlman, A. B., Dobrova, T., Horiuchi, S., Kocz, J., Lippuner, J., and Prince, T. A. (Jan 2017), **Post-outburst Radio Observations of the High Magnetic Field Pulsar PSR J1119-6127**, *ApJL* 834, L2 [[arXiv](#) | [ADS](#) | [DOI](#)]
- [10] Radice, D., Galeazzi, F., Lippuner, J., Roberts, L. F., Ott, C. D., and Rezzolla, L. (Aug 2016), **Dynamical mass ejection from binary neutron star mergers**, *MNRAS* 460, 3255 [[arXiv](#) | [ADS](#) | [DOI](#)]

- [9] Haas, R., Ott, C. D., Szilágyi, B., Kaplan, J. D., Lippuner, J., Scheel, M. A., Barkett, K., Muhlberger, C. D., Dietrich, T., Duez, M. D., Foucart, F., Pfeiffer, H. P., Kidder, L. E., and Teukolsky, S. A. (Jun 2016), **Simulations of inspiraling and merging double neutron stars using the Spectral Einstein Code**, *Phys. Rev. D* 93, 12, 124062 [[arXiv](#) | [ADS](#) | [DOI](#)]
- [8] Barkett, K., Scheel, M. A., Haas, R., Ott, C. D., Bernuzzi, S., Brown, D. A., Szilágyi, B., Kaplan, J. D., Lippuner, J., Muhlberger, C. D., Foucart, F., and Duez, M. D. (Feb 2016), **Gravitational waveforms for neutron star binaries from binary black hole simulations**, *Phys. Rev. D* 93, 4, 044064 [[arXiv](#) | [ADS](#) | [DOI](#)]
- [7] Foucart, F., Haas, R., Duez, M. D., O'Connor, E., Ott, C. D., Roberts, L., Kidder, L. E., Lippuner, J., Pfeiffer, H. P., and Scheel, M. A. (Feb 2016), **Low mass binary neutron star mergers: Gravitational waves and neutrino emission**, *Phys. Rev. D* 93, 4, 044019 [[arXiv](#) | [ADS](#) | [DOI](#)]
- [6] Lippuner, J. and Roberts, L. F. (Dec 2015), **r-Process Lanthanide Production and Heating Rates in Kilonovae**, *ApJ* 815, 82 [[arXiv](#) | [ADS](#) | [DOI](#)]
- [5] Ingleby, H. R., Lippuner, J., Rickey, D. W., Li, Y., and Elbakri, I. A. (Mar 2015), **Fast analytical scatter estimation using graphics processing units**, *J. Xray. Sci. Technol.* 23, 119 [[DOI](#)]
- [4] Lippuner, J. and Elbakri, I. A. (Oct 2011), **A GPU implementation of EGSnrc's Monte Carlo photon transport for imaging applications**, *Phys. Med. Biol.* 56, 1745 [[DOI](#)]
- [3] Lippuner, J., Elbakri, I. A., Cui, C., and Ingleby, H. R. (Mar 2011), **Epp: A C++ EGSnrc user code for x-ray imaging and scattering simulations**, *Med. Phys.* 38, 1705 [[DOI](#)]
- [2] Cui, C., Lippuner, J., Ingleby, H. R., Di Valentino, D. N. M., and Elbakri, I. A. (Mar 2010), **Epp – A C++ EGSnrc user code for Monte Carlo simulation of radiation transport**, *Proc. SPIE* 7622, 762251 [[DOI](#)]
- [1] Lippuner, J. (Apr 2008), **Simulation des Sonnensystems**, in O. Keller, editor, *Zwischen Höhlenwelt und Planetensystem: Naturforschung und Naturprojekte in der Nordostschweiz*, number 91 in Berichte der St. Gallischen Naturwissenschaftlichen Gesellschaft, pages 411–415, Typotron AG, St. Gallen, Switzerland

Presentations

Invited

- Apr 2018 **The origin of heavy elements**, Astrophysics Informal Seminar, Institute for Advanced Study, Princeton
- Mar 2018 **r-Process nucleosynthesis in compact object mergers and GW170817**, Physics of Core-Collapse Supernova and Compact Star Formations, Waseda University, Tokyo, Japan
- Feb 2018 **The origin of heavy elements**, Los Alamos Astrophysics Distinguished Seminar Series, Los Alamos National Laboratory
- Feb 2018 **The origin of heavy elements**, Postdoc Seminar, Center for Nonlinear Studies (CNLS), Los Alamos National Laboratory
- Nov 2017 **Origin of the elements: r-process nucleosynthesis with SkyNet**, Community Education class, University of New Mexico – Los Alamos
- Aug 2017 **SkyNet: A new nuclear reaction network**, University of Basel, Basel, Switzerland
- Mar 2017 **The origin of heavy elements: r-process nucleosynthesis in neutron star mergers**, Renaissance Technologies, East Setauket, New York
- Dec 2016 **The origin of heavy elements: r-process nucleosynthesis in neutron star mergers**, Theorie Seminar, Technische Universität Darmstadt, Darmstadt, Germany

- Dec 2016 **The origin of heavy elements: r-process nucleosynthesis in neutron star mergers**, AstroCoffee, Goethe-Universität Frankfurt am Main, Frankfurt, Germany
- Dec 2016 **The origin of heavy elements: r-process nucleosynthesis in neutron star mergers**, T-2 Seminar, Los Alamos National Laboratory
- Nov 2016 **r-Process nucleosynthesis with SkyNet**, Nuclear Physics, Compact Stars, and Compact Star Mergers 2016, Yukawa Institute for Theoretical Physics, Kyoto University, Kyoto, Japan
- Sep 2016 **The origin of heavy elements: r-process nucleosynthesis in neutron star mergers**, 335 Section Seminar, Jet Propulsion Laboratory
- Jun 2016 **r-Process nucleosynthesis with SkyNet**, 2016 International Collaborations in Nuclear Theory (ICNT) Meeting, *The r-process nucleosynthesis: connecting FRIB with the cosmos*, Michigan State University (MSU)
- Feb 2016 **r-Process nucleosynthesis in neutron star mergers**, JINA-CEE Online MA2 Seminar
- Contributed
- Apr 2018 **SkyNet: An open-source reaction network for r-process nucleosynthesis**, APS April Meeting 2018 (American Physical Society), Columbus, Ohio
- July 2017 **r-Process nucleosynthesis in neutron star merger disk outflows**, MICRA 2017 (Microphysics in Computational Relativistic Astrophysics), Michigan State University (MSU)
- Feb 2017 **r-Process nucleosynthesis in neutron star merger disk outflows**, 2017 JINA-CEE Frontiers in Nuclear Astrophysics Meeting, Michigan State University (MSU)
- Jan 2017 **r-Process nucleosynthesis in neutron star merger disk outflows**, APS April Meeting 2017 (American Physical Society), Washington, District of Columbia
- Apr 2016 **Influence of neutrinos on r-process nucleosynthesis in black hole–neutron star mergers**, APS April Meeting 2016 (American Physical Society), Salt Lake City, Utah
- Mar 2016 **Influence of neutrinos on r-process nucleosynthesis in black hole–neutron star mergers**, 2016 JINA-CEE Frontiers in Nuclear Astrophysics Meeting, University of Notre Dame
- Nov 2015 **Parameter study of r-process lanthanide production and heating rates in kilonovae with SkyNet**, 15th Annual Theoretical Astrophysics in Southern California (TASC) Meeting, California State University, Fullerton (CSUF)
- Aug 2015 **Parameter study of r-process lanthanide production and heating rates in kilonovae with SkyNet**, MICRA 2015 (Workshop on Microphysics In Computational Relativistic Astrophysics), Stockholm, Sweden
- Apr 2015 **Parameter study of r-process lanthanide production and heating rates in kilonovae**, APS April Meeting 2015 (American Physical Society), Baltimore, Maryland
- Mar 2015 **Parameter study of r-process lanthanide production and heating rates in kilonovae**, 2015 JINA-CEE Frontiers in Nuclear Astrophysics Meeting, Michigan State University (MSU)
- Feb 2015 **R-Process Nucleosynthesis with SkyNet**, Perimeter Institute for Theoretical Physics, Waterloo, Ontario, Canada

- Nov 2014 **R-Process Nucleosynthesis with SkyNet**, 14th Annual Theoretical Astrophysics in Southern California (TASC) Meeting, University of California, San Diego (UCSD) (awarded Best Talk)
- May 2011 **Accelerating Monte Carlo Photon Transport Using Massively Parallel GPUs**, Faculty of Science Poster Competition 2011, University of Manitoba, Winnipeg (judged Best Entry in Physics and Astronomy)
- Oct 2010 **Monte Carlo Photon Transport Mechanism of EGSnrc in a Voxelized Volume Using Massively Parallel GPUs**, Canadian Undergraduate Physics Conference (CUPC) 2010, Halifax, Nova Scotia, Canada (awarded Second Place in the Category of Computational Physics and ACEnet Computational Physics Award)
- Aug 2010 **Monte Carlo Photon Transport Mechanism of EGSnrc in a Voxelized Volume Using Massively Parallel GPUs**, Summer Student Symposium 2010, CancerCare Manitoba, Winnipeg (judged Best Presentation)
- Feb 2010 **Epp – A C++ EGSnrc User Code for Monte Carlo Simulation of Radiation Transport**, SPIE Medical Imaging 2010, San Diego, California
- Oct 2009 **Analytical X-Ray Scattering Estimation with CUDA**, Canadian Undergraduate Physics Conference (CUPC) 2009, Edmonton, Alberta, Canada (Honourable Mention)

Awards & Fellowships

- 2017 **CNLS Fellowship**, Center for Nonlinear Studies, Los Alamos National Laboratory
DAP Student Travel Grant, Division of Astrophysics (DAP), American Physical Society (APS)
Travel award, Joint Institute for Astrophysics (JINA)
- 2016 **JPL Graduate Fellowship**, NASA Jet Propulsion Laboratory
Groce Travel Grant, California Institute of Technology
DNP Student Travel Grant, Division of Nuclear Physics (DNP), American Physical Society (APS)
Local Support, Joint Institute for Astrophysics (JINA)
- 2015 **DAP Student Travel Grant**, Division of Astrophysics (DAP), American Physical Society (APS)
Local Support, Joint Institute for Astrophysics (JINA)
Groce Travel Grant, California Institute of Technology
- 2014 **Local Support**, University of California High Performance AstroComputing Center (UC-HiPACC)

University of Manitoba

- for 2011 – 2012 **Isbister Scholarship in Science** (for highest standing, any year except the graduating year in Science)
Robert Ross McLaughlin Scholarship in Mathematics (for a full-time student who has achieved the highest standing in the third year of any Mathematics Honours program)
David E. Dobbs Scholarship in Mathematics (for highest standing in required and recommended third year Honours Mathematics courses)

University of Manitoba (continued)

for 2011 – 2012
(continued)

Samuel M. Neamtan Memorial Scholarship (for high standing in Third Year Honours Physics, with special merit in the area of Theoretical Physics)

UMSU Scholarship (for excellence in academic achievement at the University of Manitoba)

International Undergraduate Student Scholarship (for international students registered full-time in any Faculty or School at the University of Manitoba who have a record of exceptional academic achievement on courses completed in the last regular academic session)

Faculty of Science Undergraduate Summer Research Award

for 2010 – 2011

Isbister Scholarship in Science (for highest standing, any year except the graduating year in Science)

Dr. Maxwell S. Rady Scholarship (for highest standing in Second Year Science, General or Honours)

Dr. Diane Dowling Memorial Scholarship (for highest standing in Second Year Science, General or Honours)

Honours Mathematics Award (for completion of the second year of the Honours Mathematics program, either the Joint or Single Honours, with the highest academic standing among all students who have completed the same program)

H.L. Verrall Family Scholarship in Physics (for full-time students who have completed their second year of study in an Honours Physics program and have achieved the highest and second highest cumulative grade point averages among all eligible students entering third year Honours Physics)

Diane Dowling Memorial Scholarship (for academic achievement in Mathematics)

Honours Physics Class of 1986 CUPC Prize (for full-time or part-time students at the University of Manitoba who attend the CUPC to present a paper or a poster and win an award, whether it be a 1st, 2nd or 3rd place award, an Honourable Mention or a Special Note)

UMSU Scholarship (for excellence in academic achievement at the University of Manitoba)

International Undergraduate Student Scholarship (for international students registered full-time in any Faculty or School at the University of Manitoba who have a record of exceptional academic achievement on courses completed in the last regular academic session)

Faculty of Science Undergraduate Summer Research Award

for 2009 – 2010

Isbister Scholarship in University 1 (for highest standing in University 1 and continuation in any degree program at the University of Manitoba)

C.P. Loewen Family Foundation Scholarship in Physics (for a full-time student who has completed at least one year of study at the University of Manitoba and enters the Honours or Major program in the Department of Physics with the highest academic standing among all eligible students)

Centennial Scholarship in Physics (for full-time students who have completed at least one year of full-time study with high academic standing and enter or continue in a Honours program in the Department of Physics and Astronomy)

Harold R. Coish Memorial Scholarship (for highest standing in PHYS 1050 and 1070)

University of Manitoba (continued)

for 2009 – 2010
(continued)

Honours Physics Class of 1986 CUPC Prize (for full-time or part-time students at the University of Manitoba who attend the CUPC to present a paper or a poster and win an award, whether it be a 1st, 2nd or 3rd place award, an Honourable Mention or a Special Note)

UMSU Scholarship (for excellence in academic achievement at the University of Manitoba)

International Undergraduate Student Scholarship (for international students registered full-time in any Faculty or School at the University of Manitoba who have a record of exceptional academic achievement on courses completed in the last regular academic session)

for 2008–2009

International Undergraduate Student Entrance Scholarship (for international high school graduates entering Canada on study permits who have been admitted to University 1 or the Faculty of Engineering at the University of Manitoba with a minimum 85% average on courses used for admission)