

Michael Zingale / Publication List

Refereed Publications

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
submitted to ApJ.
37. *On the Piecewise Parabolic Method for Compressible Flow with Stellar Equations of State*,
M. Zingale & M. P. Katz
2015, accepted to ApJS.
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.

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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. *Issues with Validating an Astrophysical Simulation Code*,
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*,
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. Bel, A. Nonaka, & M. Zingale
2014, submitted to the 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
2009, Proceedings of SciDAC 2009, Journal of Physics: Conference Series, 180, 012023.
17. *Astrophysical Applications of the Maestro Code*,
M. Zingale, A. S. Almgren, J. B. Bell, C. M. Malone, & A. Nonaka
2008, Proceedings of SciDAC 2008, Journal of Physics: Conference Series, 125, 012013.
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
2007, Proceedings of SciDAC 2007, Journal of Physics: Conference Series, 78, 012081.
15. *MAESTRO: A Low Mach Number Stellar Hydrodynamics Code*,
A. S. Almgren, J. B. Bell, & M. Zingale
2007, Proceedings of SciDAC 2007, Journal of Physics: Conference Series, 78, 012085.
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
2006, Proceedings of SciDAC 2006, Journal of Physics: Conference Series, 46, 385.
13. *The Physics of Flames in Type Ia Supernovae*,
M. Zingale, S. E. Woosley, J. B. Bell, M. S. Day, & C. A. Rendleman
2005, Proceedings of SciDAC 2005, Journal of Physics: Conference Series, 16, 405.
12. *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
2004, Proceedings of The Riddle of Cooling Flows in Galaxies and Clusters of Galaxies, held in Charlottesville, VA, May 31–June 4, 2003, Eds. T. Reiprich, J. Kempner, and N. Soker.

11. *Efficiency Gains from Time Refinement on AMR Meshes and Explicit Timestepping*,
L. J. Dursi & M. Zingale
2003, Adaptive Mesh Refinement—Theory and Applications, Proceedings of the Chicago Workshop on Adaptive Mesh Refinement Methods, Sept. 3–5, 2003 Series: Lecture Notes in Computational Science and Engineering, Vol. 41 Plewa, Tomasz; Linde, Timur; Weirs, V. Gregory (Eds.) 2005, XIV, 554
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
2002, 3D Stellar Evolution, ASP Conference Proceedings, Vol. 293, 22–26 July 2002 at UC Davis, Livermore, CA, Ed. by S. Turcotte, S. C. Keller, & R. M. Cavallo.
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
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
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
2002, Proceedings of the 11th Workshop on “Nuclear Astrophysics”, Ringberg Castle, Tegernsee, Germany, February 11–16, 2002 / Wolfgang Hillebrandt and Ewald Mäijler (Eds.). MPA/P13, Garching b. München, Germany: Max-Planck-Institut für Astrophysik, 186.
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

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. Cavocchi, 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

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.