

Adam S. Jermyn

Home: 18 Duxbury Lane, Longmeadow, MA 01106-2006, USA

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EDUCATION

PhD Student, Astronomy, University of Cambridge, Churchill College, Institute of Astronomy	
Funded by UK Marshall Scholarship	2015-18
Supervisors: Professor Christopher Tout and Professor Gordon Ogilvie	
BS, Physics, California Institute of Technology	2011-2015
Academic Advisors: Professors Tom Tombrello and Jason Alicea	
Senior Thesis: The Atmospheric Dynamics of Pulsar Companions (Professor E. Sterl Phinney)	
GPA: 4.2/4.3, Class Rank: 2/239, In-Major GPA: 4.3/4.3, In-Major Rank: 1/31	
General GRE (2013): 168/170 (Verbal), 169/170 (Mathematics), 6/6 (Writing)	
Physics GRE (2012): 990/990	
Coursework, Westfield State University	2010-11
Longmeadow High School	2007-11

RESEARCH

Disk Populations around Binary Systems (Rob Izzard)	2015-
Turbulence Closure modelling (Chris Tout, Pierre Lesaffre, Shashikumar Chitre)	2015-
Visitor - Centre for Excellence in Basic Sciences - University of Mumbai	January 2017
Visitor - École Normale Supérieure	January 2016
Quasistar Structure (Anna Zytrow)	2015-
Tidal feedback (Gordon Ogilvie)	2015-
Lin Group, UC Berkeley and UT Southwestern, Aggregation in Biological Systems	2012-
Levitin Group, McGill, Spectral Laws in Non-Human Music	2015-16
Carroll Group, Caltech, Information Retrieval from Black Holes	2015
Atwater Group, Caltech, JCAP, Nanoplasmonics, Carrier Transport, and Photoabsorption	2012-16
Senior Thesis (E. Sterl Phinney), Caltech, Transient Effects in Pulsar Companions	2013-15
Alicea Group, IQIM, Condensed Matter Theory	2012-14
Zewail Group, Caltech, Theoretical Protein Folding	2012-13
Markovic Group, Johns Hopkins University, Quantum Transport Measurement	2010
Johns Hopkins Biostatistics Department High Performance Computing Center	2008

AWARDS

APS LeRoy Apker Award	2015
Caltech George W. Housner Award for Original Research	2015
Caltech Frederic W. Hinrichs, Jr. Memorial Leadership Award	2015
Caltech Dr. D. S. Kothari Prize	2015
Caltech Library Senior Thesis Prize	2015
Caltech Haren Lee Fisher Memorial Award in Physics	2014
Caltech Jack E. Froehlich Memorial Award	2014
Caltech Perpall Scientific Speaking Competition 2nd Place	2014
US Physics Team (top 20 in US on semifinal exam), Member	2011
First Place Massachusetts State Science Fair, Flow properties of Coulomb gases	2010
CleanTech MSSEF Award	2010

Grants

Hertz Fellowship	2015
NSF Graduate Fellowship	2015
NDSEG Graduate Fellowship (declined)	2015
Marshall Scholarship	2014
Renewed 2017-18	2017
Barry M. Goldwater Fellowship	2014
Flintridge Foundation Summer Undergraduate Research Fellowship	2014
US Department of Energy NERSC Allocation m1824 (PI):	
Renewal Allocation (PI, 50,000 core-hours)	2016
Renewal Allocation (PI, 50,000 core-hours)	2015
Renewal Allocation (PI, 15,000 core-hours)	2014
Startup Allocation (15,000 core-hours)	2013
Jean J. Dixon Summer Undergraduate Research Fellowship	2013
Ph11 Summer Research Fellowship	2012

Professional Memberships

Royal Astronomical Society	2016-17
Association of Marshall Scholars	2015-17
American Physical Society	2013-17
Materials Research Society	2012-2015

PAPERS

Published:

1. Halabi, G. M., Izzard, R. G., Tout, C. A., **Jermyn, A. S.**, Cannon, R. 2DStars: A two-dimensional stellar evolution code. Mem. S.A.It. Vol. 75, 282.
2. **Jermyn, A. S.**, Tout, A. C., Ogilvie, I. G. Tidal heating and solar irradiation of Hot Jupiters. Monthly Notices of the Royal Astronomical Society (2017) 469 (2): 1768-1782, arXiv:1704.01126).
3. Corts, E, Xie, W, Cambiasso, J, **Jermyn, A. S.**, Sundararaman, R, Narang, P, Schlücker, S, Maier, S. Hot Electron Transport Driven Surface-Chemistry with Nanoscale Spatial Resolution. Nature Communications (2017).
4. Narang, P*, Sundararaman, R*, **Jermyn, A. S.**, Atwater, H, Goddard, W. Cubic nonlinearity driven upconversion in high-field plasmonic hot carrier systems. The Journal of Physical Chemistry C (2016).
5. Chatwin-Davies, A, **Jermyn, A. S.**, Carroll, S. Retrieving Qubits from Black Holes. Physical Review Letters (2015, Phys.Rev.Lett.115,261302, arXiv:1507.03592). **Highlighted in Science News.**
6. Sundararaman, R*, Narang, P*, **Jermyn, A. S.***, Atwater, H, Goddard, W. Theoretical predictions for hot carrier generation from surface plasmon decay. Nature Communications 5, 5788 (2014).
7. **Jermyn, A. S.**, Mong, R, Alicea, J. Stability of zero-modes in parafermion chains. Physical Review B (2014, PhysRevB.90.165106, arXiv:1407.6376). **Editor's Suggestion (front webpage).**

Submitted: (preprints upon request unless specified)

1. Rasmussen, A*, **Jermyn, A. S.*** Gapless Topological Order, Gravity, and Black Holes. arXiv:1703.04772. Submitted PRB 2017.
2. Steinhardt, L., C., **Jermyn, A. S.** Nonparametric Methods in Astronomy: Think, Regress, Observe – Pick Any Three. Submitted ApJ. 2016.
3. **Jermyn, A. S.**, Stevenson, D. J. Levitin, D. J. From Bach to Shamu: $1/f$ laws in non-human music. Submitted Music Perception. 2016.

In Preparation: (preprints upon request unless specified)

1. **Jermyn, A. S.**, Tout, C. A. The Role of Asymmetric Stress in Differential Rotation.
2. **Jermyn, A. S.**, Chitre, S. M. Lesaffre, P, Tout, C. A. The Magnitude of Differential Rotation.
3. Izzard, R. G., **Jermyn, A. S.** Circumbinary discs around post-AGB stars.
4. **Jermyn, A. S.**, Lesaffre, P, Tout, C. A., Chitre, S. M. A Novel Approach to Turbulence Closure.
5. **Jermyn, A. S.**, Tout, C. A., Chitre, S. M. Enhanced Mixing in Massive Rotating Stars.
6. **Jermyn, A. S.**, Tagliabue, G, Atwater, H, Goddard, W, Sundararaman, R, Narang, P. Far-from-equilibrium transport of excited carriers in nanostructures.
7. Tagliabue, G, **Jermyn, A. S.**, Sundararaman, R, Welch, A, DeChene, J, Davoyan, A, Narang, P, Atwater, H. Ballistic Transport of Plasmonic Hot Carriers at the Au-GaN Interface: A Coupled Experimental and Theoretical Study of Carrier Transport.
8. **Jermyn, A. S.**, Lin, M., De La Cruz, E. Equilibrium Self-Assembly in One Dimension.
9. **Jermyn, A. S.**, Lin, M. Statistical Mechanics Model of Aggregation with Tunable Branching.
10. **Jermyn, A. S.** Computing Bounds on the Radius of Convergence of Analytic Functions.
11. **Jermyn, A. S.** Multidimensional Derivatives of Analytic Functions.

TALKS

Invited:

1. **Jermyn, A. S.**, Tout, C. A., Chitre, S. M., Lesaffre, P. (2017), Meridional Flow and Mixing in Massive Stars. Seminar, Institute of Astronomy, University of Cambridge.
2. **Jermyn, A. S.**, Phinney, E.S. (2016). The Atmospheric Dynamics of Pulsar Companions. Invited Talk (Apker Prize), APS April.
3. **Jermyn, A. S.**, Mong, R, Alicea, J (2014), Stability of zero-modes in parafermion chains. Institute for Quantum Information and Matter.

Contributed:

1. **Jermyn, A. S.**, Tout, C. A., Chitre, S. M., Lesaffre, P. Tidal Heating and Solar Irradiation of Hot Jupiters. Churchill Conference on Everything (2017).
2. **Jermyn, A. S.** (2017). Automatic Renormalization of Local Tensor Networks. APS March.
3. **Jermyn, A. S.**, Phinney, E.S. (2015). Exterior Stellar Heating. APS Apker Finalist Seminar.
4. **Jermyn, A. S.**, Sundararaman, R, Narang, P, Goddard, W, Atwater, H (2015). Plasmonic Hot Carrier Transport and Collection in Nanostructures. APS March.
5. **Jermyn, A. S.**, Phinney, E.S. (2014). Exterior Stellar Heating. Caltech SURF Seminar.
6. **Jermyn, A. S.**, Mong, R, Alicea, J (2014), Robustness of zero-modes in parafermion chains. APS March.
7. **Jermyn, A. S.**, Alicea, J, Mong, R (2013), The Stability of Zero Energy Edge Modes in 1D Quantum Chains. Caltech SURF Seminar.
8. **Jermyn, A. S.** (2010). The Fluid Behavior of Electron Aggregates. Massachusetts Junior Academy of Sciences Symposium.

Collaborative:

1. Tagliabue, G, **Jermyn, A. S.**, Sundararaman, R, Narang, P, Welch, A, Du Chene, J, Davoyan, A, Atwater, H. Ballistic Transport of Plasmonic Hot Carriers at the Au-GaN Interface: A Coupled Experimental and Theoretical Study of Excited Carrier Transport. Nanophotonics and Micro/Nano Optics International Conference 2017.
2. Tagliabue, G, Sundararaman, R, Narang, P, **Jermyn, A. S.**, Atwater, H. Plasmonic hot-carriers in the UV-VIS regime: experimental study of the internal quantum efficiency of generation and injection into GaN. SPIE Nanoscience and Engineering 2017.
3. Rasmussen, A, **Jermyn, A. S.**, Refael, G, Gapless Topological Order, Gravity, and Black Holes. APS March 2017.
4. Corts, E*, Xie, W, Cambiasso, J, **Jermyn, A. S.**, Sundararaman, R, Narang, P, Schlücker, S, Maier, S), Mapping reactive-sites in plasmonic antennas with 15nm resolution. 8th International Conference on Surface Plasmon Polaritons 2017.
5. Corts, E*, Xie, W, Cambiasso, J, **Jermyn, A. S.**, Sundararaman, R, Narang, P, Schlücker, S, Maier, S, Spatial Mapping the Reactivity of Plasmons. MRS Spring 2017.
6. Corts, E, Xie, W, Cambiasso, J*, **Jermyn, A. S.**, Sundararaman, R, Narang, P, Schlücker, S, Maier, S, Site-specific surface chemistry driven by hot-electrons. NanoMeta 2017.
7. Steinhardt, C*, **Jermyn, A. S.**, Astronomical Methods for Nonparametric Regression, Astronomical Methods in Nonparametric Regression. AAS 229 2017.
8. Narang, P*, Sundararaman, R, **Jermyn, A. S.**, Goddard, W, Atwater, H, Generation, transport and relaxation dynamics of non-equilibrium carriers in plasmonic devices. MRS Fall 2016.
9. Izzard, R., **Jermyn, A. S.** Post-AGB Binary Discs. Torino Workshop XII 2016.
10. Sundararaman, R, Narang, P, **Jermyn, A. S.**, Atwater, H, Goddard, W, Excited carrier dynamics and transport in plasmonic nanostructures. APS March 2016.
11. Narang, P*, Sundararaman, R, **Jermyn, A. S.**, Cortes, E., Maier, S., Goddard, W (2016), Non-equilibrium hot carrier dynamics in plasmonic nanostructures. APS March.
12. Sundararaman, R, **Jermyn, A. S.**, Narang, P, Generation, transport and relaxation of non-equilibrium carriers in plasmonic nanostructures. MRS Fall 2015.
13. Narang, P*, Sundararaman, R, Brown, Ana, **Jermyn, A. S.**, Goddard, W, Atwater, H (2015), Ultrafast processes in surface plasmon decays. MRS Fall.
14. Narang, P, Sundararaman, R, **Jermyn, A. S.**, Goddard, W, Atwater, H, Surface plasmon decay dynamics in nanostructured systems: A Feynman diagram approach. APS March 2015.
15. Narang, P, Sundararaman, R, **Jermyn, A. S.**, Bouma, L, Goddard, W, Atwater, H (2014), Surface Plasmon Decay Dynamics: A Feynman Diagram Approach. Gordon Research Conference Invited Talk.
16. Sundararaman, R, Narang, P, **Jermyn, A. S.**, Atwater, H, Goddard, W, First principles theory for surface plasmon generation and decay to hot carriers. APS March 2014.
17. Narang, P, **Jermyn, A. S.**, Sundararaman, R, Goddard, W, Galli, G, Atwater, H, Localized Surface Plasmon Decay Dynamics. MRS Fall 2014.

18. Narang, P*, **Jermyn, A. S.***, Lewis, N, Atwater, H, Quantum Plasmons: Strong Correlation of Surface Plasmon Polariton Polarization with Hot Carrier Momentum Distribution. MRS Fall 2013.
19. Narang, P*, **Jermyn, A. S.**, Leenheer, A, Lewis, N, Atwater, H, Plasmonic Hot Carrier Devices: Light Capture and Catalysis. JCAP DOE Site Review Spring 2013.
20. Narang, P*, **Jermyn, A. S.***, Leenheer, A, Lewis, N, Atwater, H, Plasmonic Hot Carrier Devices: Fully Quantized Model. MRS Spring 2013.
21. Leenheer, A, Narang, P, **Jermyn, A. S.**, Lewis, N, Atwater, H, Plasmonic Hot Carrier Emission Devices: Efficiency Considerations. MRS Fall 2012.

POSTERS

1. **Jermyn, A. S.**, Lesaffre, P, Tout, C, A 2D Magnetic Mixing Length Theory. Cambridge Fluids Network Meeting 2016.
2. Sundararaman, R, Narang, P, **Jermyn, A. S.**, Brown, A, Goddard, W, Atwater, H, Generation and transport of hot carriers in plasmonic nanostructures. Joint Center for Artificial Photosynthesis All-Hands 2015.
3. Narang, P, Sundararaman, R, **Jermyn, A. S.**, Bouma, L, Goddard, W, Atwater, H, Surface Plasmon Decay Dynamics: A Feynman Diagram Approach. Gordon Research Conference 2014.
4. Sundararaman, R, Narang, P, **Jermyn, A. S.**, Atwater, H, Goddard, W, First principles theory of plasmonic hot carrier generation in nano-structured systems. Gordon Research Conference 2014.
5. Narang, P, Sundararaman, R, **Jermyn, A. S.**, Localized Surface Plasmon Decay Dynamics. MRS Spring 2014.
6. Sundararaman, R, Narang, P, **Jermyn, A. S.**, Atwater, H, Goddard, W, First Principles Calculations for Surface Plasmon Decays and Solvation Models for Surfaces in Solution. Joint Center for Artificial Photosynthesis All-Hands 2014.
7. Narang, P, Sundararaman, R, **Jermyn, A. S.**, Creel, E, Atwater, H, Goddard, W, Plasmon-driven Solar Energy Conversion and Catalysis: A First Principles Study. Joint Center for Artificial Photosynthesis All-Hands 2014.
8. Markovic, N, Silverman, S, **Jermyn, A. S.**, Rivera, R. Optical Properties of Unfunctionalized Ultra-Short Carbon Nanotubes. Poster 135, MRSEC Summer Research Experience Poster Session 2010.

PATENTS

Jermyn, A. S., Silverman, J, Markovic, N, "System for Lightweight Image Processing," US Patent Number US 9,097,739 B2 (Filed 2011, Awarded 2015).

SOFTWARE

arrfunc - Python module for treating functions as lazily-evaluated arrays (MIT, github)	2017-
2D Stars - Cambridge 2D Stellar Evolution Code. Cofounding Developer	2015-17
QuantumScattr - Quantum carrier transport code. Cofounding Developer	2012-17
AstroMicroPhysics - Python astronomical microphysics package. Lead Developer.	2015
QuantumChains - Numerical Condensed Matter Package (GPLv3, github). Lead Developer.	2013-14
NanoImage - Atomic Force Microscopy Analysis (USPTO 13/534428). Lead Developer.	2010-11

TEACHING

Cambridge Supervisor:

Mathematics: Mathematical Biology (Part II)	2017
Mathematics: Binary Stars (Part III - Masters Course)	2017
Mathematics: Computational Projects (Part IB)	2016
Mathematics: Structure and Evolution of Stars (Part III - Masters Course)	2016
Natural Sciences: Mathematics (Part IA)	2016
Physics: Astrophysical Fluid Dynamics (Part II)	2015

Caltech Teaching Assistant:

Ph101 - Order of Magnitude Physics (Prof. E. S. Phinney)	2015
Ph11 - Freshman Research Tutorial (Profs. David Stevenson and Rob Phillips)	2014-15
Ph7 - Radiation Lab (Graduate TA/Section Leader for Dr. Frank Rice)	2014
Ph6 - Atomic Physics Lab (Graduate TA/Section Leader for Dr. Frank Rice)	2014
Ph5 - Analog Circuits Lab (Undergraduate TA for Dr. Frank Rice)	2013
Ph6 - Atomic Physics Lab (Undergraduate TA for Dr. Frank Rice)	2013

Caltech Tutor:

Ph205a - Relativistic Quantum Field Theory	2014-15
Ph106 - Graduate Classical Mechanics and Electromagnetism	2013-15

Ph127 - Graduate Statistical Physics	2013-15
Ph236a - General Relativity	2013-15
Ch1 - Freshmen Chemistry	2012-15
Ma1 - Freshmen Math (Analysis, Linear Algebra, Multivariable Calculus)	2012-15
Ma2 - Sophomore Math (Probability, Statistics, and Differential Equations)	2012-15
Ph2 - Sophomore Physics (Waves, Quantum Mechanics, and Thermodynamics)	2012-15
Ph12 - Advanced Sophomore Physics (Waves, Quantum Mechanics, and Thermodynamics)	2012-15
ACM95 - Graduate Methods of Applied and Computational Mathematics	2012-15
Ph125 - Graduate Quantum Mechanics	2012-15
Caltech Guest Lecturer:	
Ph50 - Physics League (Seminar)	2017
Ph11 - Freshman Research Tutorial	2013, 2016, 2017
Unaffiliated Tutor:	
High School Physics Olympiad Preparation	2016
Other:	
Experimental Design (Thin Film Deposition) for Senior Lab	2014
Editor, Ph5 Laboratory Manual	2013

OUTREACH

1. Contributed text on the history of stellar dynamics to an upcoming biography of Sir Jeans. 2017.
2. Volunteer at Cambridge Science Festival. March 2017.
3. **Jermyn, A. S.**, Tout, C. A., Chitre, S. M., Lesaffre, P. Mixing in Massive Stars. Churchill MCR ChuTalk (Outreach Talk) (2017).
4. Co-Organized Institute of Astronomy Undergraduate Journal Club. 2016-17.
5. Volunteer at Cambridge Science Festival. March 2016.
6. **Jermyn, A.** Gravitational waves open new window to cosmos. Reach for the Stars Guest Column on MassLive. URL: http://www.masslive.com/living/index.ssf/2016/03/reach_for_the_stars_gravitational_waves_open_new_window_to_cosmos.html. March 2016.
7. Volunteer at Cambridge Institute of Astronomy Public Outreach events 2016.
8. Handmer, C. **Jermyn, A. S.**, Paragano, M., Lommen, P., Nosanov, J. The Martian: A Technical Commentary. URL: <http://caseyexaustralia.blogspot.co.uk/2015/10/the-martian-technical-commentary.html>. October 2015.
9. **Jermyn, A. S.**, Hung, P. Caltech Teaching Conference Opening Session. Caltech Center for Teaching, Learning, and Outreach Invited Talk. September 2014.
10. **Jermyn, A. S.** A Summer of Physics. Invited talk at the Skyscrapers Amateur Astronomical Society of Rhode Island. July 2011.
11. Guest speaker at the Springfield Telescope and Reflector Society and Amherst Area Amateur Astronomy Association. 6 times in 2006-2012.

EMPLOYMENT	Undergraduate IT Support	2011-14
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SKILLS

Programming Languages:

Expert: Python (NumPy/SciPy), Java, Mathematica
 Experienced: C++, Julia, Matlab
 Familiar: C, Fortran, Bash
 Passable: R, Scheme

Other:

Programming and using Finite Element codes
 Density Matrix Renormalization Group methods
 Markov Chain and Nested Sampling methods
 Massively parallel programming
 Finite Difference Time Domain EM Simulations (Meep)
 Familiarity with Unix/Linux environments

SERVICE**Cambridge:**

Representative to the Institute of Astronomy Athena SWAN/Juno committee	2016-17
Institute of Astronomy Computing Users' Committee	2017
Astronomy Graduate Student Forum Representative	2015-17
Representative to the School of Physical Sciences Graduate Education Committee Workshop	2016

Caltech:

Search Committee for the Vice President for Student Affairs	2014-15
Dean's Advisory Council	2014-15
Contributing Writer - The California Tech	2014-15
Academics and Research Committee	2012-15
Curriculum Committee	2012-15
Commencement Speaker Selection Committee	2014-15
Physics Student Faculty Conference Committee	2013-15
Physics Option Mentor	2013-15
Upperclassmen Counselor	2013-15
Council for Undergraduate Education	2013-15
Information Management Systems and Services Representative	2012-15
Title IX Committee	2014-15
Faculty Board Ad Hoc Honor Code Task Force	2013-14
Undergraduate Honor Code Committee	2013-14
Housing Stewardship Committee	2013-14
Dabney House Treasurer	2013-14
Computer Advisory Committee	2012-14
Dabney House Comptroller	2012-13