Michael Zingale / Publication List

Refereed Publications

39. *Improving the Fidelity of MAESTRO: A Low Mach Number Model for Stratified Flows,*
A. S. Almgren, J. B. Bell, A. Nonaka, & M. Zingale
in preparation

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 ApJL.

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

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. *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

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 MÃijller (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.

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.