

CONTACT INFORMATION:

Department of Physics and Astronomy
The Johns Hopkins University
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Baltimore, MD 21218
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RESEARCH INTERESTS:

Relativistic astrophysics
General relativistic magnetohydrodynamics
High-performance computing
Simulations of compact binaries, accretion disks, and related phenomena

EDUCATION:

University of North Carolina at Chapel Hill, Ph.D., Physics, 2012
Thesis: Tidal Disruption of a Star By a Massive Black Hole
Computed In Fermi Normal Coordinates (Advisor: Charles R. Evans)
University of Louisville, B.S., Physics, 2005

RESEARCH EXPERIENCE:

2014- Assistant Research Scientist,
 Center for Astrophysical Sciences, Johns Hopkins University
 General relativistic magnetohydrodynamic simulations of stellar tidal
 disruptions of a star by a black hole.
 Developer of numerical tool known as the **Multipatch code** applicable
 to a broad range of astrophysical fluid problems

2012-2014 Postdoctoral Fellow,
 Center for Relativistic Astrophysics, Georgia Institute of Technology
 Examined relativistic effects in stellar disruptions (main sequence stars
 and white dwarfs) by black holes using relativistic hydrodynamics
 simulations with the **FNC code**

2005-2012 Graduate Student,
 University of North Carolina at Chapel Hill
 Developed numerical tool known as the **FNC code** to simulate
 relativistic tidal encounters between stars and black holes in the local
 frame of the star

PUBLICATIONS:

5. Piran, T., Svirski, G., Krolik, J.H., Cheng, R.M., Shiokawa, H. “*Circularization*” vs. *Accretion – What Powers Tidal Disruption Events?*. ApJ, 806, 164 (2015).
arXiv:1502.05792
4. Shiokawa, H., Krolik, J.H., Cheng, R.M., Piran, T., Noble, S.C., “*General Relativistic Hydrodynamic Simulation of Accretion Flow from a Stellar Tidal Disruption*”. ApJ, 804, 2, 85 (2015). arXiv:1501.04365
3. Cheng, R.M., Bogdanović, T. *Tidal disruption of a star in the Schwarzschild spacetime: Relativistic effects in the return rate of debris*. Phys. Rev. D 90, 064020 (2014). arXiv:1407.3266

2. Bogdanović, T., Cheng, R.M., Amaro-Seoane, Pau. *Disruption of a Red Giant Star by a Supermassive Black Hole and the Case of PS1-10jh*. ApJ, 788, 99 (2014).
arXiv:1307.6176
1. Cheng, R.M., Evans, C.R., *Relativistic effects in the tidal interaction between a white dwarf and a massive black hole in Fermi normal coordinates*. Phys. Rev. D 87, 104010 (2013) arXiv:1303.4129

HONORS:

UNC-Chapel Hill Paul Shearin Graduate Student Award, 2012
UNC-Chapel Hill Physics & Astronomy Graduate Teaching Award, 2012
UNC-Chapel Hill Graduate School Dissertation Completion Fellowship 2011-2012
North Carolina Space Grant, Graduate Research Fellowship, 2011-2012
North Carolina Space Grant, UNC award, Summer 2011
Graduate Assistance in Areas of National Need Fellowship,
Spring/Summer 2010, Spring 2011
Bennett Award, Physics Department, University of Louisville, 2005
Sigma Pi Sigma, Physics honor society member, 2005
Barry M. Goldwater Scholar, 2001

PROFESSIONAL ACTIVITIES:

Referee for The Astrophysical Journal
Referee for Monthly Notices of the Royal Astronomical Society
2012- Junior Member, American Physical Society
Topical Group on Gravitation
Division of Astrophysics
2014- Weekly journal club moderator
Center for Astrophysical Sciences, Johns Hopkins University
2012-2014 Weekly journal club moderator, "Cosmic Coffee"
Center for Relativistic Astrophysics, Georgia Institute of Technology
Session Chair, APS April Meeting 2014

INVITED TALKS:

- *The Accretion Problem in Tidal Disruption Events*,
Theory Lunch Seminar, University of Maryland – College Park, March 2, 2015
- *Circularization of Stellar Tidal Disruption Debris*,
CAS Wine and Cheese Seminars, Johns Hopkins University, October 20, 2014
- *The Fate of Debris for a Tidally Disrupted Star*,
Texas Symposium on Relativistic Astrophysics: Dallas, TX, December 10, 2013
- *The tidal disruption process for a white dwarf and a massive black hole*,
Astrophysics Lunch, Cornell University, October 16, 2013
- *The tidal disruption process for a white dwarf and a massive black hole*,
Rochester Institute of Technology, October 14, 2013

INVITED PROGRAMS:

- *A Universe of Black Holes*, Kavli Institute for Theoretical Physics at the University of California, Santa Barbara, July 15 - Aug 9, 2013.

TALKS:

- *Simulations of Tidal Disruption to Disk Formation*, Jerusalem Tidal Disruption Events Workshop, The Hebrew University of Jerusalem, November 2-5, 2015
- *Circularization of Stellar Tidal Disruption Debris* *Black Holes in Dense Star Clusters*, Aspen Center for Physics, January 17-21, 2015
- *Circularization of Stellar Tidal Disruption Debris* GSFC-JHU Interaction Day, Johns Hopkins University, November 21, 2014
- *Tidal disruption process for a Newtonian star and non-spinning black hole*, American Physical Society, April Meeting 2014, Savannah, Georgia
- *The tidal disruption process for a white dwarf and a massive black hole*, CRA seminar, Georgia Tech., October 9, 2013
- *The tidal disruption process for a white dwarf and a massive black hole*, poster, *Massive Black Holes: Birth, Growth and Impact* conference at KITP, Aug 5 - 9, 2013
- *Tidal disruption of a star by a massive black hole: the fate of the debris*, American Physical Society, April Meeting 2013, Denver, Colorado
- *Tidal Disruption of a Star By a Massive Black Hole Computed In Fermi Normal Coordinates*, *SnowPAC 2013: Black Hole Fingerprints: Dynamics, Disruptions and Demographics*, March 17-22, 2013
- *Tidal Disruption of a Star By a Massive Black Hole Computed In Fermi Normal Coordinates*, CRA seminar, Georgia Tech., Nov. 1, 2012
- *Tidal Disruption of a Star By a Massive Black Hole Computed In Fermi Normal Coordinates*, Thesis defense, UNC-Chapel Hill, NC, May 7, 2012
- *Relativistic effects in the tidal interaction between a white dwarf and a massive black hole in Fermi normal coordinates*, American Physical Society, April Meeting 2012
- *Stellar tidal encounters with a massive black hole*. 21th Midwest Gravity Meeting, Urbana-Champaign, IL, Nov. 4-5, 2011
- *Stellar tidal encounters with a massive black hole*. 14th Eastern Gravity Meeting, Princeton, NJ, June 2-3, 2011
- *A numerical method for modeling tidal disruption of stars by a massive black hole*, poster, *Ins and Outs of Black Holes Conference*, Annapolis, MD, Nov. 15-17, 2010
- *PPMLR Hydrodynamics*, UNC-Chapel Hill Astrophysics Group, September 2010
- *Self-gravity on the Yin-Yang Mesh*, NC State Astrophysics Group, September 2009
- *Tidal Disruption by a Supermassive Black Hole*, North Carolina State University Astrophysics Group, July 2009
- *Tidal Disruption by a Supermassive Black Hole*, UNC-Chapel Hill Graduate Seminar, October 2008

COMPUTER SKILLS:

Operating Systems: Linux/Unix/Mac/Windows

Languages: C (MPI), Fortran 77/90/95 (MPI), Bash, Perl, Python

Software: Mathematica, Matlab

TEACHING EXPERIENCE: Graduate Teaching Assistant (UNC-CH)

PHYS128L: (Undergraduate) Modern Physics Laboratory

Laboratory Instructor, Grader, Spring 2007, Fall 2009/2010

Laboratory Director, Fall 2011

PHYS701: (Graduate) Classical Mechanics, Grader, Fall 2006/2010

PHYS721H): (Graduate) Quantum Mechanics I, Grader, Fall 2010

PHYS331: (Undergraduate) Introduction to Numerical Techniques

Laboratory Instructor, Grader, Spring 2006/2010

PHYS741: (Graduate) Statistical Mechanics, Grader, Spring 2009

Special Topics: (Graduate) Mathematical Methods Recitation, Instructor, Fall 2009

PHYS712 : (Graduate) Electromagnetism II, Grader, Spring 2008/2009

PHYS711: (Graduate) Electromagnetism I, Grader, Fall 2007/2008

PHYS311: (Undergraduate) Electromagnetism I, Grader, Fall 2006/2007

PHYS312: (Undergraduate) Electromagnetism II, Grader, Spring 2007

PHYS104L: (Undergraduate) General Physics Laboratory

Laboratory Instructor, Grader, Fall 2005