

P. Chris Fragile

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EDUCATION

2001 – Ph.D., Physics, University of Notre Dame, Notre Dame, IN, USA, Dissertation: “Dynamics Around Compact Objects”

2000 – M.S., Physics, University of Notre Dame, Notre Dame, IN, USA

1993 – B.S., Physics, Duke University, Durham, NC, USA

PROFESSIONAL EXPERIENCE

2010-present – Associate Professor, College of Charleston, Charleston, SC, USA. Supervision to date: 8 BS students

2005-2010 – Assistant Professor, College of Charleston

2004-2005 – Postdoctoral Researcher, UC Santa Barbara, Santa Barbara, CA, USA, advisor: Prof. Omer Blaes

2001-2004 – Postdoctoral Researcher, Lawrence Livermore National Laboratory, Livermore, CA, USA, advisor: Dr. Stephen Murray

1998 – Microlensing Planet Search Observer, Mt. Stromlo Observatory, Canberra, Australia

1997-2001 – Graduate student researcher, University of Notre Dame, Notre Dame, IN, USA, advisor: Prof. Grant Mathews & Dr. Jim Wilson

1993-1997 – Milstar Crew Commander, 4th Space Operations Squadron, USAF, Falcon AFB, CO, USA

RESEARCH INTERESTS

Computational astrophysics, particularly numerical simulations of hydrodynamic, magnetohydrodynamic (MHD), and radiation MHD effects in astrophysics. Primary recent application has been the study of black hole accretion and the feedback of black holes on their environments through jets.

HONORS AND AWARDS

2012 – Phi Kappa Phi Honor Society

2011 – KITP Scholar, Kavli Institute of Theoretical Physics (3 years)

2010 – Distinguished Research Award, College of Charleston

2006 – J. Tinsley Oden Faculty Fellowship, University of Texas, Austin

1997 – Arthur J. Schmitt Graduate Fellowship, University of Notre Dame (4 years)

1997 – Air Force Commendation Medal

1993 – Phi Beta Kappa Honor Society

SELECTED RESEARCH GRANTS

2013 – XSEDE Allocation Grant, *Numerical Simulations of Optically Thick Accretion onto Black Holes*, 2.1M hr.

2012 – NSF AST, *Numerical Simulations of Optically Thick Accretion onto Black Holes*, \$190k

2011 – XSEDE Allocation Grant, *Tilted Black Hole Accretion Disks in the Thin-Disk Limit*, 3.9M hr.

2010 – ORAU/ORNL High Performance Computing Grant, *Radiation Transport in Numerical Simulations of Black-Hole Accretion Disks*, \$75k

2010 – TeraGrid Allocation Grant, *Tilted Disks and Jets Around Rapidly Rotating Black Holes*, 2.0M hr.

2008 – NSF AST, *Tilted Accretion Disks Around Rapidly Rotating Black Holes*, \$155k

2008 – SCSGC REAP, *Radiation Transport in Numerical Simulations of Black-Hole Accretion Disks*, \$30k

2008 – TeraGrid Allocation Grant, *Tilted Disks and Jets Around Rapidly Rotating Black Holes*, 465k hr.

2006 – NASA ATP, *The Exhaust System of the Most Powerful Engines: Production and Evolution of Relativistic Astrophysical Jets*, \$311k (PI: D. Meier, Co-Is: Fragile, Markoff, & Nakamura)

2006 – SCSGC REAP, *Advanced Numerical Simulations of Magnetohydrodynamic Flows Surrounding Collapsed or Collapsing Compact Objects*, \$26k

2006 – Swift GI, *A Systematic Search for Two Distinct Gamma-Ray Burst Pulse Types in Swift BAT Data*, \$30k (PI: J. Hakkila, Co-Is: Fragile & Giblin)

REFEREED JOURNAL PUBLICATIONS

As of February 2015 (ADS): 55 refereed publications, 1764 citations, h=25, 4 > 100 citations

(Note: Graduate co-authors are underlined, undergraduate co-authors are double underlined, and high-school co-authors are boxed.)

1. G. C. Bower, et al. (12 co-authors), *Radio and Millimeter Monitoring of Sgr A*: Constraints on the G2 Encounter and the Spectrum and Variability of Sgr A**, submitted to *Astrophysical Journal*
2. M. Wielgus, **P. C. Fragile**, Z. Wang, & J. Wilson, *Local Stability of Strongly Magnetized Black Hole Tori*, *Monthly Notices of the Royal Astronomical Society*, 447, 3593 (2015) [arXiv:1412.4561]
3. J. Nielsen, et al. (13 co-authors), *The X-Ray Flux Distribution of Sagittarius A* as Seen By Chandra*, *Astrophysical Journal*, 799, 199 (2015) [arXiv:1412.3106]
4. D. M. Teixeira, **P. C. Fragile**, V. V. Zhuravlev, & P. B. Ivanov, *Conservative GRMHD Simulations of Moderately Thin, Tilted Accretion Disks*, *Astrophysical Journal*, 796, 103 (2014) [arXiv:1406.5514]
5. V. V. Zhuravlev, P. B. Ivanov, **P. C. Fragile**, & D. M. Teixeira, *No Evidence for Bardeen-Petterson Alignment in GRMHD Simulations and Semi-Analytic Models of Moderately Thin, Prograde, Tilted Accretion Disks*, *Astrophysical Journal*, 796, 104 (2014) [arXiv:1406.5515]
6. **P. C. Fragile**, A. Olejar, & P. Anninos, *Numerical Simulations of Optically Thick Accretion onto a Black Hole - II. Rotating Flow*, *Astrophysical Journal*, 796, 22 (2014) [arXiv:1408.4460]
7. A. Generozov, O. Blaes, **P. C. Fragile**, & K. B. Henisey, *Physical Properties of the Inner Shocks in Hot, Tilted Black Hole Accretion Flows*, *Astrophysical Journal*, 780, 81 (2014) [arXiv:1311.5565]
8. J. Nielsen, et al. (16 co-authors), *A Chandra/HETGS Census of X-Ray Variability from Sgr A* During 2012*, *Astrophysical Journal*, 774, 42 (2013) [arXiv:1307:5843]
9. J. Dexter & **P. C. Fragile**, *Tilted black hole accretion disc models of Sagittarius A*: time-variable millimetre to near-infrared emission*, *Monthly Notices of the Royal Astronomical Society*, 432, 2252 (2013) [arXiv:1204.4454]
10. S. Drappeau, S. Dibi, J. Dexter, S. Markoff, & **P. C. Fragile**, *Self-consistent spectra from radiative GRMHD simulations of accretion onto Sgr A**, *Monthly Notices of the Royal Astronomical Society*, 431, 2872 (2013) [arXiv:1209.4599]
11. M. A. Abramowicz & **P. C. Fragile**, *Foundations of Black Hole Accretion Disk Theory*, *Living Reviews in Relativity*, 16, 1 (2013) [arXiv:1104:5499]
12. K. B. Henisey, O. M. Blaes, & **P. C. Fragile**, *Variability from Nonaxisymmetric Fluctuations Interacting with Standing Shocks in Tilted Black Hole Accretion Disks*, *Astrophysical Journal*, 761, 18 (2012) [arXiv:1211.2273]
13. P. Anninos, **P. C. Fragile**, J. Wilson, & S. D. Murray, *Three-dimensional Moving-Mesh Simulations of Galactic Center Cloud G2*, *Astrophysical Journal*, 759, 132 (2012) [arXiv:1209.1638]
14. S. Dibi, S. Drappeau, **P. C. Fragile**, S. Markoff, & J. Dexter, *GRMHD simulations of accretion onto Sgr A*: How important are radiative losses?*, *Monthly Notices of the Royal Astronomical Society*, 426, 1928 (2012) [arXiv:1206:3976]
15. **P. C. Fragile**, J. Wilson, & M. Rodriguez, *No Correlation Between Disc Scale-Height and Jet Power in GRMHD Simulations*, *Monthly Notices of the Royal Astronomical Society*, 424, 524 (2012) [arXiv:1205.0257]

16. **P. C. Fragile**, A. Gillespie, T. Monahan, M. Rodriguez, & P. Anninos, *Numerical Simulations of Optically Thick Accretion onto a Black Hole - I. Spherical Case*, *Astrophysical Journal Supplement Series*, 201, 9 (2012) [arXiv:1204.5538]
17. **J. Dexter** & **P. C. Fragile**, *Observational Signatures of Tilted Black Hole Accretion Disks from Simulations*, *Astrophysical Journal*, 730, 36 (2011) [arXiv:1101:3783]
18. J. Dexter, E. Agol, **P. C. Fragile**, & J. C. McKinney, *The Submillimeter Bump in Sgr A* from Relativistic MHD Simulations*, *Astrophysical Journal*, 717, 1092 (2010) [arXiv:1005:4062]
19. K. D. Camarda, P. Anninos, **P. C. Fragile** & José A. Font, *Dynamical bar-mode instability in differentially rotating magnetized neutron stars*, *Astrophysical Journal*, 707, 1610 (2009) [arXiv:0911:0670]
20. **P. C. Fragile**, *Effective Inner Radius of Tilted Black Hole Accretion Disks*, *Astrophysical Journal*, 706, L246 (2009) [arXiv:0910:5721]
21. K. B. Henisey, O. M. Blaes, **P. C. Fragile**, & B. T. Ferreira, *Excitation of Trapped Waves in Simulations of Tilted Black Hole Accretion Disks with Magnetorotational Turbulence*, *Astrophysical Journal*, 706, 705 (2009) [arXiv:0910:1882]
22. **J. Dexter**, E. Agol, & **P. C. Fragile**, *Millimeter Flares and VLBI Visibilities from Relativistic Simulations of Magnetized Accretion onto the Galactic Center Black Hole*, *Astrophysical Journal*, 703, L142 (2009) [arXiv:0909:0267]
23. A. Ingram, C. Done, & **P. C. Fragile**, *Low frequency QPO spectra and Lense-Thirring precession*, *Monthly Notices of the Royal Astronomical Society*, 397, L101 (2009) [arXiv:0901:1238]
24. Q. Lei, M. A. Abramowicz, **P. C. Fragile**, J. Horák, M. Machida, & O. Straub, *Polish Doughnuts Revisited: The Angular Momentum Distribution and the Equipressure Surfaces*, *Astronomy & Astrophysics*, 498, 471 (2009) [arXiv:0812.2467]
25. **P. C. Fragile** & D. L. Meier, *General Relativistic Magnetohydrodynamic Simulations of the Hard State as a Magnetically-Dominated Accretion Flow*, *Astrophysical Journal*, 693, 771 (2009) [arXiv:0810.1082]
26. **P. C. Fragile**, C. C. Lindner, P. Anninos, & J. D. Salmonson, *Application of the Cubed-Sphere Grid to Tilted Black-Hole Accretion Disks*, *Astrophysical Journal*, 691, 482 (2009) [arXiv:0809.3819]
27. **P. C. Fragile** & O. M. Blaes, *Epicyclic Motions and Standing Shocks in Numerically Simulated Tilted Black-Hole Accretion Disks*, *Astrophysical Journal*, 687, 757 (2008) [arXiv:0807.2453]
28. J. Hakkila, T. W. Giblin, J. P. Norris, **P. C. Fragile**, & J. T. Bonnell, *Correlations Between Lag, Luminosity, and Duration in Gamma-Ray Burst Pulses*, *Astrophysical Journal*, 677, L81 (2008) [arXiv:0803.1655]
29. **P. C. Fragile**, O. M. Blaes, P. Anninos, & J. D. Salmonson, *Global General Relativistic MHD Simulation of a Tilted Black-Hole Accretion Disk*, *Astrophysical Journal*, 668, 417 (2007) [arXiv:0706.4303]
30. J. D. Salmonson, **P. C. Fragile**, & P. Anninos, *Numerical Modeling of the Radio Nebula from the 2004 December 27 Giant Flare of SGR 1806-20*, *Astrophysical Journal*, 652, 1508 (2006) [astro-ph/0610706]
31. O. M. Blaes, P. Arras, & **P. C. Fragile**, *Oscillation modes of relativistic slender tori*, *Monthly Notices of the Royal Astronomical Society*, 369, 1235 (2006) [astro-ph/0601379]
32. **P. C. Fragile**, W. A. Miller, & E. Vandernoot, *Iron-Line Emission as a Probe of Bardeen-Petterson Accretion Disks*, *Astrophysical Journal*, 635, 157 (2005) [astro-ph/0507309]
33. P. Anninos, **P. C. Fragile**, & J. Salmonson, *Cosmos++: Relativistic Magnetohydrodynamics on Unstructured Grids with Local Adaptive Refinement*, *Astrophysical Journal*, 635, 723 (2005) [astro-ph/0509254]
34. **P. C. Fragile** & P. Anninos, *Hydrodynamic Simulations of Tilted Thick-Disk Accretion onto a Kerr Black Hole*, *Astrophysical Journal*, 623, 347 (2005) [Erratum: *ApJ*, 665, 1507 (2007)] [astro-ph/0403356]
35. **P. C. Fragile**, P. Anninos, K. Gustafson, & S. D. Murray, *Magnetohydrodynamic Simulations of Shock Interactions with Radiative Clouds*, *Astrophysical Journal*, 619, 327 (2005) [astro-ph/0410285]
36. **P. C. Fragile**, S. D. Murray, & D. N. C. Lin, *Ejection of Supernova-Enriched Gas from Dwarf Disk Galaxies*, *Astrophysical Journal*, 617, 1077 (2004) [astro-ph/0408438]

37. **P. C. Fragile**, S. D. Murray, P. Anninos, & W. van Breugel, *Radiative Shock-Induced Collapse of Intergalactic Clouds*, *Astrophysical Journal*, 604, 74 (2004) [astro-ph/0311298]
38. **P. C. Fragile**, G. J. Mathews, J. Poirier, & T. Totani, *Constraints on Models for TeV Gamma Rays from Gamma-Ray Bursts*, *Astroparticle Physics*, 20, 591 (2004) [astro-ph/0206383]
39. **P. C. Fragile** & P. Anninos, *Hydrodynamic Instabilities in Cosmological Quark-Hadron Phase Transitions*, *Physical Review D*, 67, 103010 (2003) [gr-qc/0303018]
40. **P. C. Fragile**, S. D. Murray, P. Anninos, & D. N. C. Lin, *Supernova Enrichment of Dwarf Spheroidal Galaxies*, *Astrophysical Journal*, 590, 778 (2003) [astro-ph/0303208]
41. P. Anninos, **P. C. Fragile**, & S. D. Murray, *COSMOS: A Radiation-Chemo-Hydrodynamics Code for Astrophysical Problems*, *Astrophysical Journal Supplement*, 147, 177 (2003) [astro-ph/0303209]
42. P. Anninos & **P. C. Fragile**, *Non-Oscillatory Central Difference and Artificial Viscosity Schemes for Relativistic Hydrodynamics*, *Astrophysical Journal Supplement*, 144, 243 (2003) [astro-ph/0206265]
43. J. Poirier, C. D'Andrea, **P. C. Fragile**, J. Gress, G. J. Mathews, & D. Race, *Sub-TeV Gammas in Coincidence with BATSE Gamma Ray Bursts*, *Physical Review D*, 67, 042001 (2003) [astro-ph/0004379]
44. D. P. Bennett et al., *Gravitational Microlensing Events Due to Stellar Mass Black Holes*, *Astrophysical Journal*, 579, 639 (2002) [astro-ph/0109467]
45. **P. C. Fragile**, G. J. Mathews, & J. R. Wilson, *Bardeen-Petterson Effect and Quasi-periodic Oscillations in X-Ray Binaries*, *Astrophysical Journal*, 553, 955 (2001) [astro-ph/0007478]
46. **P. C. Fragile** & G. J. Mathews, *Reconstruction of Stellar Orbits Close to Sagittarius A*: Possibilities for Testing General Relativity*, *Astrophysical Journal*, 542, 328 (2000) [astro-ph/9904177]
47. C. Alcock et al., *Binary Microlensing Events from the MACHO Project*, *Astrophysical Journal*, 541, 270 (2000)
48. S. H. Rhie et al., *On Planetary Companions to the MACHO-98-BLG-35 Microlens Star*, *Astrophysical Journal*, 533, 378 (2000) [astro-ph/9905151]
49. C. Alfonso, et al., *Combined Analysis of the Binary Lens Caustic-crossing Event MACHO 98-SMC-1*, *Astrophysical Journal*, 532, 340 (2000)
50. S.H. Rhie et al., *Observations of the Binary Microlens Event MACHO-98-SMC-1 by the Microlensing Planet Search Collaboration*, *Astrophysical Journal*, 522, 1037 (1999) [astro-ph/9812252]

REFEREED BOOK CHAPTERS

1. **P. C. Fragile**, *Current Status of Simulations*, *Space Science Reviews*, T. Belloni, P. Casella, M. Falanga, M. Gilfanov, P. Jonker, & A. King, eds., 183, 87 (2014) [arXiv:1304.5541]

PUBLISHED SOFTWARE

1. **P. C. Fragile**, S. Draugel, & W. Dibona, *Journey to a Black Hole*, Apple App Store (2014)
<https://itunes.apple.com/us/app/journey-to-a-black-hole/id901386268?mt=8>

CONFERENCE PROCEEDINGS

1. **P. C. Fragile**, P. Anninos, & S. D. Murray, *3D Moving-Mesh Simulations of Galactic Center Cloud G2*, *Proceedings of the International Astronomical Union*, 303, 318 (2014) [arXiv:1401.0553]
2. J. Nielsen, et al. (15 co-authors), *The 3 Ms Chandra Campaign on Sgr A*: A Census of X-ray Flaring Activity from the Galactic Center*, *Proceedings of the International Astronomical Union*, 303, 374 (2014) [arXiv:1311.6818]
3. J. Dexter, E. Agol, **P. C. Fragile**, & J. C. McKinney, *Radiative Models of Sagittarius A* and M87 from Relativistic MHD Simulations*, *Journal of Physics: Conference Series*, 372, 012023 (2012) (arXiv:1202.0348)

4. J. Hakkila, **P. C. Fragile**, & T. W. GIBLIN, *Gamma-Ray Burst Pulse Correlations as Redshift Indicators*, Sixth Huntsville Gamma-Ray Burst Symposium (arXiv:0901.3174)
5. **P. C. Fragile**, *Jet Formation in MHD Simulations*, VII Microquasar Workshop, to appear in Proceedings of Science (arXiv:0810.0526)
6. J. Hakkila, T. W. GIBLIN, J. P. NORRIS, **P. C. Fragile**, J. T. BONNELL, & M. WELLS, *Gamma-Ray Burst Pulse Lags*, Gamma-Ray Bursts 2007, AIP Conference Proceedings, 1000, 109 (2008)
7. **P. C. Fragile**, P. ANNINOS, O. M. BLAES, & J. D. SALMONSON, *3D Relativistic MHD Simulations of Tilted Accretion Disks Around Rapidly Rotating Black Holes*, The Eleventh Marcel Grossmann Meeting, H. Kleinert, R. T. JANTZEN, & R. RUFFINI, eds. (2008) (astro-ph/0701272)
8. J. D. SALMONSON, P. ANNINOS, **P. C. Fragile** & K. CAMARDA, *Cosmos++: Relativistic Magnetohydrodynamics on Unstructured Grids with Local Adaptive Refinement*, Journal of Physics: Conference Series, 78, 012060 (2007)
9. **P. C. Fragile**, *Quasi-Periodic Oscillations in Relativistic Tori*, in Proceedings of 22nd Texas Symposium on Relativistic Astrophysics
10. W. van BRUEGEL, **C. Fragile**, S. CROFT, W. DE VRIES, P. ANNINOS, & S. MURRAY, *Jet-Induced Star Formation: Good News From Big, Bad Black Holes*, IAU Symposium Series, 222, T. S. BERGMANN, L. C. HO & H. R. SCHMITT, eds. (2004)
11. W. van BRUEGEL, **C. Fragile**, P. ANNINOS, & S. MURRAY, *Jet-Induced Star Formation*, IAU Symposium Series, 217, P. DUC, J. BRAIN, & E. BRINKS, eds. (2004)
12. **P. C. Fragile**, G. J. MATHIEWS, & J. R. WILSON, *Relativistic Hydrodynamics and Quasi-Periodic Oscillations*, Journal of the Korean Astronomical Society, 34, S265 (2001)
13. **P. C. Fragile**, G. J. MATHIEWS, & J. R. WILSON, *Bardeen-Petterson Effect in Low-Mass X-ray Binaries*, Proc. of the 20th Texas Symp. on Relativistic Astrophysics, H. Martel, ed. (2001)
14. G. J. MATHIEWS, **P. C. Fragile**, I. SUH, & J. R. WILSON, *Neutron Star Mysteries*, Origin of Matter and Evolution of Galaxies, S. Kubono et al., eds. (2001)

INVITED TALKS & COLLOQUIA

- 6/2015** – Invited Talk, Black Hole Accretion and AGN Feedback, Shanghai, China
- 12/2014** – Invited Talk, Copernicus & Hevelius Relativistic Astrophysics Meeting, Krakow, Poland
- 11/2013** – Plenary Talk, Prague Synergy: Accreting Relativistic Compact Objects and their Environment, Prague, Czech Republic
- 11/2013** – Invited Talk, Prague Synergy: Accreting Relativistic Compact Objects and their Environment, Prague, Czech Republic
- 4/2013** – Invited Talk, APS April Meeting, Denver, CO
- 2/2013** – Invited Talk, SIAM Conference on Computational Science & Engineering, Boston, MA
- 10/2012** – Invited Talk, The Physics of Accretion onto Black Holes, Bern, Switzerland
- 6/2012** – Invited Talk, Black Holes by the Black Sea, Istanbul, Turkey
- 4/2012** – Colloquium, Yale University
- 3/2012** – Invited Talk, Honors Faculty Lecture Series, College of Charleston
- 7/2011** – Invited Review, Black Hole Astrophysics: Tales of Power and Destruction, Winchester, England
- 7/2011** – Invited Talk, Combined Radio/X-rays approaches to Relativistic Astrophysics, St. Petersburg, Russia
- 11/2010** – Astrophysics Seminar, Center for Relativistic Astrophysics, Georgia Tech
- 5/2010** – Invited Talk, Dynamics of Astrophysical Disks, KIAA, Beijing, China
- 1/2010** – Invited Talk, Frontiers in MHD, Princeton Center for Theoretical Science
- 10/2009** – Invited Talk, Double Vision, Redux Contemporary Art Center, Charleston, SC
- 9/2009** – Invited Talk, Angular Momentum Transport and Energy Release in Accretion Discs, Cambridge, England
- 9/2008** – Invited Review, VII Microquasar, Foca, Turkey
- 6/2008** – Colloquium, University of Amsterdam

- 5/2008 – Astrophysics Seminar, Los Alamos National Laboratory
- 3/2008 – ACKS Seminar, Stanford University/SLAC/KIPAC
- 12/2007 – Colloquium, Clemson University
- 12/2007 – Astronomy Seminar, Clemson University
- 3/2007 – Colloquium, Department of Mathematics, College of Charleston
- 12/2006 – Invited Talk, Nordita Workshop, Copenhagen, Denmark
- 7/2006 – Invited Talk, 11th Marcel Grossmann Meeting, Berlin, Germany
- 1/2005 – Colloquium, Florida Atlantic University
- 2/2004 – Colloquium, University of Maryland

TEACHING EXPERIENCE

- 2005-present** – Taught 9 different courses, 44 different sections
 - Introductory Astronomy (both semesters, lecture & lab)
 - Introductory Physics (Algebra-based, both semesters, lecture & lab)
 - Physics in Film (a First Year Experience course I created)
 - Intelligent Life in the Universe
 - Galactic & Extragalactic Astronomy (for majors)
 - Fluid Mechanics (for majors)
 - General Relativity (for majors)
- 2008-present** – Mentored 9 Senior Research Projects
- 2003, 2004** – Mentored LLNL Summer Undergraduate Research Intern

RESEARCH STUDENTS SUPPORTED

- 2016** – Daniel Nemergut, MS, “Developing an *hpr*-Adaptive Discontinuous Galerkin Code for Hyper-Resolved Studies in Astrophysics and Cosmology” (Advisor)
- 2015** – Danilo Morales Teixeira, PhD, “The Bardeen-Petterson Effect” (co-Advisor)
- 2014** – Thomas Briggs, BS, “Implementing a Galerkin Method in Cosmos++” (Advisor)
- 2014** – Salome Dibi, PhD, “Studying MHD and radiative processes in Sgr A*” (Reader)
- 2014** – Ally Olejar, BS, “Numerical Simulations of 2D Quasi-Spherical Accretion onto a Black Hole” (Advisor)
- 2013** – Samia Drappeau, PhD, “Accretion/ejection connections and lepto-hadronic jet launching for black holes” (Reader)
- 2012** – Anna Gillespie, BS, “Magnetically Arrested Accretion In Slightly Rotating Accretion Flow” (Advisor)
- 2011** – Julia Wilson, BS, “The Connection Between Accretion Disk Scale Height and Jet Power” (Advisor)
- 2010** – Will DuPre, BS, “Modeling of Ultra-Relativistic Jets from Tilted Black Hole Accretion Disks” (Advisor)
- 2009** – Tim Monahan, BS, “Magnetically Dominated Accretion Flows” (Advisor)
- 2009** – Chris Pollanen, BS, “Exciting Quasi-Periodic Oscillations in Simulated Black Holes” (Advisor)
- 2008** – Justin Rowland, BS, “Peculiar Velocities and the Local Standard of Rest” (Advisor)
- 2008** – Chris Lindner, BS, “Numerical Study of Tilted Black Hole Accretion Disks using the Cubed Sphere Grid” (Advisor)

ARTISTIC COLLABORATION

1. H. Thornton & **P. C. Fragile**, *The Fate of Matter*, sculpture piece submitted for the ART MATTERS Student Art Exhibition at the College of Charleston (2014)

SAMPLE PRESS COVERAGE

1. “No Way Out,” Science World (published by Scholastic), March 3, 2014
2. “Que Le Spectacle Commence!” Science & Vie, August, 2013

3. “Milky Way’s Black Hole to Gobble Space Cloud This Year,” *Space.com*, March 6, 2013 (<http://www.space.com/20061-milky-way-black-hole-cloud.html>)
4. “Black Hole’s Destruction of Massive Super-Hot Gas Cloud Visualized,” *Huffpost Tech*, December 11, 2012 (http://www.huffingtonpost.co.uk/2012/11/12/black-holes-destruction-g2-gas-cloud_n_2116036.html)

PROFESSIONAL MEMBERSHIPS AND SERVICE

- 1999-present** – Member, American Physical Society
- 1999-present** – Member, American Astronomical Society
- 2011-present** – Member, Sigma Xi
- 2007-present** – Member, South Carolina Academy of Science
- 2010-present** – Member, Anacapa Society
- 2011-present** – Member, Council on Undergraduate Research
- 2000-2008** – Regional Science and Engineering Fair Judge
- 2000-present** – Regional interviewer for Duke Alumni Admissions Advisory Committee
- 2005-present** – Referee for *Science* (2012-present), *ApJ* (2005-present), *MNRAS* (2007-present), *A&A* (2009-present), and *CQG* (2011-present)
- 2009-present** – Grant reviewer for *NSF* (2009-present), *NASA* (2012-present), and *ORAU* (2010-present)
- 2013** – Reader, Samia Drappeau, PhD, “Accretion/ejection connections and lepto-hadronic jet launching for black holes”
- 2014** – Reader, Salome Dibi, PhD, “Studying MHD and radiative processes in Sgr A*”
- 2013** – SOC, Black Hole (g)Astronomy: exploring the different flavours of accretion
- 2013** – SOC, IAU Symposium #303 - The Galactic Center: Feeding and Feedback in a Normal Galactic Nucleus