Ryan Sandberg

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EDUCATION

University of Michigan   **Ann Arbor, MI**
PhD in Applied and Interdisciplinary Mathematics and Scientific Computing   *December 2021(Expected)*
Advisors:
Robert Krasny (Mathematics)
Alexander G.R. Thomas (Nuclear Engineering and Radiological Sciences)

Brigham Young University   **Provo, UT**
MS in Mathematics   *July 2015*
Advisor: Tyler Jarvis

Brigham Young University   **Provo, UT**
BS in Physics, Magna Cum Laude, Minor in Chemistry and Mathematics   *April 2013*
Advisor: Justin Peatross

RESEARCH

Research Assistant: computational plasma physics   **UM**
Lagrangian methods, modeling and simulation of laser-plasma interactions   *Jan 2018 – December 2021*

- Performed computational modeling of tunable x-ray sources via laser-plasma interactions
- Developed adaptively refined semi-Lagrangian particle method for regularized integral form of Vlasov-Poisson system incorporating a treecode on GPU

Research Assistant: abstract algebra   **BYU**
Mirror symmetry of Landau-Ginsberg models   *Feb 2014 – June 2015*

- Constructed nonabelian B model algebras

Research Assistant: visualization and modeling   **BYU**
Computational study of relativistic electron wave packet in intense laser field   *May 2011 – Aug 2013*

PUBLICATIONS

- (in preparation) "Phase matched plasma wakefield photon acceleration," R.T. Sandberg and A.G.R. Thomas.
- (in preparation) "FARRSIGHT: A Forward Adaptively Refined and Regularized Semi-Lagrangian Integral GPU- and Hierarchical Tree-code-accelerated method for the Vlasov-Poisson system," R.T. Sandberg, A.G.R. Thomas, R. Krasny.
- (under review, Phys. Rev. Lett.) "Characterisation of Laser Wakefield Acceleration Efficiency with Octave Spanning Near-IR Spectrum Measurements", Streeter et al.
- "A Nonabelian Landau-Ginzburg B-model Construction," Master's Thesis, December 2015.
- "Radiation from free electrons in a laser focus at 10^{18} W/cm^2: modeling of photon yields and required focal conditions," G. Tarbox, E. Cunningham, R. Sandberg, J. Peatross, and M. J. Ware, JOSA B, May 2015.

PRESENTATIONS

- "FARRSIGHT: A Forward Adaptively refined and Regularized Semi-Lagrangian Integral GPU- and Hierarchical Tree-code accelerated method for the Vlasov-Poisson system," R. Sandberg, A.G.R.

Thomas, R. Krasny. SIAM CSE, March 2021.

- "FARRSIGHT: A Forward Adaptively Refined and Regularized Semi-Lagrangian Integral Green's function Hierarchical Tree-code accelerated method for the Vlasov-Poisson system," R. Sandberg, A.G.R. Thomas, R. Krasny. APS DPP, November 2020.
- "Finite-size particle effects on wave breaking limits," poster, R. Sandberg, A.G.R. Thomas, R. Krasny. APS DPP, Ft Lauderdale, Florida. October 2019.
- "How to create superheroes with 1d plasma simulation: plasma waves, wave breaking, and particle acceleration," student applied math seminar, University of Michigan, February 2019.
- "Particle Method for the Vlasov-Poisson System," poster, R. Sandberg, A.G.R. Thomas, R. Krasny. APS DPP, Portland, Oregon. November 2018.
- "Comparing Chains to Other Polynomials to Better Understand Mirror Symmetry," J. Gardiner and R. Sandberg. MAA Intermountain Section, UVU, Orem, UT. March 2014.
- "Creating a Classical Model for Helium in a Strong Laser Field: A Model for a Free Electron," R. Sandberg, G. Tarbox, J. Peatross, and M. Ware. American Physical Society: Four Corners Meeting, New Mexico Tech, NM. Oct. 2012.

AWARDS

- Michigan Institute for Computational Discovery and Exploration (MICDE) Graduate Fellow, September 2020.

SKILLS, COURSES, CERTIFICATIONS

- Proficiency in C++, Python, and MATLAB
- Experience with OpenMP, OpenACC, CUDA and MPI
- NVIDIA Deep Learning Institute, Fundamentals of Accelerated Computing with CUDA C/C++, October 2020.
- US Particle Accelerator School on Plasma-based acceleration, San Diego, January 2020.
- CERN Accelerator School on high gradient wakefield accelerators, March 11-22 2019.
- Member of the American Physical Society, Division of Plasma Physics, the Society of Industrial and Applied Mathematicians, and the American Mathematical Society

REFERENCES

- Alec Thomas
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- Robert Krasny
  📞 (734)-763-3505   ✉ krasny@umich.edu
- Brendan Kochunas
  📞 (734) 763-3867   ✉ bkochuna@umich.edu
- Karl Krushelnick
  📞 (734) 763-4877   ✉ kmkr@umich.edu