Josiah Schwab

Curriculum Vitae

✉ *jschwab@gmail.com*

Academic Positions

2016-2021 **Postdoctoral Scholar**, *University of California, Santa Cruz*, Santa Cruz, CA.
Hubble Fellow (2016-2019) & Morrison Fellow (2019-2020)
Supervisor: Enrico Ramirez-Ruiz

Education

2009–2016 **Ph.D. in Physics**, *University of California, Berkeley*, Berkeley, CA.
Advisor: Eliot Quataert

2005–2009 **S.B. in Physics**, *Massachusetts Institute of Technology*, Cambridge, MA.
Advisor: Saul Rappaport

Publication Summary

46 refereed publications (5 single-author, 11 first-author, 13 second-author)

Individual Awards

2016–2019 Hubble Fellow (National Award)
2018 Finalist, APS Division of Astrophysics Thesis Award (National Award)
2017 Best Poster, Deciphering the Violent Universe (Conference Award)
2016 Mary Elizabeth Uhl Prize (Departmental Award)
2010–2015 NSF Graduate Research Fellow (National Award)
2009–2010 Outstanding Graduate Student Instructor (Departmental Award)
2009 Alan H. Barrett Prize for Excellence in Astrophysics (Departmental Award)
2005 Presidential Scholar (National Award)

Group Awards

2012–2015 APS Award for Improving Undergraduate Physics Education (National Award)
As member of The Compass Project at UC Berkeley

Grants

2019–2022 Hubble Cycle 27 Guest Observer (co-I; $30k)
2019 Lorentz Center Workshop (International Award; €14k)
2016–2019 Hubble Fellowship (National Award; $350k)
2018–2019 XSEDE Startup Allocation (National Award; 50k SUs, $1k equivalent)
2010–2015 NSF Graduate Research Fellowship (National Award; $150k)
2009–2015 Various Research Travel Grants (Campus & National Awards; $10k)

Meetings Organized

Jul. 2019 *The Beginnings and Ends of Double White Dwarfs*, Copenhagen, DK
May 2019 *Electron-Capture-Induced Stellar Collapse*, Lorentz Center, Leiden, NL

Invited Presentations

Mar. 2021 Talk, *White Dwarfs from Physics to Astrophysics*
Mar. 2021 Astronomy Seminar, *Federal University of Rio Grande do Sul*
Oct. 2020 CIERA Seminar, *Northwestern University*
Oct. 2019 Astronomy Colloquium, *California Institute of Technology*
Feb. 2019 Astronomy Colloquium, *University of Maryland*
Feb. 2019 Astronomy & Astrophysics Special Seminar, *University of Chicago*
Sep. 2018 Talk, *Hydrogen Deficient Stars*
Apr. 2018 Talk, *APS April Meeting*
Feb. 2018 Talk, *Observational Signatures of Type Ia Supernova Progenitors III*
Sep. 2017 Talk, *The Dynamic Infrared Sky*
May 2017 CGCA Seminar, *University of Wisconsin, Milwaukee*
Nov. 2015 CCAPP Seminar, *The Ohio State University*
Nov. 2015 FLASH Seminar, *University of California, Santa Cruz*
Nov. 2015 ITC Seminar, *Harvard University*
Oct. 2015 Astronomy Seminar, *Colombia University*
Aug. 2015 Talk, *Synoptic Surveys: Boutique & Experiments*
Jul. 2015 SPI-MAX Seminar, *University of Oxford*
May 2015 Astronomy Tea Talk, *California Institute of Technology*

Contributed Presentations

Jul. 2019 Talk, *The Beginnings and Ends of Double White Dwarfs*
Jun. 2019 Talk and Poster, *Ninth Meeting on Hot Subdwarfs and Related Objects*
Jul. 2018 Talk and Poster, *21st European Workshop on White Dwarfs*

Dec. 2017 Poster, *Deciphering the Violent Universe*
Jul. 2017 Talk, *Eighth Meeting on Hot Subdwarfs and Related Objects*
Mar. 2017 Talk, *The AGB-Supernovae Mass Transition*
Jul. 2016 Talk and Poster, *20th European Workshop on White Dwarfs*
Feb. 2016 Talk, *Electron Capture Supernovae and Super-AGB Star Workshop*
Jan. 2016 Dissertation Talk, *227th Meeting of the American Astronomical Society*
Jul. 2015 Talk, *Seventh Meeting on Hot Subdwarfs and Related Objects*
Jan. 2015 Poster, *225th Meeting of the American Astronomical Society*
Sep. 2014 Poster, *Binary Systems: Their Evolution and Environments*
Jul. 2014 Poster, *Why Galaxies Care about AGB Stars III*
Jul. 2012 Poster, *Rattle and Shine: GW and EM Studies of Compact Binary Mergers*
Sep. 2011 Poster, *IAU Symposium 285: New Horizons in Time Domain Astronomy*

Service

2015–2021 Director, MESA Summer School
2015–2021 Referee (A&A, ApJ, MNRAS, Phys. Rev. D, JOSS, Nature Astronomy, Nature Physics)
2017–2019 Co-organizer, UCSC Department Seminar (FLASH)
2018 Reviewer, NASA Earth and Space Science Fellowship
2015 Graduate student representative for Department of Astronomy faculty search
2012–2021 Extremely active on mesa-users mailing list

Outreach

Dec. 2020 Public Talk, *Astronomy on Tap*, Baton Rouge, LA
Apr. 2018 Public Talk, *Astronomy on Tap*, Santa Cruz, CA
May 2017 Public Talk, *Café KITP*, Santa Barbara, CA

Teaching Experience

2017–2018 **Project Mentor**, *Department of Astronomy & Astrophysics*, UC Santa Cruz.
Guided undergraduate students through a first research project as part of the course "Introduction to Research in Physics and Astrophysics"

2013–2019 **Teaching Staff**, *MESA Summer School*, UC Santa Barbara.
Developed and presented tutorials on how to use the MESA stellar evolution code

2009–2016 **Compass Project**, UC Berkeley.
Involved in teaching and curriculum design as well as in various leadership roles

2013 **Graduate Student Instructor**, *Department of Astronomy*, UC Berkeley.
Designed and taught sections for a non-majors course "Origins: From the Big Bang to the Emergence of Humans"

2011 **Graduate Student Instructor**, *Department of Astronomy*, UC Berkeley.
Taught sections for upper-division course on stellar structure & evolution

2009–2010 **Graduate Student Instructor**, *Department of Physics*, UC Berkeley.
Taught sections for introductory physics for non-majors

Mentoring Experience

Undergraduates

2017–2019 **Tin Long Sunny Wong**, *Department of Astronomy & Astrophysics*, UC Santa Cruz.
Supervised undergraduate thesis; 2 papers (first author)
Honors: Ron Ruby Award (Departmental Award), Koret Scholar (University Award), Steck Award for Finest Senior Thesis (University Award)
Currently a graduate student at UC Santa Barbara

2018 **Zoë Weber-Porter**, *Department of Astronomy & Astrophysics*, UC Santa Cruz.
Supervised work towards undergraduate thesis

2017–2018 **Kyle Akira Rocha**, *Department of Astronomy & Astrophysics*, UC Santa Cruz.
Supervised undergraduate thesis; 1 paper (second author)
Honors: Koret Scholar (University Award)
Currently a graduate student at Northwestern University

Peer-Reviewed Publications

First or Second Author

Dec. 2021 **Pre-explosion Properties of Helium Star Donors to Thermonuclear Supernovae**
T. L. S. Wong, J. Schwab and Y. Götberg
ApJ, 922.2, p. 241

Oct. 2021 **The Final Fates of Close Hot Subdwarf-White Dwarf Binaries: Mergers Involving He/C/O White Dwarfs and the Formation of Unusual Giant Stars with C/O-Dominated Envelopes**
J. Schwab and E. B. Bauer
ApJ, 920.2, p. 110

Aug. 2021 **Cooling Models for the Most Massive White Dwarfs**
J. Schwab
ApJ, 916.2, p. 119

May 2021 **Skye: A Differentiable Equation of State**
A. S. Jermyn, J. Schwab, E. Bauer, F. X. Timmes and A. Y. Potekhin
ApJ, 913.1, p. 72

Jan. 2021 **Evolutionary Models for the Remnant of the Merger of Two Carbon-Oxygen Core White Dwarfs**
J. Schwab
ApJ, 906.1, p. 53

Oct. 2020 **Multi-gigayear White Dwarf Cooling Delays from Clustering-enhanced Gravitational Sedimentation**
E. B. Bauer, J. Schwab, L. Bildsten and S. Cheng
ApJ, 902.2, p. 93

Sept. 2020 **A Helium-flash-induced Mixing Event Can Explain the Lithium Abundances of Red Clump Stars**
J. Schwab
ApJL, 901.1, p. L18

Mar. 2020 **Laminar Flame Speeds in Degenerate Oxygen-Neon Mixtures**
J. Schwab, R. Farmer and F. X. Timmes
ApJ, 891.1, p. 5

Nov. 2019 **Evolutionary Models for R Coronae Borealis Stars**
J. Schwab
ApJ, 885.1, p. 27

June 2019 **Evolution of Helium Star-White Dwarf Binaries Leading up to Thermonuclear Supernovae**
T. L. S. Wong and J. Schwab
ApJ, 878.2, p. 100

May 2019 **Mixing via Thermocompositional Convection in Hybrid C/O/Ne White Dwarfs**
J. Schwab and P. Garaud
ApJ, 876, p. 10

Feb. 2019 **Residual Carbon in Oxygen-Neon White Dwarfs and Its Implications for Accretion-induced Collapse**
J. Schwab and K. A. Rocha
ApJ, 872, p. 131

Oct. 2018 **Minimum Orbital Period of Precataclysmic Variables**
L. Nelson, J. Schwab, M. Ristic and S. Rappaport
ApJ, 866, p. 88

June 2018 **Hot subdwarfs formed from the merger of two He white dwarfs**
J. Schwab
MNRAS, 476, pp. 5303–5311

Feb. 2018 **Modules for Experiments in Stellar Astrophysics (MESA): Convective Boundaries, Element Diffusion, and Massive Star Explosions**
B. Paxton, J. Schwab, E. B. Bauer, L. Bildsten, S. Blinnikov, P. Duffell, R. Farmer, J. A. Goldberg, P. Marchant, E. Sorokina, A. Thoul, R. H. D. Townsend and F. X. Timmes
ApJS, 234, p. 34

Dec. 2017 **Exploring the Carbon Simmering Phase: Reaction Rates, Mixing, and the Convective Urca Process**
J. Schwab, H. Martínez-Rodríguez, A. L. Piro and C. Badenes
ApJ, 851, p. 105

Dec. 2017 **Fast and Luminous Transients from the Explosions of Long-lived Massive White Dwarf Merger Remnants**
J. Brooks, J. Schwab, L. Bildsten, E. Quataert, B. Paxton, S. Blinnikov and E. Sorokina
ApJ, 850, p. 127

Dec. 2017 **The importance of Urca-process cooling in accreting ONe white dwarfs**
J. Schwab, L. Bildsten and E. Quataert
MNRAS, 472, pp. 3390–3406

Aug. 2017 **Electron Captures on ^{14}N as a Trigger for Helium Shell Detonations**
E. B. Bauer, J. Schwab and L. Bildsten
ApJ, 845, p. 97

July 2017 **Accretion-induced Collapse from Helium Star + White Dwarf Binaries**
J. Brooks, J. Schwab, L. Bildsten, E. Quataert and B. Paxton
ApJ, 843, p. 151

Jan. 2017 **Convection Destroys the Core/Mantle Structure in Hybrid C/O/Ne White Dwarfs**
J. Brooks, J. Schwab, L. Bildsten, E. Quataert and B. Paxton
ApJL, 834, p. L9

Jan. 2017 **Wait for It: Post-supernova Winds Driven by Delayed Radioactive Decays**
K. J. Shen and J. Schwab
ApJ, 834, p. 180

Dec. 2016 **The evolution and fate of super-Chandrasekhar mass white dwarf merger remnants**
J. Schwab, E. Quataert and D. Kasen
MNRAS, 463, pp. 3461–3475

Nov. 2016 **Turbulent Chemical Diffusion in Convectively Bounded Carbon Flames**
D. Lecoanet, J. Schwab, E. Quataert, L. Bildsten, F. X. Timmes, K. J. Burns, G. M. Vasil, J. S. Oishi and B. P. Brown
ApJ, 832, p. 71

Oct. 2015 **Thermal runaway during the evolution of ONeMg cores towards accretion-induced collapse**
J. Schwab, E. Quataert and L. Bildsten
MNRAS, 453, pp. 1910–1927

Nov. 2012 **The viscous evolution of white dwarf merger remnants**
J. Schwab, K. J. Shen, E. Quataert, M. Dan and S. Rosswog
MNRAS, 427, pp. 190–203

Aug. 2010 **Further Evidence for the Bimodal Distribution of Neutron-star Masses**
J. Schwab, P. Podsiadlowski and S. Rappaport
ApJ, 719, pp. 722–727

Jan. 2010 **Galaxy-Scale Strong-Lensing Tests of Gravity and Geometric Cosmology: Constraints and Systematic Limitations**
J. Schwab, A. S. Bolton and S. A. Rappaport
ApJ, 708, pp. 750–757

Jan. 2008 **Big bang nucleosynthesis constraints on the self-gravity of pressure**
S. Rappaport, J. Schwab, S. Burles and G. Steigman
Phys. Rev. D, 77.2, p. 023515

Co-Author

Mar. 2023 **Modules for Experiments in Stellar Astrophysics (MESA): Time-dependent Convection, Energy Conservation, Automatic Differentiation, and Infrastructure**
A. S. Jermyn, E. B. Bauer, J. Schwab, R. Farmer, W. H. Ball, E. P. Bellinger, A. Dotter, M. Joyce, P. Marchant, J. S. G. Mombarg, W. M. Wolf, T. L. Sunny Wong, G. C. Cinquegrana, E. Farrell, R. Smolec, A. Thoul, M. Cantiello, F. Herwig, O. Toloza, L. Bildsten, R. H. D. Townsend and F. X. Timmes
ApJS, 265.1, p. 15

July 2021 **A highly magnetized and rapidly rotating white dwarf as small as the Moon**
I. Caiazzo, K. B. Burdge, J. Fuller, J. Heyl, S. R. Kulkarni, T. A. Prince, H. B. Richer, J. Schwab, I. Andreoni, E. C. Bellm, A. Drake, D. A. Duev, M. J. Graham, G. Helou, A. A. Mahabal, F. J. Masci, R. Smith and M. T. Soumagnac
Nature, 595.7865, pp. 39–42

June 2021 **Minimum Orbital Periods of H-rich Bodies**
S. Rappaport, A. Vanderburg, J. Schwab and L. Nelson
ApJ, 913.2, p. 118

Mar. 2021 **On the Impact of ^{22}Ne on the Pulsation Periods of Carbon-Oxygen White Dwarfs with Helium-dominated Atmospheres**
M. T. Chidester, F. X. Timmes, J. Schwab, R. H. D. Townsend, E. Farag, A. Thoul, C. E. Fields, E. B. Bauer and M. H. Montgomery
ApJ, 910.1, p. 24

Mar. 2020 **Updated parameter estimates for GW190425 using astrophysical arguments and implications for the electromagnetic counterpart**
R. J. Foley, D. A. Coulter, C. D. Kilpatrick, A. L. Piro, E. Ramirez-Ruiz and J. Schwab
MNRAS, 494.1, pp. 190–198

Aug. 2019 **Detection of circumstellar helium in Type Iax progenitor systems**
W. V. Jacobson-Galán, R. J. Foley, J. Schwab, G. Dimitriadis, S. Dong, S. W. Jha, D. Kasen, C. D. Kilpatrick and R. Thomas
MNRAS, 487.2, pp. 2538–2577

July 2019 **Modules for Experiments in Stellar Astrophysics (MESA): Pulsating Variable Stars, Rotation, Convective Boundaries, and Energy Conservation**
B. Paxton, R. Smolec, J. Schwab, A. Gautschy, L. Bildsten, M. Cantiello, A. Dotter, R. Farmer, J. A. Goldberg, A. S. Jermyn, S. M. Kanbur, P. Marchant, A. Thoul, R. H. D. Townsend, W. M. Wolf, M. Zhang and F. X. Timmes
ApJS, 243.1, p. 10

Feb. 2019 **The Long-term Evolution and Appearance of Type Iax Postgenitor Stars**
M. Zhang, J. Fuller, J. Schwab and R. J. Foley
ApJ, 872, p. 29

Sept. 2018 **A search for a surviving companion in SN 1006**
W. E. Kerzendorf, G. Strampelli, K. J. Shen, J. Schwab, R. Pakmor, T. Do, J. Buchner and A. Rest
MNRAS, 479, pp. 192–199

Sept. 2018 **Three Hypervelocity White Dwarfs in Gaia DR2: Evidence for Dynamically Driven Double-degenerate Double-detonation Type Ia Supernovae**
K. J. Shen, D. Boubert, B. T. Gänsicke, S. W. Jha, J. E. Andrews, L. Chomiuk, R. J. Foley, M. Fraser, M. Gromadzki, J. Guillochon, M. M. Kotze, K. Maguire, M. R. Siebert, N. Smith, J. Strader, C. Badenes, W. E. Kerzendorf, D. Koester, M. Kromer, B. Miles, R. Pakmor, J. Schwab, O. Toloza, S. Toonen, D. M. Townsley and B. J. Williams
ApJ, 865, p. 15

July 2016 **Neutronization During Carbon Simmering In Type Ia Supernova Progenitors**
H. Martínez-Rodríguez, A. L. Piro, J. Schwab and C. Badenes
ApJ, 825, p. 57

Apr. 2016 **Carbon Shell or Core Ignitions in White Dwarfs Accreting from Helium Stars**
J. Brooks, L. Bildsten, J. Schwab and B. Paxton
ApJ, 821, p. 28

Sept. 2015 **Modules for Experiments in Stellar Astrophysics (MESA): Binaries, Pulsations, and Explosions**
B. Paxton, P. Marchant, J. Schwab, E. B. Bauer, L. Bildsten, M. Cantiello, L. Dessart, R. Farmer, H. Hu, N. Langer, R. H. D. Townsend, D. M. Townsley and F. X. Timmes
ApJS, 220, p. 15

May 2015 **The interplay of disc wind and dynamical ejecta in the aftermath of neutron star-black hole mergers**
R. Fernández, E. Quataert, J. Schwab, D. Kasen and S. Rosswog
MNRAS, 449, pp. 390–402

June 2014 **Type Ia Supernovae from Merging White Dwarfs. II. Post-merger Detonations**
C. Raskin, D. Kasen, R. Moll, J. Schwab and S. Woosley
ApJ, 788, p. 75

June 2009 **The Dark-matter Fraction in the Elliptical Galaxy Lensing the Quasar PG 1115+080**
D. Pooley, S. Rappaport, J. Blackburne, P. L. Schechter, J. Schwab and J. Wambsganss
ApJ, 697, pp. 1892–1900

Mar. 2007 **The Kinetic Luminosity Function and the Jet Production Efficiency of Growing Black Holes**
S. Heinz, A. Merloni and J. Schwab
ApJL, 658, pp. L9–L12