Michael Zingale / Curriculum Vitæ

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web: http://www.astro.sunysb.edu/mzingale/
github: https://github.com/zingale
youtube: https://www.youtube.com/user/michaelzingale

Present Position:

Jan. 2012–   *Associate Professor of Physics and Astronomy*, Stony Brook University, Stony Brook, NY

Research Interests:

I am interested in developing and applying computational hydrodynamics algorithms to problems in nuclear astrophysics. A large part of this work is the development of low Mach number hydrodynamics algorithms suited toward long-time evolution in astrophysical flows. The low Mach number simulation code Maestro (developed together with collaborators at LBNL) has been applied to a variety of problems to model convection in stellar environments, including Type Ia supernovae, X-ray bursts, novae, and massive star evolution. Maestro is publicly available.

Education:

2000   Ph.D. in Astronomy and Astrophysics, University of Chicago
thesis: *Helium Detonations on Neutron Stars*
advisor: Dr. J. W. Truran

1998   M.S. in Astronomy and Astrophysics, University of Chicago

1996   B.S. in Physics and Astronomy, University of Rochester, Magna Cum Laude
thesis: *Magnetohydrodynamical Wave Support of Molecular Clouds*
Minor in Mathematics, University of Rochester

Academic Appointments:

2014–   *Affiliate*, Institute for Advanced Computational Science, Stony Brook University, Stony Brook, NY

2006–2011   *Assistant Professor of Physics and Astronomy*, Stony Brook University

2001–2005   *Postdoctoral Researcher*, SciDAC Supernova Science Center, University of California, Santa Cruz. Worked on simulations of turbulent thermonuclear flames in Type Ia supernova. Initiated a collaboration with Lawrence Berkeley Lab to apply low Mach number hydrodynamics methods to astrophysical flames. *advisor:* Dr. S. E. Woosley

2000–2001   *Research Associate*, Center for Astrophysical Thermonuclear Flashes, University of Chicago. One of the developers of the FLASH Code. Research focused on flame simulations in Type Ia supernovae. *advisor:* Dr. J. W. Truran

| 1997–2000 | *Graduate student researcher*, Center for Astrophysical Thermonuclear Flashes and Department of Astronomy and Astrophysics, University of Chicago. One of the developers of the FLASH Code.   *advisor:* Dr. J. W. Truran |

Honors / Awards:

2015	Scialog Fellow for *Scialog: Time Domain Astrophysics: Stars and Explosions*
2006	Presidential Early Career Award in Science and Engineering (PECASE). Nomination through DOE NNSA.
2006	DOE Office of Nuclear Physics Outstanding Junior Investigator (OJI) Award for a proposal entitled: *Multidimensional Modeling of Astrophysical Thermonuclear Explosions*
2000	Gordon Bell Award in High Performance Computing, Special Category for a paper entitled *High-Performance Reactive Fluid Flow Simulations Using Adaptive Mesh Refinement on Thousands of Processors*, Calder et al. 2000. (SC 2000 conference)
2000	Carl Sagan Award for Excellence in Teaching (Dept. of Astronomy & Astrophysics, University of Chicago)
1997	Gregor Wentzel graduate teaching award (Dept. of Physics, University of Chicago)
1996	Stoddard Prize in physics for senior thesis (University of Rochester)
1996	Flagg Award for highest GPA in physics (University of Rochester)
1996	Inducted into Phi Beta Kappa honor society (University of Rochester)
1994	Inducted into Sigma Pi Sigma physics honor society (University of Rochester)

Publications:

60+ refereed publications and conference proceedings, h-index = 20 (ISI)

Research Grants/Contracts as Principal Investigator:

2011–2013	Department of Energy, Office of Nuclear Physics (2.5-year renewal), *Multidimensional Modeling of Astrophysical Thermonuclear Explosions*, DOE DE-FG02-06ER41448	$253,000
2010–2011	Contract with Lawrence Livermore National Laboratory, *Multidimensional Modeling of Nova with Realistic Nuclear Physics*, 2010: B589924; 2011: B593287	$99,768
2009–2011	Department of Energy, Office of Nuclear Physics Outstanding Junior Investigator Award (2-year renewal), *Multidimensional Modeling of Astrophysical Thermonuclear Explosions*, DOE DE-FG02-06ER41448	$186,000
2007–2009	Contract with Lawrence Livermore National Laboratory, *Verification and Validation of Radiation Hydrodynamics for Astrophysical Applications*, 2007: B568673; 2008: B574691; 2009 B582735	$150,000

| 2006–2009 | Department of Energy, Office of Nuclear Physics Outstanding Junior Investigator Award, *Multidimensional Modeling of Astrophysical Thermonuclear Explosions*, DOE DE-FG02-06ER41448 | $255,000 |

Research Grants/Contracts as Co–Investigator:

2015–2018	Department of Energy, Office of Nuclear Physics *Research in Nuclear Astrophysics: Supernovae, Compact Objects, and Algorithms*, DOE DE-FG02-87ER40317, PI: James Lattimer, Co-Is: Alan Calder, Michael Zingale	$1,100,000
2013–2015	Department of Energy, Office of Nuclear Physics *Research in Nuclear Astrophysics: Supernovae, Compact Objects, and Algorithms*, DOE DE-FG02-87ER40317, PI: James Lattimer, Co-Is: Alan Calder, Michael Zingale	$640,000
2012–2015	NSF, *White Dwarf Mergers as Progenitors of Type Ia Supernovae*, AST-1211563, PI: Alan Calder, Co-Is: Doug Swesty, Michael Zingale	$437,643

Large Computer Time Allocations:

2016	PI on a NERSC 2016 allocation, *Three-dimensional studies of neutron star systems* (4.6 M MPP hours)
2015–2016	PI on an INCITE 2015 award for the OLCF Cray XK7 titan machine entitled *Approaching Exascale Models of Astrophysical Explosions* (2015: 50 Mh, 2016: 55 Mh)
2011–2015	Co-I on NSF PRAC for NCSA/Blue Waters, *Type Ia Supernovae* (9.1 M node hours)
2015	PI on a NERSC 2015 allocation, *Three-dimensional studies of convection in X-ray bursts* (5.9 M MPP hours)
2014	PI on a NERSC 2014 allocation, *Three-dimensional studies of convection in X-ray bursts* (14 M MPP hours)
2014	Co-I on a NERSC 2014 allocation, *Type Ia Supernovae and X-Ray Bursts* (9 M MPP hours)
2012–2014	Co-I on an INCITE 2012 award for the OLCF Cray XT5 for a proposal entitled *Petascale Simulations of Type Ia Supernovae* (2012: 46 Mh; 2013: 55 Mh; 2014: 50 Mh)
2013	PI on XSEDE allocation on Kraken/NICS, *CASTRO Simulations of Merging White Dwarfs* (4.1 Mh)
2013	Co-I on a NERSC 2013 allocation, *Type Ia Supernovae and X-ray Bursts* (3.5 M MPP hours)
2011	Co-I on a TeraGrid allocation on the Kraken machine for a proposal entitled *Thermonuclear Bursts on the Surfaces of Compact Astrophysical Objects* (2.1 Mh, Oct. 2011)
2011	Co-I on an INCITE 2011 award for the Cray XT5/ORNL for a proposal entitled *Petascale Simulations of Type Ia Supernovae* (50 Mh)
2010	PI on a TeraGrid allocation on the Kraken machine for a proposal entitled *Thermonuclear Bursts on the Surfaces of Compact Astrophysical Objects* (1 Mh; Oct. 2010)

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2010	Co-I on an INCITE 2010 award for the Cray XT5/ORNL for a proposal entitled *Multidimensional Models of Type Ia Supernovae from Ignition to Observables* (5 Mh initially + 20 Mh supplement)
2007–2009	Co-Investigator on an INCITE 2007 award for the Cray XT3/ORNL for a proposal entitled *First Principles Models of Type Ia Supernovae*. (2007: 4 Mh; 2008: 3.5 Mh; 2009: 3 Mh)
2006	Co-Principal Investigator on the Leadership Computing Facility (ORNL) allocation entitled *Ignition and Flame Propagation in Type Ia Supernovae*. (3 Mh)

Stony Brook Physics and Astronomy Teaching Experience:

Astronomy Today (AST 100)	A one-credit undergraduate seminar on current astronomy topics, where students lead the discussion on current topics. (F 2010, F 2011, F 2014, F 2015)
Introduction to the Solar System (AST 105)	An overview of solar system topics (solar system dynamics, Kepler's laws, planetary processes, exoplanets, . . .) for non-majors. (F 2007, F 2008, F 2009, F 2011, S 2014, S 2015)
Astronomy (AST 203)	A calculus-based introduction to astronomy and astrophysics for majors, covering the basics of radiation, spectra, binary stars, stellar evolution, ISM, clusters, galaxies, and cosmology. (S 2007, S 2008, S 2009, S 2010, S 2011, S 2012)
Introduction to Planetary Sciences (AST 205)	A calculus-based introduction to the solar system for majors covering basic solar system motion, planetary processes, exoplanets, and solar system formation. (F 2010, F 2014)
Stars (PHY 521)	A graduate-level introduction to the physical processes inside stars, stellar structure and atmospheres, and stellar explosions. (F 2013, F 2015)
Python for Scientific Computing (PHY 546; formerly grad special topics)	A one-hour weekly graduate seminar that I created that introduces python and a variety of libraries (NumPy, matplotlib, SciPy, SymPy) for numerical analysis, visualization, and data processing, as well as basic software engineering practices (git/github, debugging, testing). (S 2014, S 2015, S 2016)
The Application of Simulation in Astrophysics (grad special topics)	Develop the equations of hydrodynamics, instabilities common in astrophysics, and discuss numerical methods for solving the Euler equations (finite-volume methods, Riemann solvers, etc.) (S 2006)
Numerical Methods for (Astro)Physics (grad special topics)	A practical introduction to good development practices, order-of-accuracy, numerical differentiation, integration, interpolation, ODEs, root finding, solving hyperbolic, elliptical, and parabolic PDEs, computational fluid dynamics, and parallel programming, with examples in python. (S 2013, S 2016)

Other Teaching Experience:

Summer 2001 — *University of Chicago / Department of Computer Science:*
Teaching assistant for the Introduction to Programming in C class in the Computer Science Professional Masters Program at the University of Chicago.

1997–1998 — *Center of Astronomical Research in Antarctica (CARA) outreach program:*
Developed and taught thermodynamics, E&M, and mechanics experiments to grade 7–12 Chicago school students. Awarded the Carl Sagan teaching award.

1996–1997 — *Introductory Physics Teaching Assistant (University of Chicago):*
Taught weekly discussion and laboratory sections. Awarded the Gregor Wentzel teaching award.

Professional Development:

2001 — Finite Volume Upwind and Centered Methods for Hyperbolic Conservation Laws (Barcelona, Spain)

1999 — NASA Summer School for High Performance Computational Earth and Space Sciences

Stony Brook University Service:

2013– — Astronomy Open Nights coordinator, Dept. of Physics and Astronomy

2011–2012, 2013– — Strategic Advising Committee, Dept. of Physics and Astronomy

2013–2014 — Undergraduate Astronomy Coordinator, Dept. of Physics and Astronomy

2014–2015 — Department Chair Search Committee, Dept. of Physics and Astronomy

2014–2015 — Three-year Reappointment Committee for Astronomy colleague, Dept. of Physics and Astronomy

2013–2014 — Tenure Committee for Astronomy colleague, Dept. of Physics and Astronomy

2013–2014 — Astronomy Faculty Search Committee, Dept. of Physics and Astronomy

2013 — Ad-hoc Committee for High-Energy Physics Hire, Dept. Physics and Astronomy

2007–2012 — Colloquium Committee, Dept. of Physics and Astronomy (chair: Fall 2008, Fall 2009, Fall 2010, Fall 2011)

2011 — CESAME/Physics and Astronomy joint hire committee, Dept. of Physics and Astronomy

2010 — Teaching Learning Technology (TLT) Advisory Committee

2009 — Long Range Planning Committee, Dept. of Physics and Astronomy

2007–2009 — Graduate Advising Committee, Dept. of Physics and Astronomy

2006–2009 — University Senate Committee on Computing and Communications (chair: Feb. 2008 – May 2009)

2008 — Department Chair Search Committee, Dept. of Physics and Astronomy

2007–2008	Astronomy Faculty Search Committee, Dept. of Physics and Astronomy
2006–2007	Graduate Admission Committee, Dept. of Physics and Astronomy
2006–2007	NYCCS Faculty Search Committee (Dept. level), Dept. of Physics and Astronomy

Professional Service:

2014–	Elected to the OLCF User Group Executive Board (Vice chair: 2014–2015; Chair: 2015–2016)
ongoing	Referee for the *Astrophysical Journal*, *Astronomy and Astrophysics*, *Nature*, *Monthly Notices of the Royal Astronomical Society*, *Journal of Computational Physics*, and *Nuclear Physics A*
2006–	Annual *Astronomy Open Night* public outreach talks, Stony Brook (Open Night coordinator from Fall 2013–)
2014	External reviewer for NSF PRAC
2013	Served on a NASA ATP grant review panel
2013	External reviewer for NSF Office of Cyber Infrastructure
2012	Reviewer for the Great Lakes Consortium for Petascale Computation (2012) proposals for the NCSA Blue Waters machine.
2011	External reviewer for DOE Office of Nuclear Physics
2007	External reviewer for NASA Astrophysics Theory and Fundamental Physics Program
2006	Served on NSF Astronomy and Astrophysics Program review panel

Meeting Organization:

2015	Scientific organizing committee for the workshop *GNASH: The anomalous metal-poor stars and convective-reactive nuclear astrophysics* (U. Victoria, Victoria, BC)
2015	Co-organizer of the *New York Area Computational Astrophysics meeting* (Farmingdale State College, April 2015)
2014–2015	Organizing committee for the 2015 *Oak Ridge Leadership Computing Facility User Meeting*
2012–2013	Local organizing committee for the *National Nuclear Physics Summer School* (NNPSS 2013).
2012	Co-convener of *Thermonuclear explosions: Type Ias, Novae, and X-ray bursts* working group at *Nuclear Astrophysics Town Meeting* (Detroit, MI)

Astrophysical Software / Other Projects:

ongoing	Creator of the Open Astrophysics Bookshelf github organization `http://open-astrophysics-bookshelf.github.io/` and author of the open text *Computational Hydrodynamics for Astrophysics*

ongoing	Co-developer of the publicly-available low Mach number hydrodynamics code Maestro, http://bender.astro.sunysb.edu/Maestro/
ongoing	Co-developer of the publicly-available compressible hydrodynamics code Castro, https://ccse.lbl.gov/Downloads/downloadCASTRO.html
ongoing	Developed and distribute many simple teaching codes (advection, Eulerian compressible and incompressible hydro solvers, multigrid, etc., with accompanying notes and exercises), http://www.astro.sunysb.edu/mzingale/software/
ongoing	Created a library of astronomy animations introducing basic concepts (e.g. Kepler's laws, blackbody radiation, waves, binary star/exoplanet dynamics, etc.) as well as more advanced concepts (e.g. entropy in convection), http://www.astro.sunysb.edu/mzingale/software/astro/, also available on youtube, http://www.youtube.com/user/michaelzingale
ongoing	Contributor to the astrophysics visualization package yt
1997–2002	Original member of the FLASH Code development team

Guest Appointments:

2000–2003	Guest Appointment at Argonne National Laboratory / Mathematics and Computer Science Division
April 2001	Guest at the Max-Planck-Institut für Astrophysik

Professional Societies:
Member of the American Association of Physics Teachers
Member of the American Astronomical Society
Member of the American Physical Society

Students Advised:

graduate	Chris Malone (Stony Brook, PhD 2011, thesis: *Multidimensional Simulations of Convection Preceding a Type Ia X-ray Bursts*)
	Adam Jacobs (Stony Brook, current student, working on Maestro simulations of sub-Chandrasekhar mass SNe Ia)
	Max Katz (Stony Brook, current student, working on Castro simulations of white dwarf mergers)
undergraduate	Max Katz (REU student at Stony Brook, summer 2010, worked on generating initial models with the MESA code)
	Adam Siegel (Stony Brook, BS 2011, worked on flame modeling)
	Ryan Orvedahl (Stony Brook, BS 2013, worked on Maestro algorithm issues and particle analysis)

References:
references available upon request

Michael Zingale / Publications and Talks

Refereed Publications

40. *Low Mach Number Modeling of Convection in Helium Shells on Sub-Chandrasekhar White Dwarfs II: Bulk Properties of Simple Models,*

    A. M. Jacobs, M. Zingale, A. Nonaka, A. S. Almgren, & J. B. Bell

    2015, submitted to ApJ

39. *Double White Dwarf Mergers on Adaptive Meshes I. Methodology and Code Verification,*

    M. P. Katz, M. Zingale, A. C. Calder, F. D. Swesty, A. S. Almgren, W. Zhang

    2016, accepted to ApJ

38. *Comparisons of Two- and Three-Dimensional Convection in Type I X-ray Bursts*

    M. Zingale, C. M. Malone, A. Nonaka, A. S. Almgren, & J. B. Bell

    2015, ApJ, 807, 60.

37. *On the Piecewise Parabolic Method for Compressible Flow with Stellar Equations of State,*

    M. Zingale & M. P. Katz

    2015, ApJS, 216, 31.

36. *pyro: A teaching code for computational astrophysical hydrodynamics,*

    M. Zingale

    2014, Astronomy & Computing, 6, 52.

35. *Multidimensional Modeling of Type I X-ray Bursts. II. Two-Dimensional Convection in a Mixed H/He Accretor,*

    C. M. Malone, M. Zingale, A. Nonaka, A. S. Almgren, & J. B. Bell

    2014, ApJ, 788, 115.

34. *The Deflagration Stage of Chandrasekhar Mass Models For Type Ia Supernovae: I. Early Evolution,*

    C. M. Malone, A. Nonaka, S. E. Woosley, A. S. Almgren, J. B. Bell, S. Dong, & M. Zingale

    2014, ApJ, 782, 11.

33. *Low-Mach Number Modeling of Core Convection in Massive Stars,*

    C. Gilet, A. S. Almgren, J. B. Bell, A. Nonaka, S. E. Woosley, & M. Zingale

    2013, ApJ, 773, 137.

32. *Low Mach Number Modeling of Convection in Helium Shells on Sub-Chandrasekhar White Dwarfs. I. Methodology,*

    M. Zingale, A. Nonaka, A. S. Almgren, J. B. Bell, C. M. Malone, & R. J. Orvedahl

    2013, ApJ, 764, 97.

31. *High-Resolution Simulations of Convection Preceding Ignition in Type Ia Supernovae Using Adaptive Mesh Refinement,*

A. Nonaka, A. J. Aspden, M. Zingale, A. S. Almgren, J. B. Bell, & S. E. Woosley

2012, ApJ, 745, 73.

30. *The Convective Phase Preceding Type Ia Supernovae,*

M. Zingale, A. Nonaka, A. S. Almgren, J. B. Bell, C. M. Malone, & S. E. Woosley

2011, ApJ, 740, 8.

29. *Multidimensional Modeling of Type I X-ray Bursts. I. Two-Dimensional Convection Prior to the Outburst of a Pure He Accretor,*

C. M. Malone, A. Nonaka, A. S. Almgren, J. B. Bell, & M. Zingale

2011, ApJ, 728, 118.

28. *CASTRO: A New Compressible Astrophysical Solver. I. Hydrodynamics and Self-Gravity,*

A. S. Almgren, V. E. Beckner, J. B. Bell, M. S. Day, L. H. Howell, C. C. Joggerst, M. J. Lijewski, A. Nonaka, M. Singer, & M. Zingale

2010, ApJ, 715, 1221.

27. *MAESTRO: An Adaptive Low Mach Number Hydrodynamics Algorithm for Stellar Flows,*

A. Nonaka, A. S. Almgren, J. B. Bell, M. J. Lijewski, C. Malone, & M. Zingale

2010, ApJS, 188, 358.

26. *Low Mach Number Modeling of Type Ia Supernovae. IV. White Dwarf Convection,*

M. Zingale, A. S. Almgren, J. B. Bell, A. Nonaka, & S. E. Woosley

2009, ApJ, 704, 196.

25. *A New Low Mach Number Approach in Astrophysics,*

A. S. Almgren, J. B. Bell, A. Nonaka, & M. Zingale

2009, CiSE, 11, 24.

24. *Turbulence-Flame Interactions in Type Ia Supernovae,*

A. J. Aspden, J. B. Bell, M. S. Day, S. E. Woosley, & M. Zingale

2008, ApJ, 689, 1173.

23. *Low Mach Number Modeling of Type Ia Supernovae. III. Reactions,*

A. S. Almgren, J. B. Bell, A. Nonaka, & M. Zingale

2008, ApJ 684, 449.

22. *Propagation of the First Flames in Type Ia Supernovae,*

M. Zingale and L. J. Dursi

2007, ApJ, 656, 333.

21. *Low Mach Number Modeling of Type Ia Supernovae. II. Energy Evolution,*

    A. S. Almgren, J. B. Bell, C. A. Rendleman, & M. Zingale

    2006, ApJ, 649, 927.

20. *Low Mach Number Modeling of Type Ia Supernovae. I. Hydrodynamics,*

    A. S. Almgren, J. B. Bell, C. A. Rendleman, & M. Zingale

    2006, ApJ, 637, 922.

19. *Three-Dimensional Numerical Simulations of Rayleigh-Taylor Unstable Flames in Type Ia Supernovae,*

    M. Zingale, S. E. Woosley, C. A. Rendleman, M. S. Day, & J. B. Bell

    2005, ApJ, 632, 1021.

18. *Validating an Astrophysical Simulation Codes,*

    A. C. Calder, L. J. Dursi, B. Fryxell, T. Plewa, V. G. Weirs, T. Dupont, H. F. Robey, R. P. Drake, B. A. Remington, G. Dimonte, J. Hayes, J. M. Stone, P. M. Ricker, F. X. Timmes, M. Zingale, & K. Olson

    2004, CiSE, 6, 10.

17. *Direct Numerical Simulations of Type Ia Supernovae Flames II: The Rayleigh-Taylor Instability,*

    J. B. Bell, M. S. Day, C. A. Rendleman, S. E. Woosley, & M. Zingale

    2004, ApJ, 608, 883.

16. *Direct Numerical Simulations of Type Ia Supernovae Flames I: The Landau-Darrieus Instability,*

    J. B. Bell, M. S. Day, C. A. Rendleman, S. E. Woosley, & M. Zingale

    2004, ApJ, 606, 1029.

15. *On the Nonlinear Evolution of Wind-driven Gravity Waves,*

    A. Alexakis, A. C. Calder, L. J. Dursi, R. Rosner, J. W. Truran, B. Fryxell, M. Zingale, F. X. Timmes, K. Olson, & P. Ricker

    2004, Phys. of Fluids, 16, 9, 3256.

14. *Adaptive Low Mach Number Simulations of Nuclear Flames,*

    J. B. Bell, M. S. Day, C. A. Rendleman, S. E. Woosley, & M. Zingale

    2004, JCP, 195, 2, 677.

13. *A Comparative Study of the Turbulent Rayleigh-Taylor Instability Using High-Resolution Three-Dimensional Numerical Simulations: The Alpha-Group Collaboration,*

    G. Dimonte, D. L. Youngs, A. Dimits, S. Weber, M. Marinak, S. Wunsch, C. Garasi, A. Robinson, M. J. Andrews, P. Ramaprabhu, A. C. Calder, B. Fryxell, J. Biello, L. Dursi, P. MacNeice, K. Olson, P. Ricker, R. Rosner, F. Timmes, H. Tufo, Y.-N. Young, & M. Zingale

    2004, Phys. of Fluids, 16, 5, 1668.

12. *On Heavy Element Enrichment in Classical Novae,*

    A. Alexakis, A. C. Calder, A. Heger, E. F. Brown, L. J. Dursi, J. W. Truran, R. Rosner, D. Q. Lamb, F. X. Timmes, B. Fryxell, M. Zingale, P. M. Ricker, & K. Olson

    2004, ApJ, 602, 931.

11. *Morphology of Rising Hydrodynamic and Magneto-hydrodynamic Bubbles from Numerical Simulations,*

    K. Robinson, L. J. Dursi, P. M. Ricker, R. Rosner, A. C. Calder, M. Zingale, T. Linde, A. Caceres, B. Fryxell, K. Olson, K. Riley, A. Siegel, J. W. Truran, & N. Vladimirova

    2004, ApJ, 601, 621.

10. *Parallel netCDF: A High-Performance Scientific I/O Interface,*

    J. Li, W,-k. Laio, A. Choudhary, R. Ross, R. Thakur, R., W. Gropp, R. Latham, A. Siegel, B. Gallagher, & M. Zingale

    2003, technical paper, SC2003.

9. *The Response of Astrophysical Thermonuclear Flames to Curvature and Stretch,*

    L. J. Dursi, M. Zingale, A. Calder, B. Fryxell, F. X. Timmes, N. Vladimirova, R. Rosner, A. Caceres, D. Q. Lamb, K. Olson, P. M. Ricker, K. Riley, A. Siegel, & J. W. Truran

    2003, ApJ, 595, 955.

8. *Mapping Initial Hydrostatic Models in Godunov Codes,*

    M. Zingale, L. J. Dursi, J. ZuHone, A. C. Calder, B. Fryxell, T. Plewa, J. W. Truran, A. Caceres, K. Olson, P. M. Ricker, K. Riley, R. Rosner, A. Siegel, F. X. Timmes, & N. Vladimirova

    2002, ApJS, 143, 539.

7. *On Validating an Astrophysical Simulation Code,*

    A. C. Calder, B. Fryxell, T. Plewa, R. Rosner, L. J. Dursi, V. G. Weirs, T. Dupont, H. F. Robey, J. O. Kane, B. A. Remington, R. P. Drake, G. Dimonte, M. Zingale, F. X. Timmes, K. Olson, P. Ricker, P. MacNeice, & H. M. Tufo

    2002, ApJS, 142, 201.

6. *A Case Study in Application I/O on Linux Clusters,*

    R. Ross, D. Nurmi, A. Cheng, & M. Zingale

    2001, technical paper, SC2001.

5. *Helium Detonations on Neutron Stars,*

    M. Zingale, F. X. Timmes, B. Fryxell, D. Q. Lamb, K. Olson, A. C. Calder, L. J. Dursi, P. Ricker, R. Rosner, P. MacNeice, & H. Tufo

    2001, ApJS, 133, 195.

4. *High-Performance Reactive Fluid Flow Simulations Using Adaptive Mesh Refinement on Thousands of Processors,*

   A. C. Calder, B. C. Curtis, L. J. Dursi, B. Fryxell, G. Henry, P. MacNeice, K. Olson, P. Ricker, R. Rosner, F. X. Timmes, H. M. Tufo, J. W. Truran, & M. Zingale

   2000, Gordon Bell Prize winner/Special category, technical paper, SC2000.

3. *On the Cellular Structure of Carbon Detonations,*

   F. X. Timmes, M. Zingale, K. Olson, B. Fryxell, P. Ricker, A. C. Calder, L. J. Dursi, J. W. Truran, & R. Rosner

   2000, ApJ, 543, 938.

2. *FLASH: An Adaptive Mesh Hydrodynamics Code for Modeling Astrophysical Thermonuclear Flashes,*

   B. Fryxell, K. Olson, P. Ricker, F. X. Timmes, M. Zingale, D. Q. Lamb, P. MacNeice, R. Rosner, & H. Tufo

   2000, ApJS, 131, 273.

1. *Flash Code: Studying Astrophysical Thermonuclear Flashes,*

   R. Rosner, A. Calder, J. Dursi, B. Fryxell, D. Q. Lamb, J. C. Niemeyer, K. Olson, P. Ricker, F. X. Timmes, J. Truran, H. Tufo, Y. Young, M. Zingale, E. Lusk, & R. Stevens

   2000, CiSE, 2, 33.

Conference Proceedings

23. *Understanding Ignition in Type Ia Supernovae,*

    M. Zingale, A. Jacobs, A. S. Almgren, J. B. Bell, A. Nonaka, C. Malone, & S. Woosley

    2015, extended abstract for the 25th International Colloquium on the Dynamics of Explosions and Reactive Systems, Leeds, UK, Aug. 2–7, 2015.

22. *Low Mach Number Modeling of Stratified Flows,*

    A. S. Almgren, J. B. Bell, A. Nonaka, & M. Zingale

    2014, in Finite Volumes for Complex Applications VII: Methods, Theoretical Aspects—FVCA 7, Berlin, June 2014, ed. Fuhrmann, J., Ohlberger, M., & Rohde, C., 3-âĂŞ15

    Proceedings of the FVCA7 - The International Symposium of Finite Volumes for Complex Applications VII Berlin, June 15–20, 2014

21. *From Convection to Explosion: End-to-End Simulation of Type Ia Supernovae,*

    A. Nonaka, A. S. Almgren, J. B. Bell, H. Ma, S. E. Woosley, & M. Zingale

    2011, Proceedings of SciDAC 2011, Denver, CO, July 10–14, 2011, http://press.mcs.anl.gov/scidac2011/

20. *MAESTRO, CASTRO, and SEDONA — Petascale Codes for Astrophysical Applications,*

    A. Almgren, J. Bell, D. Kasen, M. Lijewski, A. Nonaka, P. Nugent, C. Rendlement, R. Thomas, & M. Zingale

2010, Proceedings of the 2010 Scientific Discovery through Advanced Computing (SciDAC) Conference. Chattanooga, Tennessee, July 11–15, 2010. Oak Ridge National Laboratory. http://computing.ornl.gov/workshops/scidac2010/

19. *Type Ia Supernovae: Advances in Large Scale Simulation,*

   H. Ma, M. Zingale, S. E. Woosley, A. J. Aspden, J. B. Bell, A. S. Almgren, A. Nonaka, & S. Dong

   2010, Proceedings of the 2010 Scientific Discovery through Advanced Computing (SciDAC) Conference. Chattanooga, Tennessee, July 11–15, 2010. Oak Ridge National Laboratory. http://computing.ornl.gov/workshops/scidac2010/

18. *Type Ia Supernovae: Advances in Large Scale Simulation,*

   S. E. Woosley, A. S. Almgren, A. J. Aspden, J. B. Bell, D. Kasen, A. R. Kerstein, H. Ma, A. Nonaka, & M. Zingale

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17. *Astrophysical Applications of the Maestro Code,*

   M. Zingale, A. S. Almgren, J. B. Bell, C. M. Malone, & A. Nonaka

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16. *Type Ia supernovae,*

   S. E. Woosley, A. Almgren, J. B. Bell, G. Glatzmaier, D. Kasen, A. R. Kerstein, H. Ma, P. Nugent, F. Röpke, V. Sankaran, & M. Zingale

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15. *MAESTRO: A Low Mach Number Stellar Hydrodynamics Code,*

   A. S. Almgren, J. B. Bell, & M. Zingale

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14. *New Approaches for Modeling Type Ia Supernovae,*

   M. Zingale, A. S. Almgren, J. B. Bell, M. S. Day, C. A. Rendleman, & S. E. Woosley

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13. *Efficiency Gains from Time Refinement on AMR Meshes and Explicit Timestepping,*

   L. J. Dursi & M. Zingale

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12. *The Physics of Flames in Type Ia Supernovae,*

   M. Zingale, S. E. Woosley, J. B. Bell, M. S. Day, & C. A. Rendleman

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11. *Simulations of Rising Hydrodynamic and Magnetohydrodynamic Bubbles,*

    P. M. Ricker, K. Robinson, L. J. Dursi, R. Rosner, A. C. Calder, M. Zingale, J. W. Truran, T. Linde, A. Caceres, B. Fryxell, K. Olson, K. Riley, K, A. Siegel, & N. Vladimirova

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10. *Investigations of Pointwise Ignition of Helium Deflagrations on Neutron Stars,*

    M. Zingale, S. E. Woosley, A. Cumming, A. Calder, L. J. Dursi, B. Fryxell, K. Olson, P. Ricker, R. Rosner, & F. X. Timmes

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9. *Onset of Convection on a Pre-Runaway White Dwarf,*

    L. J. Dursi, A. C. Calder, A. Alexakis, J. W. Truran, M. Zingale, B. Fryxell, P. Ricker, F. X. Timmes, & K. Olson

    2002, Classical Nova Explosions: International Conference on Classical Nova Explosions. AIP Conference Proceedings, Vol. 637. Sitges, Spain, 20–24 May, 2002. Edited by M. Hernanz & J. Jose

8. *Mixing by Non-linear Gravity Wave Breaking on a White Dwarf Surface,*

    A. C. Calder, A. Alexakis, L. J. Dursi, R. Rosner, J. W. Truran, B. Fryxell, P. Ricker, M. Zingale, K. Olson, F. X. Timmes, & P. MacNeice

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7. *Mixing by Wave Breaking at the Surface of a White Dwarf,*

    J. W. Truran, A. Alexakis, A. C. Calder, L. J. Dursi, M. Zingale, B. Fryxell, P. Ricker, F. X. Timmes, K. Olson, & R. Rosner

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6. *Numerical Simulations of Thermonuclear Flashes on Neutron Stars,*

    B. Fryxell, M. Zingale, F. X. Timmes, D. Q. Lamb, K. Olson, A. C. Calder, L. J. Dursi, P. Ricker, R. Rosner, J. W. Truran, P. MacNeice, & H. Tufo

    2001, Nuclear Physics A, 688, 172.

5. *Quenching Processes in Flame-Vortex Interactions,*

    M. Zingale, J. C. Niemeyer, F. X. Timmes, L. J.Dursi, A. C. Calder, B. Fryxell, D. Q. Lamb, K. Olson, P. Ricker, R. Rosner, J. W. Truran, & P. MacNeice

    2001, 20th Texas Symposium on Relativistic Astrophysics, Austin, Texas, 10–15 Dec. 2000, Melville, NY: AIP Conference Proceedings, Vol. 586. Edited by J. C. Wheeler & H. Martel.

4. *Simulations of Astrophysical Fluid Instabilities,*

   A. C. Calder, B. Fryxell, R. Rosner, L. J. Dursi, K. Olson, P. M. Ricker, F. X. Timmes, M. Zingale, P. MacNeice, & H. M. Tufo

   2001, 20th Texas Symposium on Relativistic Astrophysics, Austin, Texas, 10–15 Dec. 2000, Melville, NY: AIP Conference Proceedings, Vol. 586. Edited by J. C. Wheeler & H. Martel.

3. *Adaptive Mesh Simulations Of Astrophysical Detonations Using the ASCI Flash Code,*

   B. Fryxell, A. C. Calder, L. J. Dursi, D. Q. Lamb, P. MacNeice, K. Olson, P. M. Ricker, R. Rosner, F. X. Timmes, J. W. Truran, H. M. Tufo, & M. Zingale

   Proceedings of the VII International Workshop on Advanced Computing and Analysis Techniques in Physics Research (ACAT 2000), Fermilab, October 16–20, 2000.

2. *Large-Scale Simulations of Clusters of Galaxies,*

   P. M. Ricker, A. C. Calder, L. J. Dursi, B. Fryxell, D. Q. Lamb, P. MacNeice, K. Olson, R. Rosner, F. X. Timmes, J. W. Truran, H. M. Tufo, & M. Zingale

   Proceedings of the VII International Workshop on Advanced Computing and Analysis Techniques in Physics Research (ACAT 2000), Fermilab, October 16–20, 2000.

1. *Helium Detonations on Neutron Stars,*

   B. Fryxell, M. Zingale, F. X. Timmes, D. Q. Lamb, K. Olson, A. C. Calder, L. J. Dursi, P. Ricker, R. Rosner, J. W. Truran, P. MacNeice, & H. Tufo

   Proceedings of the 10th Workshop on "Nuclear Astrophysics", Ringberg Castle, Tegernsee, Germany, March 20–25 2000.

White Papers

2. *Modeling Astrophysical Explosions with Sustained Exascale Computing,*

   M. Zingale, A. C. Calder, C. M. Malone, & F. X. Timmes

   2015, Response to RFI NOT-GM-15-122: *Science Drivers Requiring Capable Exascale High Performance Computing*

1. *The LOFT perspective on neutron star thermonuclear bursts,*

   J. J. M. in 't Zand, D. Altamirano, D. R. Ballantyne, S. Bhattacharyya, E. F. Brown, Y. Cavecchi, D. Chakrabarty, J. Chenevez, A. Cumming, N. Degenaar, M. Falanga, D. K. Galloway, A. Heger, J. José, L. Keek, M. Méndez, S. Mahmoodifar, M. Linares, C. M. Malone, M. C. Miller, F. B. S. Paerels, J. Poutanen, A. Różańska, H. Schatz, M. Serino, V. F. Suleimanov, T. E. Strohmayer, F.-K. Thielemann, A. L. Watts, N. N. Weinberg, S. E. Woosley, W. Yu, S. Zhang, & M. Zingale

   2015, White Paper in Support of the Mission Concept of the Large Observatory For x-ray Timing

Invited Lectures / Seminars / Colloquia

02/26/2016 (upcoming)   Seminar at the U. S. Naval Research Laboratory, *Computational Challenges of Modeling X-ray Bursts and Type Ia Supernovae*

08/02/2015   Invited talk at the *International Colloquium on the Dynamics of Explosions and Reactive Systems (ICDERS)*, Leeds, UK, *Understanding Ignition in Type Ia Supernovae*

06/22/2015   Invited talk at the *OLCF User's Meeting*, ORNL, Oak Ridge, TN, *Computation Challenges of Modeling Astrophysical Explosions*

06/03/2015   Invited talk at the *Fifty One Ergs* meeting, NCSU, *Modeling the Early Phases of Type Ia Supernovae*

05/24/2015   "Setting the Stage" talk on *Stellar Hydrodynamics* at the JINA *GNASH: The anomalous metal-poor stars and convective-reactive nuclear astrophysics* workshop, Victoria, BC, Canada, `http://jina-cee.phys.uvic.ca/gnash-workshop/talks-and-contributions/monday/setting-the-stage`

04/08/2015   Seminar at U Mass Darthmouth, *Algorithmic Developments for Modeling Stellar Explosions*

01/15/2015   CCS-2 Seminar at Los Alamos National Laboratory, *The Challenges of Modeling Type Ia Supernovae and X-ray Bursts*

09/15/2014   Invited talk at the *Type Ia Supernovae: progenitors, explosions, and cosmology* conference, Chicago, IL, *Modeling the Early Phases of SNe Ia*, `https://kicp-workshops.uchicago.edu/sn2014/presentations.php`

04/30/2014   Invited presentation at *Large Scale Computing and Storage Requirements for Nuclear Physics (NP): Target 2017* meeting, *Convection in X-ray Bursts*

02/28/2014   Astronomy Seminar at the Center for Cosmology and Particle Physics, New York University, *Modeling Convective Burning in Type Ia Supernovae and X-ray Bursts*

09/27/2013   Nuclear Theory Seminar at Brookhaven National Lab, *Modeling Convective Burning in Type Ia Supernovae and X-ray Bursts*

07/09/2013   Seminar at the Flash Center, University of Chicago, *Modeling Convective Burning in Type Ia Supernovae and X-ray Bursts*

10/10/2012   Astro Computation working group at *2012 Nuclear Astrophysics Town Meeting*, *Thermonuclear Driven Events*

04/04/2012   Nuclear Astrophysics Seminar at Ohio University entitled *The Challenges of Modeling Explosive Phenomena*

07/28/2010   Invited talk at the Lorentz Center Workshop on *X-ray Bursts and Burst Oscillations* entitled *The Algorithmic Challenges of Multidimensional Models of X-ray Bursts*, `http://www.lorentzcenter.nl/lc/web/2010/408/info.php3?wsid=408`

05/13/2010   Joint NRAO / UVa Dept. of Astronomy Colloquium (Charlottesville, VA) entitled *Modeling Convection and Ignition in Type Ia Supernovae*

03/31/2010   Center for the Study of Cosmic Evolution Seminar, Dept. of Physics and Astronomy, Michigan State University (E. Lansing, MI), entitled: *Modeling Convection and Ignition in Type Ia Supernovae*

05/12/2009   Astronomy Seminar at the American Museum of Natural History (New York, NY), entitled: *Modeling Convection and Ignition in Type Ia Supernovae*

09/30/2008   Astronomy Seminar at the Institute for Advanced Studies (Princeton, NJ), entitled: *New Methods for Modeling Type Ia Supernovae*

07/15/2008   Invited Poster at the *SciDAC 2008* conference (Seattle, WA), entitled: *Astrophysical Applications of the Maestro Code* (with co-authors: A. S. Almgren, J. B. Bell, C. M. Malone, & A. J. Nonaka)

04/06/2007   Astronomy Seminar at Rutgers University (New Brunswick, NJ), entitled: *The Challenges of Modeling Type Ia Supernova*

10/31/2006   Astronomy Colloquia at McGill University (Montreal, CA), entitled: *Understanding Type Ia Supernovae*

06/27/2006   Invited talk at the *SciDAC 2006* conference (Denver, CO), entitled: *The Challenges of Modeling Type Ia Supernovae*

10/03/2005   T-13 Seminar, Los Alamos National Laboratory, entitled: *Simulations of Thermonuclear Flames in Type Ia Supernovae*

06/26/2005   Invited poster at the *SciDAC 2005* conference (San Francisco, CA), *The Physics of Thermonuclear Flames in Type Ia Supernovae*

03/01/2005   Astronomy Seminar at SUNY Stony Brook, *Flame Instabilities in Type Ia Supernovae*

02/23/2005   N Division Seminar, Lawrence Livermore National Laboratory, *Flame Instabilities in Type Ia Supernovae*

12/17/2003   Astrophysics Seminar, Institute for Advanced Study, Princeton, NJ, *Flame Instabilities in Type Ia Supernovae*

Popular Press Features

How Stars Explode, Forbes.com, Oct. 1, 2009
(http://www.forbes.com/2009/09/30/supernovae-universe-science-technology-breakthroughs-stars.html)

Unveiled: The First Full 3-D Model of a Star Going Supernova, Popular Science Online, Sept. 24, 2009
(http://www.popsci.com/military-aviation-amp-space/article/2009-09/first-3-d-models-white-dwarf-supernova)

Flash Upon a Neutron Star, American Scientist, Sept.–Oct. 2000, vol. 88, no. 5, p. 400.

Popular Press Mentions

Stars Go Kaboom, Spilling Cosmic Secrets, Science News, 2009, Vol. 176, #4 (Aug. 15, 2009)
(see also http://www.sciencenews.org/view/feature/id/46029/title/Stars_go_kaboom,_spilling_cosmic_secrets)

Supernova explosion simulated in exquisite detail, New Scientist Online, July 2006
(http://www.newscientist.com/article/dn9604-supernova-explosion-simulated-in-exquisite-detail.html)

Life-or-Death Question: How Supernovas Happen? NY Times, Nov. 9, 2004.

Physics Today cover, Feb. 2002.