Scott Charles Noble

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Citizenship: United States of America
Date of Birth: 1975
Place of Birth: USA

Education

12/2003	**Ph.D. in Physics** University of Texas at Austin, Austin, Texas Thesis: *A Numerical Study of Relativistic Fluid Collapse* Co-supervisors: Prof. Matthew W. Choptuik, U. of British Columbia Prof. Philip J. Morrison, U. of Texas at Austin
06/1997	**B.S. in Physics** California Institute of Technology, Pasadena, California

Professional and Teaching Experience

07/2015 – 07/2015	**Invited Lecturer**, "Numerical Astrophysics: GRMHD", 1-week graduate level, TIARA Summer School, National Taiwan University, `http://events.asiaa.sinica.edu.tw/school/20150713/`;
08/2014 – present	**Assistant Professor**, Dept. of Physics & Engineering Physics, TU PHYS 4063: "Electricity & Magnetism", upper undergraduate level, (Fall 2014, Fall 2015); PHYS 4073: "Electromagnetic Waves & Optics", upper undergraduate level, (Spring 2015); PHYS 4563: "Astrophysics", upper undergraduate level, (Spring 2016); PHYS 4982: "Senior Thesis", Vernon Londagin (AY 2015-2016), Jeffrey Harris (AY 2015-2016), William Bates (Fall 2014); PHYS 7003: "Advanced Classical Mechanics", graduate level, (Fall 2015); PHYS 7063: "Electromagnetic Theory", graduate level, (Spring 2016); PHYS 7971: "Graduate Seminar", graduate level, organized Physics Colloquia, supervised student attendance (AY 2015-2016);
07/2013 – 08/2013	**Invited Participant**, "A Universe of Black Holes", Kavli Institute of Theoretical Physics, Univ. of California in Santa Barbara.
04/2011 – 04/2011	**Co-Instructor**, Perimeter Scholars International, Perimeter Institute, "Explorations in Numerical Relativity", `www.perimeterscholars.org/314.html`.
09/2009 – 08/2014	**Associate Research Scientist**, Center for Computational Relativity and Gravitation (CCRG), RIT

01/2008 – 01/2008	**Instructor**, Johns Hopkins U. (JHU), Intersession 2008: Physics & Astronomy 171.299.01, "Intro. to Computer Programming for Scientists & Engineers"
09/2006 – 08/2009	**Associate Research Scientist**, Center for Astrophysical Sciences, Johns Hopkins U. with Prof. Julian Krolik
10/2003 – 08/2006	**Postdoctoral Research Fellow**, Center for Theoretical Astrophysics, U. of Illinois at Urbana-Champaign with with Prof. Charles Gammie
09/2000 – 09/2003	**Graduate Research Assistant**, U. of British Columbia, with Prof. Matthew Choptuik
06/2000 – 08/2000	**Graduate Research Assistant**, U. of Texas at Austin, with Prof. Matthew Choptuik.
01/2000 – 05/2000	**Assistant Instructor**, U. of Texas at Austin: Physical Science 303: "Physics Lab" for Liberal Arts majors. Prepared original lectures and material supplementing existing teaching material, responsible for lab experiment setup, design, and execution;
06/1999 – 12/1999	**Computer Programmer**, Physics Computer Group, U. of Texas at Austin
08/1997 – 12/1999	**Teaching Assistant**, U. of Texas at Austin: PHY 101L: "Mechanics Lab" Calculus-based, for Scientists and Engineers (lab instructor); PHY n303K: "Engineering Physics I" (grader); PHY 309K: "Mechanics and Heat" (test maker, teaching assistant); PHY 329: "Computational Physics" (system administrator);
01/1997 – 07/1997	**Undergraduate Research Assistant**, Caltech, with Prof. Steven Koonin, Prof. Chris Adami and Dr. Nicholas Cerf: *Solving the NP-Complete 3-SAT Problem through Simulation of a Quantum Computer*
06/1996 – 08/1996	**Summer Undergraduate Research Fellow**, Caltech, with Prof. Steven Koonin, Prof. Chris Adami and Dr. Nicholas Cerf: *Solving the NP-Complete 3-SAT Problem through Simulation of a Quantum Computer*
06/1995 – 08/1995	**Summer Undergraduate Research Fellow**, Caltech, with Dr. Ren-yuan Zhu: *A Study on the Performance of the Crystal Calorimeter for BaBar at SLAC*
06/1994 – 08/1994	**Summer Undergraduate Research Fellow**, Caltech, with Dr. Ren-yuan Zhu: *Simulating the Resolution Performance of Crystal Calorimeters for the B Factory Experiment at SLAC and the CMS Experiment at LHC*

Research Grants

08/2015 – 07/2018	**Principal Investigator**: *Collaborative Research: Predicting the Transient Signals from Galactic Centers: Circumbinary Disks and Tidal Disruptions around Black Holes*, PI: **S. Noble**; co-PIs: M. Campanelli (RIT), J. Krolik (JHU), Y. Zlochower (RIT); NSF ACI 1515969, PRAC program; Amount: \$29,954 (total), \$12,683 (TU). Supports travel for graduate students, postdoctoral researchers, PI/co-PIs at TU, JHU, and RIT, and provides an allocation on the Blue Waters supercomputer (see below).
09/2015 – 08/2018	**Co-Principal Investigator**: *Collaborative Research: Accretion Dynamics of Black Hole Mergers*, PI: M. Campanelli (RIT); co-PIs: J. Krolik (JHU), **S. Noble**, Y. Zlochower (RIT); NSF AST 1515982; Amount: \$967,006 (total), \$137,348 (TU); Supports Noble's summer salary and travel.
06/2015 – 07/2015	**Principal Investigator**: *Faculty Development Summer Fellowship*, PI: **S. Noble**; TU internal grant; Amount: 1 Summer-month salary plus \$500 for travel & supplies.

08/2010 – 07/2015 **Co-Principal Investigator**: *CDI-Type II: Computing Supermassive Black Hole Mergers in Astrophysics*, PIs: M. Campanelli (RIT), J. Krolik (JHU); co-PIs: **S. Noble**, Y. Zlochower; NSF CDI AST 1028087. Amount: $2,000,000 (split equally between RIT and JHU). Supported Noble's annual salary, computer equipment and a student's salary at RIT.

09/2012 – 05/2013 **Co-Principal Investigator**: *Improving the Performance and Walltime of GRMHD Calculations for the Blue Waters Petascale Project*, PI: M. Campanelli; co-PIs: **S. Noble**, J. Faber, Y. Zlochower; Amount: $74,759.00; Sponsors: NSF and the National Center for Supercomputing Applications (NCSA); Supported annual salaries of Noble and Zilhao, a postdoctoral researcher at RIT.

Supercomputing Allocations (1 SU = 1 CPU-hour of computing power on a current processor)

10/2015 – 09/2016 **Co-Principal Investigator**: *XSEDE*; Renewal; Title: *Simulation of extreme black hole binaries in astrophysical environments*; TG-PHY060027N; PI: C.Lousto; co-PIs: H.-P.Bischof, M.Campanelli, J.Faber, **S.Noble**, and Y.Zlochower; Amount: **2.4M SUs** on Gordon (SDSC), **5.4M SUs** on Comet (SDSC), **2.7M SUs** on Stampede (TACC), (the total amounts to approximately **15M SUs** using SU units equivalent to previous years).

08/2015 – 07/2018 **Principal Investigator**: *PRAC*; Title: *Collaborative Research: Predicting the Transient Signals from Galactic Centers: Circumbinary Disks and Tidal Disruptions around Black Holes*, PI: **S. Noble**; co-PIs: M. Campanelli, J. Krolik, Y. Zlochower; NSF ACI 1515969, PRAC program; Amount: **32M SUs per year for 3 years** on Blue Waters petascale supercomputer (NCSA).

10/2014 – 09/2015 **Co-Principal Investigator**: *XSEDE*; Renewal; Title: *Dynamics of Highly Spinning Black Hole Binaries and Their Gaseous Environment*; TG-PHY060027N; PI: C.Lousto; co-PIs: H.-P.Bischof, M.Campanelli, J.Faber, **S.Noble**, and Y.Zlochower; Amount: **5.4M SUs** on Gordon (SDSC), **3M SUs** on Stampede (TACC).

09/2013 – 08/2014 **Co-Principal Investigator**: *XSEDE*; Renewal; Title: *Intermediate Mass Ratio Black-Hole Binaries with High Spins: Dynamics of the Black Holes and Their Gaseous Environments*; TG-PHY060027N; PI: C.Lousto; co-PIs: H.-P.Bischof, M.Campanelli, J.Faber, **S.Noble**, and Y.Zlochower; Amount: **2.3M SUs** on Gordon (SDSC), **4M SUs** on Stampede (TACC), **1M SUs** on Lonestar (TACC) (the total amounts to approximately **15M SUs** using SU units equivalent to previous years).

04/2013 – 10/2014 **Science & Technical Lead**: *PRAC*; Title: *Computational Relativity and Gravitation at Petascale: Simulating and Visualizing Astrophysically Realistic Compact Binaries*; NSF ACI 0832606 PRAC; PI: M.Campanelli; co-PIs: H.-P.Bischof, J.Faber, C.Lousto, and Y.Zlochower; Science/Technical Lead: **S. Noble**; Amount: **17.5M SUs** on Blue Waters (NCSA). Allocation is associated with a proposal submitted prior to Noble's arrival at RIT, but is now exclusively allocated for Noble's circumbinary disk calculations.

09/2012 – 08/2013 **Co-Principal Investigator**: *XSEDE*; Renewal; Title: *Binary Black Holes of Intermediate Mass Ratios and Spins, and their Gaseous Environments*; TG-PHY060027N; PI: C.Lousto; co-PIs: H.-P.Bischof, M.Campanelli, J.Faber, H. Nakano, **S.Noble**, B. Mundim, and Y.Zlochower; Amount: **17.3M SUs** on several XSEDE clusters.

09/2011 – 08/2012 **Co-Principal Investigator**: *XSEDE*; Renewal; Title: *Simulations of Astrophysical Extreme Binary Black Holes*; TG-PHY060027N; PI: C.Lousto; co-PIs: H.-P.Bischof, M.Campanelli, J.Faber, **S.Noble**, and Y.Zlochower; Amount: **12.5M SUs** on several XSEDE clusters.

Student Supervision

08/2015 – present	Vernon Londagin, undergraduate senior thesis project (TU): "Using Mathematica as a Bootstrap to Simulate Light and Gas Around Binary Black Hole Systems"
05/2015 – 08/2015	Luke Schriewer, Tulsa Undergraduate Research Challenge (TU): "Application of Nuclear Equations of State to Explore Neutron Star Solutions in Simulations"
05/2015 – 08/2015	Vernon Londagin, Tulsa Undergraduate Research Challenge (TU): "Using Mathematica as a Bootstrap to Simulate Light and Gas Around Binary Black Hole Systems"
05/2015 – present	Amanda Seiders, PhD project (TU): "GRMHD on Overlapping, Non-Aligned Grids"
08/2014 – 05/2015	Jeffrey Harris, undergraduate senior thesis project (TU): "Visualization and Analysis of Lightlike and Timelike Geodesics in Isolated Schwarzschild and Binary Kerr Spacetime Geometries"
08/2014 – 11/2014	William Bates, undergraduate senior thesis project (TU) "Neutron Star Collapse"
08/2012 – present	Dennis Bowen, PhD project (RIT): "Circumbinary Disks"
01/2010 – 11/2012	Billy Vazquez, graduate student project (RIT): "Imaging Binary Black Holes"
06/2008 – 08/2009	Robert Abramovic, undergraduate student project (JHU): "Null Geodesics and Surfaces in Curved Spacetimes"

University Service at TU

10/2014	Designed the course PHYS 4093/6093 "Introduction to General Relativity";
AY 2015 – 2016	Organizer of the 2015-2016 Norman M. Hulings Lecture (Prof. Clifford Will) on behalf of the College of Engineering and Natural Sciences;
Fall 2014 – present	Member of the Department's Hiring Committee for various academic positions;
AY 2014 – 2015	Member of the Department's Graduate Program's Review Committee;
Fall 2014 – present	Member of the PhD Advisory Committee for Wenhua Xue;
Fall 2014 – present	Member of the Department's Undergraduate Curriculum Committee;
Fall 2014 – present	Member of the Department's Graduate Curriculum Committee;
Fall 2014 – present	Member of the Department's Engineering Physics Curriculum Committee;
08/2015	Panelist of the New Faculty Orientation Panel, "What I wish I knew then...Advice from colleagues who recently joined TU too";
AY 2015 – 2016	1st Alternate to the Faculty Senate for the College of ENS;

Outreach

09/2014 – present	Supporting Faculty at Jerry McCoy's Physics Journal Club, a monthly meeting of 200 local high school students and citizens to discuss articles on current physics topics;
2010 – 2013	Exhibitor for the CCRG at ImagineRIT, presented research to the public, prepared scientific visualizations and an interactive computer program, `www.rit.edu/imagine/`;
10/2013	Presented black holes and outer space to a preschool class at Margaret's House, Rochester, NY;

Professional Development

06/2015	**Summer New Faculty Workshop**, College Park, MD, sponsored by AAPT;
11/2014	SmartEvals Online Tutorial (TU);
08/2014	Blackboard Tutorial, instructor: Janet Cairns (TU);

Memberships

2003 – present	American Physical Society
2008 – present	American Astronomical Society
2015 – present	American Association of Physics Teachers

Seminar Organizer

08/2015 – 05/2016	Physics Department Colloquia, TU;
08/2010 – 09/2011	Center for Computational Relativity and Gravitation, RIT;

Peer Review

Tenure Review Letter Writer (external);
NASA Astrophysics Theory Program Panelist;
Referee for: Astrophysical Journal Letters, Astrophysical Journal Supplement Series, Classical & Quantum Gravity, Pub. of the Astron. Society of Japan, Monthly Notices of the Royal Astronomical Society, General Relativity & Gravitation, Astronomy & Computing;

Collaborations

2010 – 2015
CDI-Type II: Computing Supermassive Black Hole Mergers in Astrophysics, NSF CDI AST 1028087, lead science and computational development for simulating magnetized circumbinary accretion disks in GR, supervised graduate students and postdocs, organized annual collaboration meetings at RIT, participated in weekly telecons;

2009 – 2014
Computational Relativity and Gravitation at the Petascale: Simulating Astrophysical Realistic Compact Binaries, NSF OCI 0832606, lead collaborative efforts to optimize `HARM3D`'s performance on Blue Waters, executed simulations;

2009 – 2014
Community Infrastructure for General Relativistic MHD (CIGR), NSF-PHY-0903782, participated in GRMHD code development for the Einstein Toolkit, attended weekly telecons to discuss Toolkit news/updates/bug-fixes;;

Skills and Expertise

Expert-level: (10+ years)

C, C++, Fortran, gdb, Make, Mathematica, Maple, MPI, Perl, Shell Scripting, LaTeX, GNU/Linux/Unix, Windows, Microsoft Word/Excel/PowerPoint,IDL, gprof, CVS, PowerPoint;
Mathematical Methods, ODEs, PDEs, Differential Geometry, Root-Finding, Minimization, Perturbation Theory, Statistics;
Computational Fluid Dynamics, Finite Volume/Difference Methods, High-Resolution Shock-Capturing Methods, Adaptive Mesh Refinement;
Scientific Computing and Code Development, High-performance/Massively Parallel Computing, Code Optimization, Debugging, Profiling/Benchmarking;
Presenting Research at National Conferences and Workshops, Scientific Research Collaboration, Scientific Research Program Management;

Intermediate-level: (5+ years)

HDF5, PAPI, CVS, Open Office/Libre Office, ImageMagick, Supermongo;
Git, MediaWiki, Mac OS X, Keynote;
Writing Proposals for Research Grants and Fellowships (NSF, NASA);
Writing Proposals for National Supercomputing Allocations (Teragrid, XSEDE, NSF/PRAC);

Presenting Research at International Conferences and Workshops, Supervising and Mentoring Students in an Academic Research Environment, Building and Managing Supercomputing Clusters and Workstation Networks, Data Backup/Archival Solutions;

Novice-level: (1+ years) Python, OpenMP, Java, Load Balancing Algorithms, Gnuplot, Subversion (SVN), Blackboard;

Computational Infrastructure Contributions

Developer/Maintainer — `HARM3D`, solves the magnetohydrodynamics (MHD) equations of motion in curved, general relativistic (GR), spacetimes; employs Godunov-like, flux-conservative, high-resolution shock-capturing techniques, parallelism, fixed mesh refinement, constraint transport methods; [Noble2009a]; *privately shared, to be released publicly.*

Developer/Maintainer — `BOTHROS2`, improved version of `BOTHROS`; supports a wider variety of emission models, 3-d simulation data with time-interpolation (resolves effects from the finite speed of light), nonuniform and adaptive "camera" resolutions or pixelation; [Noble2007a], *privately shared, to be released publicly.*

Developer/Maintainer — `my_Bessel_J`, a very fast routine for calculating the Bessel function $J_n(z)$ for arbitrarily large z, n, up to $n \sim 10^{55}$. Its execution time is constant with n, in contrast to the typical $\sim n^p$ dependence seen with many popular routines. `rainman.astro.illinois.edu/codelib/codes/bessel/src/` .

Principal Co-developer — `BOTHROS`, general relativistic ray-tracing software to calculate electromagnetic energy transport in curved spacetimes from 2-d GRMHD simulation data; solves the relativistic absorptive radiative transfer equation; thermal synchrotron and bremsstrahlung emission models; [Noble2007a].

Principal Co-developer — `PVS_GRMHD`, software suite used to calculate the primitive variables (density, pressure, and velocity) from a set of conserved variables (components of the stress-energy tensor) necessary for conservative GRMHD simulations; used by researchers worldwide; [Noble2006], *released publicly:* `rainman.astro.illinois.edu/codelib/codes/pvs_grmhd/src/` .

Co-developer — `HARM` (public release version), a 2-d GRMHD code on which `HARM3D` is based; *released publicly:* `rainman.astro.illinois.edu/codelib/codes/harm/src/` .

Co-developer — `Einstein Toolkit`, high performance computing software suite for a sundry of dynamical GR applications; based on the `Cactus` framework; helped develop its GRMHD component; *released publicly:* `einsteintoolkit.org` .

Publications

Refereed

1. Schnittman, J. D., Krolik, J. H., and **Noble, S. C.**, "Disk Emission from Magneto-hydrodynamic Simulations of Spinning Black Holes", *accepted Astrophysical Journal*, (2016). `http://arxiv.org/abs/1512.00729`

2. **Noble, S. C.** and Choptuik, M. W., "Driven neutron star collapse: Type I critical phenomena and the initial black hole mass distribution", *Physical Review D*, **93**, 024015 (2016). `http://arxiv.org/abs/1512.02999`

3. 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", *Astrophysical Journal*, **804**, 85 (2015); `http://arxiv.org/abs/1501.04365`.

4. Zilhão, M., **Noble, S. C.**, Campanelli, M., Zlochower, Y., "Resolving the relative influence of strong field spacetime dynamics and MHD on circumbinary disk physics", *Physical Review D*, **91**, 024034 (2015); `http://ccrg.rit.edu/~scn/papers/pn-cmbh-disks.pdf`.

5. Mundim, B. C., Nakano, H., Yunes, N., Campanelli, M., **Noble, S. C.**, Zlochower, Y., "Approximate Black Hole Binary Spacetime via Asymptotic Matching", *Physical Review D*, **89**, 084008 (2014). `http://arxiv.org/abs/1312.6731`

6. Zilhão, M. and **Noble, S. C.**, "Dynamic Fisheye Grids for Binary Black Holes Simulations", *Classical and Quantum Gravity*, **31**, 065013 (2014). `http://ccrg.rit.edu/~scn/papers/warped.pdf`

7. Moesta, P., Mundim, B. C., Faber, J. A., Haas, R., **Noble, S. C.**, Bode, T., Loeffler, F., Ott, C. D., Reisswig, C., and Schnetter, E., "GRHydro: a new open-source general-relativistic magnetohydrodynamics code for the Einstein toolkit", *Classical and Quantum Gravity*, **31**, 015005 (2014). `http://ccrg.rit.edu/~scn/papers/grhydro-et.pdf`

8. Schnittman, J. D., Krolik, J. H., and **Noble, S. C.**, "X-ray Spectra from MHD Simulations of Accreting Black Holes", *Astrophysical Journal*, **769**, 156 (2013). `http://ccrg.rit.edu/~scn/papers/xray-spectra.pdf`
Press Release: `http://www.nasa.gov/topics/universe/features/black-hole-study.html`

9. **Noble, S. C.**, Mundim, B. C., Nakano, H., Krolik, J. H., Campanelli, M., Zlochower, Y., Yunes, N., "Circumbinary MHD Accretion into Inspiraling Binary Black Holes", *Astrophysical Journal*, **755**, 51 (2012). `http://ccrg.rit.edu/~scn/papers/cmhdaiibh.pdf`, Movies: `http://ccrg.rit.edu/~scn/cmhdaiibh/`

10. Dolence, J. C., Gammie, C. F., Shiokawa, H. and **Noble, S. C.**, "Near-infrared and X-Ray Quasi-periodic Oscillations in Numerical Models of Sgr A*", *Astrophysical Journal Letters*, **746**, L10 (2012). `http://ccrg.rit.edu/~scn/papers/sgra_qpos.pdf`

11. Shiokawa, H., Dolence, J. C., Gammie, C. F., and **Noble, S. C.**, "Global GRMHD Simulations of Black Hole Accretion Flows: A Convergence Study", *Astrophysical Journal*, **744**, 187 (2012). `http://ccrg.rit.edu/~scn/papers/global_mhd_convergence.pdf`

12. **Noble, S. C.**, Krolik, J. H., Schnittman, J. D. and Hawley, J. F., "Radiative efficiency and thermal spectrum of accretion onto Schwarzschild black holes", *Astrophysical Journal*, **743**, 115 (2011). `http://ccrg.rit.edu/~scn/papers/thermspec.pdf`

13. Leung, P. K., Gammie, C. F. and **Noble, S. C.**, "Numerical Calculation of Magnetobremsstrahlung Emission and Absorption Coefficients", *Astrophysical Journal*, **737**, 21 (2011). `http://ccrg.rit.edu/~scn/papers/magbrem.pdf`

14. **Noble, S. C.**, Krolik, J. H. and Hawley, J. F., "Dependence of inner accretion disk stress on parameters: the Schwarzschild case", *Astrophysical Journal*, **711**, 959-973 (2010). `http://ccrg.rit.edu/~scn/papers/schwarzstress.pdf`

15. **Noble, S. C.** and Krolik, J. H., "GRMHD prediction of coronal variability in accreting black holes", *Astrophysical Journal*, **703**, 964-975 (2009). `http://ccrg.rit.edu/~scn/papers/grmhd_var.pdf`

16. **Noble, S. C.**, Krolik, J. H., Hawley, J. F., "Direct calculation of the radiative efficiency of an accretion disk around a black hole", *Astrophysical Journal*, **692**, 411-421 (2009). [Noble2009a] `http://ccrg.rit.edu/~scn/papers/radeff.pdf`

17. **Noble, S. C.** and Choptuik, M. W. "Type II critical phenomena of neutron star collapse", *Physical Review D*, **78**, 064059 (2008). `http://ccrg.rit.edu/~scn/papers/t2ns.pdf`

18. **Noble, S. C.**, Leung, P. K., Gammie, C. F., and Book, L. G., "Simulating the Emission and Outflows from Accretion Disks", *Classical and Quantum Gravity*, **24**, S259-S274 (2007). [Noble2007a] `http://ccrg.rit.edu/~scn/papers/sgra2d.pdf`

19. **Noble, S. C.**, Gammie, C. F., McKinney, J. C., and Del Zanna, L. "Primitive Variable Solvers for Conservative General Relativistic Magnetohydrodynamics", *Astrophysical Journal*, **641**, 626-637 (2006). [Noble2006] `http://ccrg.rit.edu/~scn/papers/pvs.pdf`

Conference Proceedings

20. Gammie, C. F., **Noble, S. C.**, Leung, P. K., "Numerical models of black hole accretion flows", *Computer*

Physics Communications, **177**, 250-253 (2007). http://ccrg.rit.edu/~scn/papers/nmbhaf.pdf

21. **Noble, S. C.**, Leung, P. K., Gammie, C. F., and Book, L. G., "Simulating VLBI Images of Sgr A* ", Proceedings of the MG11 Meeting on General Relativity, Berlin, Germany July 23 - 29, 2006 http://ccrg.rit.edu/~scn/papers/mg11.pdf

Seminars and Talks

Invited Talks

1. "Topics in GRMHD" and "Future Directions in GRMHD", talks on latest research results in the field and personal, given during the TIARA Summer School titled "Numerical Astrophysics: GRMHD", June 11, 2015. http://events.asiaa.sinica.edu.tw/school/20150713/;

2. "The Influence of Strong Field Spacetime Dynamics and MHD on Circumbinary Disk Physics", Blue Waters Symposium, NCSA, Univ. of Illinois at Urbana-Champaign, May 14, 2014.

3. "Computational Plasma Physics Meets Einstein's Theory of General Relativity: Using Supercomputers to Predict How Black Holes Shine", Physics & Astronomy Colloquium, SUNY-Geneseo, April 24, 2014.

4. "Predicting the Needle in the Haystack: Simulating Accreting Supermassive Binary Black Holes", Conference titled *Massive Black Holes: Birth, Growth and Impact* associated with the program titled *A Universe of Black Holes*, KITP, UCSB, August 7, 2013. http://online.kitp.ucsb.edu/online/bholes_c13/noble/

5. "Computational Relativity and Gravitation at Petascale: Simulating and Visualizing Astrophysically Realistic Compact Binaries", NCSA/Illinois Enhanced Intellectual Services for Petascale Performance (NEIS-P^2) Symposium, NCSA, Univ. of Illinois, Champaign-Urbana, May 21, 2013.

6. "Frontiers in Computational Relativistic Magnetohydrodynamics Applied to Astrophysical Systems:Predicting Light Signatures of Black Holes", Conference on Computational Physics, Kobe, Japan, October 18, 2012. http://ccrg.rit.edu/~scn/pres/ccp-2012.pdf

7. "Magnetized Accretion onto Inspiraling Binary Black Holes", CITA Seminar, Toronto, ON, Canada, March 15, 2012. Talk: http://ccrg.rit.edu/~scn/pres/cita-03152012.pdf, Video: http://hosting.epresence.tv/CITA/1/watch/421.aspx

8. "Simulating the Light and Plasma of Thin Accretion Disks about Black Holes", Astro Lunch Seminar, RIT, June 15, 2011. http://ccrg.rit.edu/~scn/pres/astro-lunch-rit-06152011.pdf

9. "MHD Simulations of Black Hole Accretion Disks", SnowPAC: Snowbird Workshop on Particle Astrophysics, Astronomy & Cosmology, Utah, February 1, 2011. http://ccrg.rit.edu/~scn/pres/snowpac-2011.pdf

10. "The Razor's Edge: Dynamical Models of Thin Accretion Disks around Black Holes", TAPIR Seminar, Caltech, May 28, 2010. http://ccrg.rit.edu/~scn/pres/tapir-may-2010.pdf

11. "Illuminating Black Hole Spacetimes with Accretion Disks", Strong Gravity Seminar, Perimeter Institute, March 25, 2010. http://ccrg.rit.edu/~scn/pres/noble-pi-march-2010.pdf

12. "Seeing Spacetime by Proxy: Binary Black Holes in Gaseous Environments", APS April Meeting 2010, Washington, DC, February 14, 2010. http://ccrg.rit.edu/~scn/pres/aps-april-2010.pdf

13. "Accretion onto Black Holes", Computational Relativistic Astrophysics Program, Princeton Center for Theoretical Science, Princeton University, October 24, 2009. http://ccrg.rit.edu/~scn/pres/pcts-10232009.pdf

14. "The GRMHD Paradigm of Black Hole Accretion", Applied Mathematics and Statistics Seminar, Univ. of California Santa Cruz, October 15, 2009. http://ccrg.rit.edu/~scn/pres/ucsc-102009.pdf

15. "Calculating the Radiative Efficiency of Thin Disks with 3D GRMHD Simulations", Gravity Group Astrophysics/Cosmology Lunch Seminar, Princeton University, November 14, 2008. http://ccrg.rit.edu/~scn/pres/princeton-11142008.pdf

16. "Theoretical Calculations of the Inner Disk's Luminosity", 37$^{\text{th}}$ COSPAR 2008, E17, Montreal, Quebec, July

16, 2008, http://ccrg.rit.edu/~scn/pres/cospar-2008.ppt

17. "Simulating Black Hole Lighthouses", Center for Computational Relativity and Gravitation Seminar, RIT, May 16, 2008, http://ccrg.rit.edu/~scn/pres/rit-05162008.pdf

18. "Simulating grMHD Accretion Disks and their Emission", Numerical Relativity Seminar, Physics Department, Louisiana State University, November 30, 2006, http://ccrg.rit.edu/~scn/pres/lsu-11302006.pdf

19. "Simulating and Imaging Accretion Disks (e.g. Sgr A*, i.e. the Galactic Center)", FLAMR2 Workshop, Canadian Institute for Theoretical Astrophysics (CITA), U. of Toronto, June 2, 2006, http://ccrg.rit.edu/~scn/pres/flamr2-06022006.pdf

20. "Solving the NP-Complete 3-SAT Problem through Simulation of a Quantum Computer", Quantum Information and Computation (QUIC) Kickoff Mini-Workshop, Caltech, February 1997.

Contributed Talks

21. "Exploring the Model Dependence of Electromagnetic Signals in Circumbinary Disk Simulations", General Relativity and Gravitation: A Centennial Perspective, sponsored by the ISGRG and GGR/APS, Pennsylvania State University, June 7-12, 2015, http://ccrg.rit.edu/~scn/pres/grg-2015.pdf.

22. "3-D GRMHD Simulations of Accreting Binary Black Holes", Aspen Winter Conference ("Black Holes in Dense Stellar Clusters"), Aspen Center for Physics, January 2015, http://ccrg.rit.edu/~scn/pres/aspen-winter-2015.pdf.

23. "Magnetized Accretion onto Inspiraling Binary Black Holes: II. Disk Dynamics", APS April Meeting 2012, Atlanta, GA, April 1, 2012, http://ccrg.rit.edu/~scn/pres/aps-april-2012.pdf

24. "Magnetized Accretion onto Inspiraling Binary Black Holes", CCRG Seminar, RIT, Rochester, NY, March 23, 2012, http://ccrg.rit.edu/~scn/pres/ccrg-03232012.pdf

25. "Bridging the Gap: Circumbinary MHD Accretion in the Post-Newtonian Regime", 21st Midwest Relativity Meeting, November 5, 2011.

26. "Relativistic MHD Simulations of Circumbinary Disks", BBH Disk Workshop, RIT, June 28, 2011.

27. "Beyond MOND", Review talk, CCRG Lunch Seminar, RIT, July 2, 2010.

28. "Direct Calculation of the Radiative Efficiency of Thin Accretion Disks", 213th American Astronomical Society Meeting, #338.05, Long Beach, CA, USA, January 6, 2009, http://ccrg.rit.edu/~scn/pres/aas-01062009.pdf

29. "The Radiative Efficiency of Thin Accretion Disks", 24th Texas Symposium on Relativistic Astrophysics, Vancouver, Canada, December 12, 2008, http://ccrg.rit.edu/~scn/pres/texas-12122008.pdf

30. "Calculating the Radiative Efficiency of Thin Disks with 3D GRMHD Simulations", Center for Astrophysical Sciences Seminar, Johns Hopkins University, November 25, 2008, http://ccrg.rit.edu/~scn/pres/cas-jhu-11252008.pdf

31. "Simulating Accretion Disks and their Emission", Center for Astrophysical Sciences Seminar, Johns Hopkins U., December 11, 2007, http://ccrg.rit.edu/~scn/pres/cas-12112007.pdf

32. "Simulating VLBI Images of Sgr A*", 11th Marcel Grossmann International General Relativity Conference, Berlin, Germany, July 28, 2006, http://ccrg.rit.edu/~scn/pres/mg11-07282006.pdf

33. "Imaging Accretion Disk Evolutions", New Frontiers of Numerical Relativity, Albert Einstein Institute, Golm, Germany, July 20, 2006, http://ccrg.rit.edu/~scn/pres/nfnr-07202006.pdf

34. "Beyond MOND: TeVeS and its Tests", Center for Theoretical Astrophysics Seminar, U. of Illinois in Urbana-Champaign, March 1, 2006, http://ccrg.rit.edu/~scn/pres/cta_uiuc_03012006.pdf

35. "Bulletin on the Biggest, Baddest Black Hole on the Block: Recent Observations and Models of the Accretion Disk around Sgr A*", Center for Theoretical Astrophysics Seminar, U. of Illinois in Urbana-Champaign,

September 21, 2005, http://ccrg.rit.edu/~scn/pres/cta_uiuc_09212005.pdf

36. "The Origins, Applications and Mysteries of the Fluorescent Iron Line", Center for Theoretical Astrophysics Seminar, U. of Illinois in Urbana-Champaign, November 3, 2004, http://ccrg.rit.edu/~scn/pres/cta_uiuc_11032004.pdf

37. "State of the Art MHD Methods for Astrophysical Applications", Center for Theoretical Astrophysics Seminar, U. of Illinois in Urbana-Champaign, February 25, 2004, http://ccrg.rit.edu/~scn/pres/cta_uiuc_02252004.pdf

38. "Critical Phenomena and Driven Neutron Star Collapse", Center for Theoretical Astrophysics Seminar, U. of Illinois in Urbana-Champaign, October 22, 2003, http://ccrg.rit.edu/~scn/pres/cta_uiuc_10222003.pdf

39. "A Numerical Study of Relativistic Fluid Collapse", Final Ph. D. Defense, Physics Dept., U. of Texas at Austin, September 5, 2003, http://ccrg.rit.edu/~scn/pres/defense.pdf

40. "Critical Phenomena in General Relativity", Graduate Student Seminar, Physics and Astronomy Dept., U. of British Columbia, June 10, 2003, http://ccrg.rit.edu/~scn/pres/grad_theory_lunch.pdf

41. "Critical Phenomena in Velocity-Induced Perfect Fluid Collapse", American Physical Society, April Meeting, Philadelphia, PA, April 5-8, 2003, http://ccrg.rit.edu/~scn/pres/aps_april2003.pdf

42. "Critical Phenomenon in Perturbed Neutron Star Models", Scientific Computing and Visualization Laboratory Seminar, U. of British Columbia, February 11, 2003, http://ccrg.rit.edu/~scn/pres/scv_seminar.pdf

43. "Dynamically Perturbed Neutron Stars", Gravity Group Seminar, U. of British Columbia, September 27, 2001, http://ccrg.rit.edu/~scn/pres/gravity_group2.ps

44. "Simulating Relativistic Perfect Fluids", Gravity Group Seminar, U. of British Columbia, January 18, 2001, http://ccrg.rit.edu/~scn/pres/gravity_group1.ps

45. "Simulating Ultrarelativistic Flows with Adaptive Mesh Refinement", Ph.D. Qualifier, Relativity Seminar, U. of Texas at Austin, October 28, 1999.

46. "Solving the NP-Complete 3-SAT Problem through Simulation of a Quantum Computer", Summer Undergraduate Research Fellowship Presentation Day, Caltech, October 1996.

47. "A Study on the Performance of the Crystal Calorimeter for BaBar at SLAC", Summer Undergraduate Research Fellowship Presentation Day, Caltech, October 1995.

48. "Simulating the Resolution Performance of Crystal Calorimeters for the B Factory Experiment at SLAC and the CMS Experiment at LHC", Summer Undergraduate Research Fellowship Presentation Day, Caltech, October 1994.

Conference Posters

1. "Self-consistent Models of Sagittarius A*", Black Holes: 2007 Spring Symposium, STScI, Baltimore, April 23-26, 2007, http://ccrg.rit.edu/~scn/posters/bh_stsci_apr2007.pdf

2. "Improved Primitive Variable Calculation for Conservative GRMHD Codes", Physics of Astrophysical Outflows and Accretion Disks Conf., KITP, UCSB, May 23-27, 2005, http://ccrg.rit.edu/~scn/posters/kitp-2005-poster.pdf

3. "Perfect Fluids at the Threshold of Black Hole Formation", 17^{th} International Conf. on General Relativity and Gravitation (a.k.a. GR17) , Dublin, Ireland, July 18-23, 2004. http://ccrg.rit.edu/~scn/posters/gr17-poster.pdf

In the News...

1. Magazine Cover & Interior Photograph: ***Science News***, May 31, 2014 edition. https://www.sciencenews.org/sn-magazine/may-31-2014?mode=archive&context=189185. Cover photograph and cover animation for the "app" version of the magazine were selected from the visualization made for http://www.nasa.gov/topics/universe/features/black-hole-study.html (see below).

Another image of mine, `http://ccrg.rit.edu/~scn/images/sgra_3d-hires.jpg`, was used for the header for the article on the Firewall Paradox in the edition.

2. Movie: Provided image sequence of ray-traced simulation data for a NASA animation of the X-ray emission from the corona of a geometric thin black hole accretion disk. `http://www.nasa.gov/topics/universe/features/black-hole-study.html` . Several articles were written about our findings, including:
   (a) TACC front-page article, Feb. 26, 2014, "Let There Be Light", by Aaron Dubrow: `https://www.tacc.utexas.edu/news/feature-stories/2014/let-there-be-light`.
   (b) NSF.gov front-page article, Feb. 18, 2014, by Aaron Dubrow: `http://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=130431`.
   (c) Wikipedia: "animations of black hole accretion", `http://en.wikipedia.org/wiki/Accretion_disc`.
   (d) HPCWire, March 3, 2014: "Supercomputers Advance Understanding of Black Holes" by Tiffany Trader, `http://www.hpcwire.com/2014/03/03/supercomputers-advance-understanding-black-holes/`.
3. Movie: Animation of the synchrotron emission from a 3D GRMHD simulation of plasma surrounding the Milky Way's nuclear supermassive black hole, Credits: Noble, S. C. and Gammie, C. F., **"How the Universe Works: Black Holes"**, *Discovery Channel*, `dsc.discovery.com/videos/how-the-universe-works-black-holes`
4. Image Description: "Theoretical calculation of synchrotron emission from the Milky Way's nuclear supermassive black hole using 3D GRMHD simulation data", Image: `http://ccrg.rit.edu/~scn/press_images/sgra_3d.jpg`, Hi-res.: `http://personal.utulsa.edu/~scn759/images/sgra_3d-hires.jpg`
   (a) "The Shadow of a Black Hole", by Matthew Francis, The Nature of Reality, NOVA, PBS, (Aug. 21, 2015), `http://www.pbs.org/wgbh/nova/blogs/physics/2015/08/the-shadow-of-a-black-hole/`.
   (b) Appeared in NASA's Astrophysics Roadmap (2013), "Enduring Quests, Daring Visions NASA Astrophysics in the Next Three Decades" `http://science.nasa.gov/science-committee/subcommittees/nac-astrophysics-subcommittee/astrophysics-roadmap/`.
   (c) Appeared in the table of contents of journal Nature in support of the article: Doeleman, S. S. et al., "Event-horizon-scale structure in the supermassive black hole candidate at the Galactic Centre", *Nature*, **455**, 78-80 (2008).
   (d) Image Description: "Theoretical calculation of synchrotron emission from the Milky Way's nuclear supermassive black hole using 3D GRMHD simulation data", Appeared in the on-line article: "Milky Way's black hole seen in new detail", *Science News*, **174**, #7 (September 27th, 2008), `http://www.sciencenews.org/view/generic/id/36161/description/Milky_Ways_black_hole_seen_in_new_detail`
   (e) Appeared on FrenchTribune.com: `http://frenchtribune.com/teneur/1319997-scientists-declared-super-massive-black-hole-center-milky-way`
5. Image Description: "Theoretical calculation of synchrotron emission from the Milky Way's nuclear supermassive black hole using 2D GRMHD simulation data", Advertisement for the journal *Classical and Quantum Gravity* (2007), Image: `http://ccrg.rit.edu/~scn/press_images/sgra_2d.jpg`

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