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| CONTACT INFORMATION | Performance Engineer National Center for Computational Sciences Oak Ridge National Laboratory P.O. Box 2008, MS-6016 Oak Ridge, TN 37831, USA | <i>Office:</i> +1-865-341-1415 <i>Fax:</i> +1-865-241-8484 <i>E-mail:</i> harrisja@ornl.gov |
| RESEARCH INTERESTS | <p>Nuclear Astrophysics: supernova ejecta and nucleosynthesis, core-collapse supernova explosion mechanism, formation and evolution of massive stars</p> <p>Computational Astrophysics: nuclear reaction kinetics, spectral neutrino transport, astrophysical fluid dynamics</p> <p>High-Performance Computing: hybrid architectures, code optimization and parallelization, computational strategies for exascale</p> | |
| EDUCATION | <p>The University of Tennessee, Knoxville, TN</p> <p>Ph.D. in Physics, Department of Physics & Astronomy August 2015</p> <ul style="list-style-type: none"> • Thesis title: <i>Nucleosynthesis in Self-Consistent Core-Collapse Supernova Models using Multidimensional Chimera Simulations</i> • Thesis committee: Dr. William “Raph” Hix (adviser), Dr. O. E. “Bronson” Messer, Dr. Michael W. Guidry, Dr. Thomas Papenbrock, Dr. Jack Dongarra • Area of study: Nuclear and computational Astrophysics • Interdisciplinary Graduate Minor in Computational Science <p>M.S. in Physics, Department of Physics & Astronomy July 2012</p> <p>Murray State University, Murray, KY</p> <p>B.S. in Engineering Physics, Department of Engineering and Physics May 2009</p> <ul style="list-style-type: none"> • <i>Summa Cum Laude</i> • Second major in Mathematics & Statistics | |
| PROFESSIONAL EXPERIENCE | <p>Performance Engineer January 2019 to present Scientific Computing Group, National Center for Computational Sciences, Oak Ridge National Laboratory</p> <ul style="list-style-type: none"> • Exascale Computing Project (ECP): <ul style="list-style-type: none"> ◦ <i>Exascale Models of Stellar Explosions: Quintessential Multi-Physics Simulation</i> ◦ PI: Dr. Daniel N. Kasen <p>Postdoctoral Research Associate April 2017 to December 2018 Scientific Computing Group, National Center for Computational Sciences, Oak Ridge National Laboratory</p> <ul style="list-style-type: none"> • Supervisor: Dr. Judith Hill • Mentor: Dr. O. E. “Bronson” Messer • Center for Accelerated Application Readiness (CAAR) project: <ul style="list-style-type: none"> ◦ <i>Using FLASH for Astrophysics Simulations at an Unprecedented Scale</i> ◦ PI: Dr. O. E. “Bronson” Messer ◦ Utilize GPUs in the FLASH supernova code to enable increased physical fidelity and connect core-collapse supernova simulations to observational signatures • Exascale Computing Project (ECP): <ul style="list-style-type: none"> ◦ <i>Exascale Models of Stellar Explosions: Quintessential Multi-Physics Simulation</i> ◦ PI: Dr. Daniel N. Kasen ◦ Develop and implement shared multi-physics interfaces for FLASH5 | |

- Postdoctoral Research Fellow** September 2015 to April 2017
 Nuclear Science Division, Lawrence Berkeley National Laboratory
- Supervisors: Dr. Daniel N. Kasen, Dr. Wick C. Haxton
 - Exascale Computing Project (ECP):
 - *Exascale Models of Stellar Explosions: Quintessential Multi-Physics Simulation*
 - PI: Dr. Daniel N. Kasen
 - Develop new software ecosystem to exploit exascale systems to provide ground-breaking simulations of stellar explosions
 - Establish framework for extending supernova simulations with multiple codes
 - Effects of mass loss on supernova progenitor structure and explosion dynamics
- Graduate Research Assistant** January 2011 to August 2015
 Department of Physics & Astronomy, University of Tennessee
- Supervisors: Dr. William “Raph” Hix (August 2013–August 2015), Dr. O. E. “Bronson” Messer (May 2012–July 2013), Dr. Michael W. Guidry (January 2011–April 2012)
 - Core-collapse supernova nucleosynthesis
- Graduate Teaching Assistant** August 2009 to May 2013
 Department of Physics & Astronomy, University of Tennessee
- Supervisor: Dr. James E. Parks
 - *Physics Tutor* for introductory physics courses
 - *Lab Instructor*
 - *Grader* for PHYS 573: Numerical Methods in Physics
 - *Guest Lecturer* for PHYS 615: Astrophysics and Cosmology

SELECTED
 REFEREED
 PUBLICATIONS

- [1] Laiu, M. P., Endeve, E., Chu, R., **Harris, J. A.**, Messer, O. E. B. tornado-transport: Anderson- and GPU-accelerated nonlinear solvers for neutrino-matter coupling. *Journal of Physics: Conference Series*, 1623, 012013, 2020. doi:10.1088/1742-6596/1623/1/012013
- [2] Mezzacappa, A., Marronetti, P., Landfield, R. E., Lentz, E. J., Yakunin, K. N., Bruenn, S. W., Hix, W. R., Messer, O. E., Endeve, E., Blondin, J. M., **Harris, J. A.** Gravitational wave signature of a core-collapse supernova explosion of a 15 M_{\odot} star. *Physical Review D*, 102, 023027, 2020. doi:10.1103/PhysRevD.102.023027
- [3] Luo, L., Straatsma, T. P., Suarez, L. E. A., Broer, R., Bykov, D., D’Azevedo, E. F., Faraji, S. S., Gottiparthi, K. C., De Graaf, C., **Harris, J. A.**, Havenith, R. W. A., Jensen, H. J. A., Joubert, W., Kathir, R. K., Larkin, J., Li, Y. W., Lyakh, D. I., Messer, O. E., B., Norman, M. R., Oefelein, J. C., Sankaran, R., Tillack, A. F., Barnes, A. L., Visscher, L., Wells, J. C., Wibowo, M. Pre-exascale accelerated application development: The ORNL Summit experience. *IBM Journal of Research & Development*, 64, 11, 2020. doi:10.1147/JRD.2020.2965881
- [4] Bruenn, S. W., Blondin, J. M., Hix, W. R., Lentz, E. J., Messer, O. E. B., Mezzacappa, A., Endeve, E., **Harris, J. A.**, Marronetti, P., Budiardja, R. D., Chertkow, M. A., Lee, C. -T. Chimera: A massively parallel code for core-collapse supernova simulation. *Astrophysical Journal Supplement* 248, 11, 2020. doi:10.3847/1538-4365/ab7aff
- [5] Dubey, A., Chawdhary, S., **Harris, J. A.**, Messer, O. E. B. Simulation Planning Using Component Based Cost Model. In: *2019 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*, Rio De Janeiro, Brazil, May 20–24, 2019. doi:10.1109/IPDPSW.2019.00116
- [6] **Harris, J. A.**, Hix, W. R., Chertkow, M. A., Lee, C. -T., Lentz, E. J., Messer, O. E. B. Implications for Post-Processing Nucleosynthesis of Core-Collapse Supernova Models with Lagrangian Particles. *Astrophysical Journal* 843, 2, 2017. doi:10.3847/1538-4357/aa76de

- [7] Hix, W. R., **Harris, J. A.** The Multidimensional Character of Nucleosynthesis in Core-Collapse Supernovae. *Handbook of Supernovae*, 2016. doi:10.1007/978-3-319-20794-0_77-1
- [8] Bruenn, S. W., Lentz, E. J., Hix, W. R., Mezzacappa, A., **Harris, J. A.**, Messer, O. E. B., Endeve, E., Blondin, J. M., Chertkow, M. A., Lingerfelt, E. J., Marronetti, P., Yakunin, K. N. Development of Explosions in Axisymmetric Ab Initio Core-Collapse Supernova Simulations of 12-25 M_{\odot} Stars. *Astrophysical Journal*, 818, 123, 2016. doi:10.3847/0004-637X/818/2/123
- [9] Lentz, E. J., Bruenn, S. W., Hix, W. R., Mezzacappa, A., Messer, O. E. B., Endeve, E., Blondin, J. M., **Harris, J. A.**, Blondin, J. M., Marronetti, P., Yakunin, K. N. Three-dimensional Core-collapse Supernova Simulated Using a 15 M_{\odot} Progenitor. *Astrophysical Journal Letters*, 807, L31, 2015. doi:10.1088/2041-8205/807/2/L31
- [10] **Harris, J. A.**, Hix, W. R., Chertkow, M. A., Bruenn, S. W., Lentz, E. J., Messer, O. E. B., Mezzacappa, A., Blondin, J. M., Marronetti, P., Yakunin, K. N. Advancing Nucleosynthesis in Self-consistent, Multidimensional Models of Core-Collapse Supernovae. In: *Proceedings of the 13th Symposium on Nuclei in the Cosmos (NIC 2014)*, Debrecen, Hungary, July 7–11, 2014. PoS(NIC XIII)099
- [11] Dong, T., Haidar, A., Luszczek, P., **Harris, J. A.**, Tomov, S., Dongarra, J. LU Factorization of Small Matrices: Accelerating Batched DGETRF on the GPU. In: *Proceedings of the 16th IEEE International Conference on High Performance Computing and Communications (HPCC 2014)*, Paris, France, August 20–22, 2014. *High Performance Computing and Communications*, 157, 2014. doi:10.1109/HPCC.2014.30
- [12] Guidry, M. W. and **Harris, J. A.** Explicit Integration of Extremely-Stiff Reaction Networks: Quasi-Steady-State Methods. *Computational Science & Discovery*, 6, 015002, 2013. doi:10.1088/1749-4699/6/1/015002
- [13] Messer, O. E. B., **Harris, J. A.**, Parete-Koon, S., Chertkow, M. A. Multicore and Accelerator Development for a Leadership-Class Stellar Astrophysics Code. In: *Proceedings of the 11th International Conference on Applied Parallel and Scientific Computing (PARA 2012)*, Helsinki, Finland, June 10–13, 2012. *Lecture Notes in Computer Science*, 7782, 92, 2013. doi:10.1007/978-3-642-36803-5_6