Wyatt Brege

Astrophysics ⋆ Numerical Relativity ⋆ Python ⋆ C++ ⋆ Git

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QUALIFICATIONS SUMMARY

- Worked with a large, collaborative driven code base
- Strong high level math and physics background
- Deep experience with Linux, version control systems and solving systems of differential equations

TECHNICAL SKILLS

- **Math and Physics Specialties**: Mechanics, Hydrodynamics, Gravitation, Differential Equations, Numerical Algorithms
- **Programming Languages**: Python and Sage, C++, Fortran, PHP, Bash

PROFESSIONAL EXPERIENCE

May. 2013 - present   **Graduate Research Assistant**, *Physics and Astronomy, Washington State University*, PO Box 642814, Pullman, WA 99164-2814.
- Implemented a high order accurate finite differencing scheme for use in high spin black hole-neutron star mergers and accretion disk simulations
- Completing a nuclear theory based neutron star Equation of State survey for black hole-neutron star mergers
- Technologies got to work on: C++, Spectral Einstein Code (SpEC)

Aug. 2010 - Dec. 2014   **Graduate Teaching Assistant**, *Physics and Astronomy, Washington State University*, PO Box 642814, Pullman, WA 99164-2814.
- ASTR 135 Laboratory, Astronomy, Fall 2010, Spring 2012
- PHYS 101 Laboratory, General Physics I, Fall 2011, Fall 2012, Fall 2014
- PHYS 102 Laboratory, General Physics II, Spring 2013
- PHYS 201 Laboratory, Physics for Scientists and Engineers I, Spring 2011, Summer 2012
- PHYS 202 Laboratory, Physics for Scientists and Engineers II, Fall 2012

Jun. 2005 - Jul. 2010   **Chef**, *One Trick Pony Grill and Taproom*, 136 Fulton St E, Grand Rapids, MI 49503.
- cooking, menu editing, recipes, scheduling, ordering, catering, management, customer correspondence

EDUCATION

2017   **PhD, Physics**, *Washington State University, Pullman, WA.*

2010   **Bachelor of Science, Mathematics**, *Grand Valley State University, Allendale, MI.*

2010   **Bachelor of Science, Physics**, *Grand Valley State University, Allendale, MI.*

ACADEMIC ACHIEVEMENTS

- NASA Space Grant, 2015, 2016 and 2017
- Graduate Assistance in Areas of National Need (GAANN) fellowship, 2010-2011 and 2011-2012
- Science, Mathematics, And Research for Transformation (SMART) scholarship, 2009-2010

- Outstanding Student Acheivment Award, GVSU Mathematics Department, 2009

Research Experience

May 2013 - 2017
Black hole-neutron star mergers and accretion disk simulations, *Washington State University, SXS collaboration.*
- evolved black hole-neutron star systems in SpEC with adaptive mesh refinement and nuclear-theory based equations of state
- implemented a high-order accurate finite difference scheme with boundary closures to solve the fluid equations of an accretion disk on a multipatch grid structure

May 2010 - Aug 2010
Generalized uncertainty principle and minimal length, *Grand Valley State University.*
- determined new connections between polymer quantum mechanics and minimal length

Aug 2009 - May 2010
Motion in two-center gravitational systems, *Grand Valley State University.*
- implemented Gragg extrapolation to evolve Hamilton's equations for a three-body gravitational system
- demonstrated the chaotic behavior of particle trajectories around generic rotating binary systems
- completion of Physics senior thesis

Aug 2009 - Dec 2009
Quasicrystals, tilings and diffraction patterns, *Grand Valley State University.*
- studied the atomic structure of aperiodic tiles
- completion of Mathematics senior thesis

May 2009 - Aug 2009
Symmetry analysis of differential equations, *University of Central Florida.*
- determined the underlining symmetries of the Lane-Emden equation
- participated in the UCF combined math and physics Research Experience for Undergrads

Publications

- Foucart, F., Desai, D., **Brege, W.**, Duez, M.D. 4, Kasen, D., Hemberger, D.A., Kidder, L.E., Pfeiffer, H.P., Scheel, M.A., *Dynamical ejecta from precessing neutron star-black hole mergers with a hot, nuclear-theory based equation of state (Pre-print)* arXiv:1611.01159, November 3, 2016

Contributed Talks

- **Brege, W.**, Foucart, F., Duez, M.D., *Equation of state survey of black hole-neutron star mergers* APS April Meeting, April 16 2016, BAPS.2016.APR.C14.3

- **Brege, W.**, Duez, M.D., *A high order accurate finite difference scheme with boundary closures for astrophysical simulations* Northwest APS Meeting, May 16 2015, BAPS.2015.NWS.E6.6

- **Brege, W.**, Duez, M.D., *A stable high-order multipatch method for black hole accretion simulations* APS April Meeting, April 12 2015, BAPS.2015.APR.K13.9

- **Brege, W.**, Bolen, B., *Polymer quantum mechanics and an approach to minimal length (Poster)* 19th International Conference on General Relativity and Gravitation (GR19), 06 July 2010

- **Brege, W.**, Brennan, J., *Symmetry Analysis and the Lane-Emden Equation* 2009 Undergraduate Symposium at Argonne National Labs, Argonne, IL, 13 November 2009

- **Brege, W.**, Brennan, J., *Symmetry Analysis of the Lane-Emden Equation* MathFest 2009, Portland, OR, 07 August 2009

MEMBERSHIPS

- SXS Collaboration, member 2013-present
- American Physical Society, member 2009-present
- Mathematical Association of America, member 2009-present
- Omikron Delta Kappa, member 2010-present
- Society of Physics Students (SPS), member 2009-present
- Pi Mu Epsilon (Iota chapter), member 2009-2010