Michael Zingale / Publications and Talks

Refereed Publications

51. *Numerical Stability of Detonations in White Dwarf Simulations,*

    M. P. Katz & M. Zingale

    2019, accepted to ApJ

50. *pyro: a framework for hydrodynamics explorations and prototyping,*

    A. Harpole, M. Zingale, I. Hawke, & T. Chegini

    2019, Journal of Open Source Software, 4, 34, p. 1265

49. *Toward Resolved Simulations of Burning Fronts in Thermonuclear X-ray Bursts,*

    M. Zingale, K. Eiden, Y. Cavecchi, A. Harpole, J. B. Bell, M. Chang, I. Hawke, M. P. Katz, C. M. Malone, A. J. Nonaka, D. E. Willcox, & W. Zhang

    2019, submitted to Proceedings of AstroNum 2018

48. *Thermonuclear (Type Ia) Supernovae and Progenitor Evolution,*

    A. C. Calder, D. E. Willcox, C. J. DeGrendele, D. Shangase, M. Zingale, & D. M. Townsley

    2019, accepted to Proceedings of AstroNum 2018

47. *Turbulence-driven thermal and kinetic energy in the atmospheres of hot Jupiters,*

    T. Ryu, M. Zingale, & R. Perna

    2018, Monthly Notices of the Royal Astronomical Society, 481, 4, 5517–5531

46. *pynucastro: an interface to nuclear reaction rates and code generator for reaction network equations,*

    D. E. Willcox & M. Zingale

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45. *Observatory science with eXTP,*

    J. J. M. in 't Zand et al.

    2018, Science China Physics, Mechanics & Astronomy, 62, 29506

44. *Meeting the Challenges of Modeling Astrophysical Thermonuclear Explosions: Castro, Maestro, and the AMReX Astrophysics Suite,*

    M. Zingale, A. S. Almgren, M. G. Barrios Sazo, V. E. Beckner, J. B. Bell, B. Friesen, A. M. Jacobs, M. P. Katz, C. M. Malone, A. J. Nonaka, D. E. Willcox, & W. Zhang

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43. *The OLCF GPU Hackathon Series: The Story Behind Advancing Scientific Applications with a Sustained Impact,*

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42. *Toward Simulating Black Widow Binaries with Castro,*

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41. *Review: White paper on nuclear astrophysics and low energy nuclear physics Part 1: Nuclear astrophysics,*

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    2017, Progress in Particle and Nuclear Physics, 94, 1

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

    2016, ApJ, 827, 84

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

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

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

    M. Zingale & M. P. Katz

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

    M. Zingale

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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

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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

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

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

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

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

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

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

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

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

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

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

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

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7. *On Validating an Astrophysical Simulation Code,*

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5. *Helium Detonations on Neutron Stars,*

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

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

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24. *The LOFT mission concept: a status update,*

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   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

02/26/2019	Invited talk in the *Spectral Deferred Correction Methods for Temporal Integration* session at the SIAM Computational Science and Engineering 2019 meetin, *Improved Coupling of Hydrodynamics and Nuclear Burning in Astrophysical Flows using SDC*
10/12/2018	Flatiron Institute Center for Computational Astrophysics Colloquium, *Algorithmic Demands for Modeling X-ray Bursts and Type Ia Supernovae*
08/23/2018	Talk at the TEAMS Collaboration meeting, *StarKiller Microphysics*
06/26/2018	Invited talk at AstroNum 2018—13th International Conference on Numerical Modeling of Space Plasma Flows, Panama City, Florida, *Modeling X-ray Bursts with the AMReX Astrophysics Suite*
08/10/2017	Seminar at LLNL High Energy Density Science Center, LLNL, *Modeling Stellar Explosions with the AMReX Astrophysics Suite*
07/27/2017	Seminar at Computational Science Initiative, BNL, *The AMReX Astrophysics Suite: Simulating the Stars at the Exascale*
06/30/2017	Invited talk at AstroNum 2017—12th International Conference on Numerical Modeling of Space Plasma Flows, St. Malo, France, *Computational Challenges of Modeling X-ray Bursts and Type Ia Supernovae*
06/02/2017	Invited participant / overview talk at Stellar Hydro Days, Univesity of Victoria, *Modeling Stellar Convection and Explosions with Maestro, Castro, and the BoxLib/AMReX Astrophysics Suite*
04/05/2017	Astronomy Seminar at Michigan State University, *Computational Challenges of Modeling X-ray Bursts and Type Ia Supernovae*
02/23/2017	Seminar at Stony Brook Institute for Advanced Computational Science, *Computational Challenges of Modeling X-ray Bursts and Type Ia Supernovae*
06/15/2016	Case study talk at DOE Nuclear Physics / ASCR Exascale Requirements Review, Gaithersburg, MD, *Thermonuclear Transients*
04/29/2016	Seminar at Oak Ridge National Laboratory, *Modeling Stellar Explosions with Maestro, Castro, and the BoxLib Astrophysics Suite*
03/17/2016	Talk at the *18th Workshop on Nuclear Astrophysics*, Ringberg Castle, Tegernsee, Germany, *Models of convection in X-ray bursts and pre-SNe Ia white dwarfs*
02/26/2016	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.