

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

- 2016-present** – Professor, College of Charleston, Charleston, SC, USA. Supervision to date: 10 BS students, 1 MS student
2010-2016 – Associate Professor, College of Charleston
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

- 2017** – Who’s Who in America
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

- 2017** – XSEDE Allocation Grant, *Alpha-viscosity vs. GRMHD*, 3.1M hr. (valued at \$108k)
2016 – NSF AST, *RUI: Advanced Numerical Simulations of Black Hole Accretion*, \$220k
2016 – NRAO Student Observing Support, *Anatomy of a jet-cloud interaction and starburst in Minkowski’s Object*, \$7,641
2015 – XSEDE Allocation Grant, *Numerical Simulations of Low-Angular-Momentum, Super-Critical Accretion onto Black Holes*, 2.5M hr. (valued at \$88k)
2013 – XSEDE Allocation Grant, *Numerical Simulations of Optically Thick Accretion onto Black Holes*, 2.1M hr.

- 2012** – NSF AST, *RUI: 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, *RUI: 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)
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)

SUCCESSFUL OBSERVING PROPOSALS

- 2016** – VLA 2017A, *A detailed study of the jet-galaxy interaction in Minkowski's Object*, 4 hr (PI: M. Lacy)
2016 – HST Cycle-24, *A Local Laboratory for Studying Positive Feedback from Supermassive Black Holes*, 7 orbits (PI: Steve Croft)
2015 – ALMA Cycle-3, *Anatomy of a jet-cloud interaction and starburst in Minkowski's Object*, 4.8 hr (PI: M. Lacy)
2012 – Chandra Cycle-13, *Chandra HETG Ultra-deep Gratings Spectroscopy of Sgr A* (CHUGSS)*, 3M sec. (PI: F. K. Baganoff)

REFEREED JOURNAL PUBLICATIONS

As of April 2017 (ADS): 57 refereed publications, 2293 citations, h=29, 7 publications > 100 citations (Note: Graduate co-authors are underlined, undergraduate co-authors are double underlined, and high-school co-authors are boxed.)

1. **P. C. Fragile**, D. R. Ballantyne, & J. W. L. Witry, *Simulating the Effects of Type-I X-Ray Bursts on a Surrounding Accreting Disk*, in preparation
2. **P. C. Fragile**, S. M. Etheridge, P. Anninos, B. Mishra, & W. Kluźniak, *Exploring Thermal and Other Instabilities in Radiation-Pressure-Dominated Thin Disks: I. Viscous Hydrodynamic Simulations*, in preparation
3. **P. C. Fragile**, P. Anninos, S. Croft, M. Lacy, & J. W. L. Witry, *Numerical Simulations of a Jet-Cloud Collision and Starburst: Application to Minkowski's Object*, submitted to The Astrophysical Journal [arXiv:1701.00024]
4. M. J. Middleton, **P. C. Fragile**, M. Bachetti, M. Brightman, Y-F. Jiang, W. Ho, T. P. Roberts, A. R. Ingram, T. Dauser, C. Pinto, D. J. Walton, F. Fuerst, A. C. Fabian, & N. Gehrels, *Independent constraints on the equation of state from Lense-Thirring precession in ultraluminous pulsars*, submitted to Monthly Notices of the Royal Astronomical Society
5. D. M. Capellupo, D. Haggard, N. Choux, G. C. Bower, B. Cotton, N. Degenaar, J. Dexter, H. Falcke, **P. C. Fragile**, C. O. Heinke, C. J. Law, S. Markoff, J. Neilsen, G. Ponti, F. Yusef-Zadeh, *Simultaneous Monitoring of X-Ray and Radio Variability in Sagittarius A**, to appear in The Astrophysical Journal [arXiv:1707.01937]
6. P. Anninos, C. Bryant, **P. C. Fragile**, A. M. Holgado, C. Lau, & D. Nemergut, *CosmosDG: An hpr-Adaptive Discontinuous Galerkin Code for Hyper-Resolved Relativistic MHD*, Astrophysical Journal Supplement Series, 231, 17 (2017) [arXiv:1706.09939]
7. B. Mishra, F. H. Vincent, A. Manousakis, **P. C. Fragile**, T. Paumard, & W. Kluźniak, *Quasi-Periodic Oscillations from Relativistic Ray-Traced Hydrodynamical Tori*, Monthly Notices of the Royal Astronomical Society, 467, 4036 (2017) [arXiv:1510.07414]

8. **P. C. Fragile** & A. Sądowski, *On the Decay of Strong Magnetization in Global Disc Simulations with Toroidal Fields*, Monthly Notices of the Royal Astronomical Society, 467, 1838 (2017) [arXiv:1701.01159]
9. M. Lacy, S. Croft, **P. C. Fragile**, S. Wood, & K. Nyland, *ALMA Observations of the Interaction of the Radio Jet with Molecular Gas in Minkowski's Object*, The Astrophysical Journal, 838, 146 (2017) [arXiv:1703.03006]
10. **B. Mishra**, **P. C. Fragile**, C. L. Johnson, & W. Kluźniak, *Three-Dimensional, Global, Radiative GRMHD Simulations of a Thermally Unstable Disc*, Monthly Notices of the Royal Astronomical Society, 463, 3437 (2016) [arXiv:1603.04082]
11. **P. C. Fragile**, O. Straub, & O. Blaes, *High-Frequency and Type-C QPOs from Oscillating, Precessing Hot, Thick Flow*, Monthly Notices of the Royal Astronomical Society, 461, 1356 (2016) [arXiv:1602.08082]
12. 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**, Astrophysical Journal, 802, 69 (2015) [arXiv:1502.06534]
13. 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]
14. 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]
15. 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]
16. 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]
17. **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]
18. 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]
19. 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]
20. 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]
21. 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]
22. M. A. Abramowicz & **P. C. Fragile**, *Foundations of Black Hole Accretion Disk Theory*, Living Reviews in Relativity, 16, 1 (2013) [arXiv:1104.5499]
23. 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]
24. 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]
25. 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]
26. **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]

27. **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]
28. J. Dexter & **P. C. Fragile**, *Observational Signatures of Tilted Black Hole Accretion Disks from Simulations*, *Astrophysical Journal*, 730, 36 (2011) [arXiv:1101:3783]
29. 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]
30. 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]
31. **P. C. Fragile**, *Effective Inner Radius of Tilted Black Hole Accretion Disks*, *Astrophysical Journal*, 706, L246 (2009) [arXiv:0910:5721]
32. 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]
33. 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]
34. 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]
35. 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]
36. **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]
37. **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]
38. **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]
39. 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]
40. **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]
41. 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]
42. 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]
43. **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]
44. 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]
45. **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]
46. **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]
47. **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]

48. **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]
49. **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]
50. **P. C. Fragile** & P. Anninos, *Hydrodynamic Instabilities in Cosmological Quark-Hadron Phase Transitions*, *Physical Review D*, 67, 103010 (2003) [gr-qc/0303018]
51. **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]
52. 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]
53. 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]
54. 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]
55. D. P. Bennett et al. (32 co-authors), *Gravitational Microlensing Events Due to Stellar Mass Black Holes*, *Astrophysical Journal*, 579, 639 (2002) [astro-ph/0109467]
56. **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]
57. **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]
58. C. Alcock et al. (59 co-authors), *Binary Microlensing Events from the MACHO Project*, *Astrophysical Journal*, 541, 270 (2000)
59. S. H. Rhie et al. (40 co-authors), *On Planetary Companions to the MACHO-98-BLG-35 Microlens Star*, *Astrophysical Journal*, 533, 378 (2000) [astro-ph/9905151]
60. C. Alfonso, et al. (93 co-authors), *Combined Analysis of the Binary Lens Caustic-crossing Event MACHO 98-SMC-1*, *Astrophysical Journal*, 532, 340 (2000)
61. S.H. Rhie, A. C. Becker, D. P. Bennett, **P. C. Fragile**, B. R. Johnson, L. J. King, B. A. Peterson, & J. Quinn, *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. Mathews, & J. R. Wilson, *Relativistic Hydrodynamics and Quasi-Periodic Oscillations*, Journal of the Korean Astronomical Society, 34, S265 (2001)
13. **P. C. Fragile**, G. J. Mathews, & 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. Mathews, **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

- 9/2017 – Invited Talk, STROBE-X Science Definition Meeting, Lubbock, TX
- 8/2017 – Invited Talk, “The Great American Eclipse,” King Charles Inn Lunch & Learn, Charleston, SC
- 8/2017 – Invited Talk, “The Great American Eclipse,” Summerville (SC) Rotary Club
- 7/2017 – Invited Talk, “Astronomy in the Lowcountry,” Summerville (SC) Chamber of Commerce Energy & Environment Division
- 7/2017 – Invited Talk, “Astronomy in the Lowcountry,” Summerville (SC) Rotary Club
- 7/2016 – Invited Talk, Simulations and Modeling of Relativistic MHD Accretion Discs, Oxford, England
- 2/2016 – Colloquium, College of Charleston
- 2/2016 – Invited Talk, 2016 Darwin Week, Charleston, SC
- 6/2015 – Invited Talk, Black Hole Accretion and AGN Feedback, Shanghai, China
- 4/2015 – Public Lecture, Celebrating 100 Years of General Relativity, Clemson, SC
- 3/2015 – Invited Review, The Extreme Physics of Eddington Accretion onto Black Holes, Bern, Switzerland
- 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

SELECTED STUDENT PRESENTATIONS

- 2017 – Sarina Etheridge, American Astronomical Society #229, “Contrasting Magnetohydrodynamic Turbulence with alpha-Viscosity in Simulations of Black Hole Accretion”
 2017 – Jason Witry, American Astronomical Society #229, “Numerical Simulations of a Jet-Cloud Collision and Starburst: Application to Minkowski’s Object”
 2013 – Julia Wilson, American Astronomical Society #221, “3D Moving-Mesh Simulations of Galactic Center Cloud G2”

TEACHING EXPERIENCE

2005-present – Taught 10 different undergraduate courses (55 independent sections) at College of Charleston

- Introductory Astronomy (both semesters, lecture & lab)
- Introductory Physics (Algebra-based, both semesters, lecture & lab)
- Physics in Film (a First Year Seminar that I created)
- Intelligent Life in the Universe
- Introduction to Astrophysics (sophomore-level course for majors)
- Galactic & Extragalactic Astronomy (for majors)
- Fluid Mechanics (for majors)
- Stellar Astronomy & Astrophysics (for majors)
- General Relativity (for majors)

2008-present – Mentored 11 Senior Research Projects and 1 Masters Thesis

2002-2005 – Taught 5 semesters of Introductory Astronomy at Las Positas College

2003, 2004 – Mentored LLNL Summer Undergraduate Research Intern

RESEARCH THESES SUPPORTED

- 2017 – Sarina Etheridge, BS, C of C, “Viscous Instability in Thin Accretion Disks” (Advisor)
 2017 – Jason Witry, BS, C of C, “Numerical Simulations of Neutron Star Superburst Collisions with Accretion Disks” (Advisor)
 2016 – Vassilios Mewes, PhD, U. of Valencia, “Numerical relativity simulations of tilted black hole-torus

systems” (Reader)

2016 – Daniel Nemergut, MS, C of C, “Toward COSMOSDG: An Open-Sourced *hpr*-Adaptive Discontinuous Galerkin Code for Hyper-Resolved Studies in Astrophysics” (Advisor)

2015 – Ally Olejar, BS, C of C, “Numerical Simulations of 2D Quasi-Spherical Accretion onto a Black Hole” (Advisor)

2015 – Danilo Morales Teixeira, PhD, U. of Sao Paulo, “Active Galactic Nuclei: Properties at parsec and kilo-parsec scales” (co-Advisor)

2014 – Thomas Briggs, BS, C of C, “Implementing a Galerkin Method in Cosmos++” (Advisor)

2014 – Salome Dibi, PhD, U. of Amsterdam, “Studying MHD and radiative processes in Sgr A*” (Reader)

2013 – Samia Drappeau, PhD, U. of Amsterdam, “Accretion/ejection connections and lepto-hadronic jet launching for black holes” (Reader)

2012 – Anna Gillespie, BS, C of C, “Magnetically Arrested Accretion In Slightly Rotating Accretion Flow” (Advisor)

2011 – Julia Wilson, BS, C of C, “The Connection Between Accretion Disk Scale Height and Jet Power” (Advisor)

2010 – Will DuPre, BS, C of C, “Modeling of Ultra-Relativistic Jets from Tilted Black Hole Accretion Disks” (Advisor)

2009 – Tim Monahan, BS, C of C, “Magnetically Dominated Accretion Flows” (Advisor)

2009 – Chris Pollanen, BS, C of C, “Exciting Quasi-Periodic Oscillations in Simulated Black Holes” (Advisor)

2008 – Justin Rowland, BS, C of C, “Peculiar Velocities and the Local Standard of Rest” (Advisor)

2008 – Chris Lindner, BS, C of C, “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. “Charleston businesses prepping for solar eclipse,” Charleston Regional Business Journal, February 14, 2017 (<http://www.charlestonbusiness.com/news/hospitality-and-tourism/71523/>)
2. “Black hole accretion disk observed to ‘breathe,’” *Phys.org*, June 21, 2016 (<http://phys.org/news/2016-06-black-hole-accretion-disk.html>)
3. “No Way Out,” Science World (published by Scholastic), March 3, 2014
4. “Que Le Spectacle Commence!” Science & Vie, August, 2013
5. “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>)
6. “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), *CQG* (2011-present), and *New Astronomy* (2017-present)

2009-present – Grant reviewer for *NSF* (2009-present), *NASA* (2012-present), and *ORAU* (2010-present)

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

P. Chris Fragile. Department of Physics and Astronomy, College of Charleston, Charleston, SC 29424; fragilep@cofc.edu. Omer M. Blaes. In this paper we extend the results of Fragile & Anninos (2005) to include magnetic fields. The inclusion of magnetic fields is important because it is now widely believed that local stresses within black-hole accretion disks are generated by turbulence that results from the magnetorotational instability (MRI; Balbus & Hawley 1991). Dr. P. Chris Fragile. -Disruption of Galactic Center Cloud G2-. Recently, my research group worked with collaborators from Lawrence Livermore National Laboratory on a series of 3D simulations to study the fate of a newly discovered gas cloud moving through the Galactic Center. P. Anninos, P. C. Fragile, J. Wilson, & Stephen D. Murray, 3D Moving-Mesh Simulations of Galactic Center Cloud G2, *Astrophysical Journal*, 759, 132 (2012). available here from ADS or here from astro-ph. updated: 29-Sep-12. Fragile Author: Chris Katsaropoulos Publisher: Luminis Books ISBN: 978-1-935462-27-9. Mesmerizing and beautiful, a truly stunning book! Katsaropoulos is new to writing fiction, and his first novel sets the bar incredibly high. Fragile by Chris Katsaropoulos is an experiential novel about what pulls us together and apart. Amelia Geist saved herself for her childhood love, Tris Holloway, even though he has long abandoned her.