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| Name | Daniel S. Zimmerman |
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| E-mail | dan@danzimmerman.com |
| University E-mail | dsz@umd.edu |
| Citizenship | United States |
| Occupational Field | Physicist |
| Webpage | http://www.danzimmerman.com |

Education

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| 2010 | Ph. D. in Physics |
| Principal subject | Rotating Turbulence |
| Thesis title | Turbulent Shear Flow in a Rapidly Rotating Spherical Annulus http://hdl.handle.net/1903/11184 |
| Advisor | Professor Daniel P. Lathrop |
| School | University of Maryland, College Park, MD |
| 2001 | B. Sc. in Physics with Great Distinction |
| School | Clarkson University, Potsdam, NY |

Appointments

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| Oct 2010 - Present | Postdoctoral Researcher |
| Activities | Sodium-specific instrumentation development for Three Meter Sodium Geodynamo Experiment. Sodium fill procedure design. Sodium fill equipment design and construction. Initial sodium fill and commissioning. Undergraduate researcher advising. Initial magnetohydrodynamic measurements in the Three Meter experiment. Experiments in acoustic mode flow tomography method in air. |
| Organization | Institute for Research in Electronics and Applied Physics (IREAP), University of Maryland, College Park, MD |
| August July 2009-Oct 2010 | Faculty Research Assistant |
| Activities | Continued instrumentation development and hydrodynamic characterization of the Three Meter Experiment. Scientific publication of water results. Undergraduate researcher advising. |
| Organization | IREAP and Department of Physics, University of Maryland, College Park, MD |
| August 2001-June 2009 | Graduate Research Assistant |
| Activities | Design, construction, testing and commissioning of the Three Meter Sodium Geodynamo Experiment. Assistance with instrumentation and experiments in the 30cm and 60cm sodium spherical Couette experiments, and the 30cm sodium Taylor-Couette experiment. Scientific studies characterizing hydrodynamic turbulence in water in the Three Meter Geodynamo Experiment. |
| Organization | IREAP and Department of Physics, University of Maryland, College Park, MD |
| September 2000-May 2001 | Undergraduate Teaching Assistant |
| Activities | Lab Instructor for PHYS 131, "Physics I", Instructor Prof. David Wick |
| Organization | Department of Physics, Clarkson University, Potsdam NY |
| September 1999-May 2000 | Undergraduate Research Assistant |
| Activities | Assisted with research in optical second harmonic generation at electrochemical interfaces with Prof. Dipankar Roy |

Publications

Peer reviewed

M. Rieutord, S.A. Triana, **D.S. Zimmerman**, and D.P. Lathrop.
Excitation of inertial modes in an experimental spherical Couette flow.
Phys. Rev. E, 86:026304, Aug 2012.
<http://dx.doi.org/10.1103/PhysRevE.86.026304>

S. A. Triana, **D. S. Zimmerman**, and D. P. Lathrop.
Precessional states in a laboratory model of the earth's core.
J. Geophys. Res., 117(B4):B04103–, April 2012.
<http://dx.doi.org/10.1029/2011JB009014>

D.S. Zimmerman, S.A. Triana, and Lathrop D.P.
Bi-stability in turbulent, rotating spherical Couette flow.
Physics of Fluids, 23(6):065104, 2011.
<http://dx.doi.org/10.1063/1.3593465>

H. Matsui, M. Adams, D. Kelley, S.A. Triana, **D.S. Zimmerman**, B. Buffet, and D.P. Lathrop.
Numerical and experimental investigation of shear-driven inertial oscillations in an Earth-like geometry.
Physics of the Earth and Planetary Interiors, 188:194 – 202, 2011.
<http://dx.doi.org/10.1016/j.pepi.2011.07.012>

D.H.. Kelley, S.A. Triana, **D.S. Zimmerman**, and D.P. Lathrop.
Selection of inertial modes in spherical Couette flow.
Phys. Rev. E, 81(2):026311, Feb 2010.
<http://dx.doi.org/10.1103/PhysRevE.81.026311>

D.H Kelley, S.A. Triana, **D.S. Zimmerman**, A. Tilgner, and D. Lathrop.
Inertial waves driven by differential rotation in a planetary geometry.
Geophysical and Astrophysical Fluid Dynamics, 101:469–487, Oct 2007.
<http://dx.doi.org/10.1080/03091920701561907>

D.H. Kelley, S.A. Triana, **D.S. Zimmerman**, B. Brawn, D.P. Lathrop, and D.H. Martin.
Driven inertial waves in spherical Couette flow.
Chaos, 16(4), 2006.
<http://dx.doi.org/10.1063/1.2390555>

E. Mihóková, L. S. Schulman, M. Nikl, B. Gaveau, K. Polák, K. Nitsch, and **D.S. Zimmerman**.
Temperature dependence of anomalous luminescence decay: Theory and experiment.
Phys. Rev. B, 66(15):155102, Oct 2002.
<http://dx.doi.org/10.1103/PhysRevB.66.155102>

M. Nikl, P. Boháček, E. Mihóková, N. Solovieva, M. Martini, A. Vedda, P. Fabeni, G.P. Pazzi, M. Kobayashi, M. Ishii, Y Usuki, and **D.S. Zimmerman**.
Modification of PbWO₄ scintillator characteristics by doping.
Journal of Crystal Growth, 229(1-4):312 – 315, 2001.
[http://dx.doi.org/10.1016/S0022-0248\(01\)01170-8](http://dx.doi.org/10.1016/S0022-0248(01)01170-8)

Conference Proceedings

M.J. Walters, J.E. Garland, C.M. Pettit, **D.S. Zimmerman**, D.R. Marr, and D. Roy. Weak adsorption of anions on gold: Measurement of partial charge transfer using fast Fourier transform electrochemical impedance spectroscopy. *Journal of Electroanalytical Chemistry*, 499(1):48 – 60, 2001. [http://dx.doi.org/10.1016/S0022-0728\(00\)00468-X](http://dx.doi.org/10.1016/S0022-0728(00)00468-X)

S. A. Triana, D. H. Kelley, **D.S. Zimmerman**, D.R. Sisan, and D. P. Lathrop. Hopf bifurcations with fluctuating gain. *Astronomische Nachrichten*, 329(7):701–705, Sep 2008. <http://dx.doi.org/10.1002/asna.200811012>

D.S. Zimmerman, S.A. Triana, D.R. Sisan, W.A. Tillotson, W. Dorland, and D.P. Lathrop. Characterization of the magnetorotational instability from a turbulent background state. *AIP Conference Proceedings*, 733(1):13–20, 2004. <http://dx.doi.org/10.1063/1.1832133>

Funding

NSF Grants

"Core dynamics experiments in the Three Meter Geodynamo device," Total Award \$332,136, National Science Foundation EAR-1114303 (Co-PI)

Presentations

Invited Talks

Turbulence, Waves, Transport (and perhaps Dynamo) in Laboratory Model Cores *European Geosciences Union General Assembly 2012*. Vienna, Austria, April 27, 2012.

Three Meter Turbulent Spherical Couette (on behalf of Dan Lathrop) *Turbulent Taylor-Couette Workshop, University of Twente*. Enschede, Netherlands June 24, 2010.

Other Talks

Inertial modes and hydromagnetic waves in spherical Couette flow. *Les Houches Winter School: Waves and Instabilities in Geophysical and Astrophysical Flows, Les Houches, France, Feb 3, 2013*

Journey to the Center of the ERF: Planetary Cores, Accretion Disks and "Helioseismology" in the lab. *University of Maryland AstroTerps Club Meeting (Invited)*, November 28, 2012

Spatial variation of angular momentum transport in turbulent spherical Couette flow. *64th Annual Meeting of the APS Division of Fluid Dynamics*. Baltimore, MD, November 20, 2011

Turbulent scaling in rotating spherical Couette flow. *63rd Annual Meeting of the APS Division of Fluid Dynamics*. Long Beach, CA, November 21, 2010

Bi-stable turbulent spherical Couette. *62nd Annual Meeting of the APS Division of Fluid Dynamics*. Minneapolis, MN, November 23, 2009

Hydromagnetic Taylor-Couette experiments in liquid sodium. *60th Annual Meeting of the APS Division of Fluid Dynamics*. Salt Lake City, UT, November 19, 2007

Experimental observation and characterization of the magnetorotational instability. *57th Annual Meeting of the APS Division of Fluid Dynamics*. Seattle, WA, November 22, 2004

Posters

Hydromagnetic Waves and Progress in the UMD 3m Experiment. <http://goo.gl/UrS8H>
2012 American Geophysical Union Fall Meeting. San Francisco, CA, December 3-7, 2012.

Turbulent flow transitions in spherical Couette flow. *2012 Dynamics Days Meeting*.
Baltimore, MD, Jan 4-7, 2012.

Angular momentum transport in turbulent spherical Couette flow. *2011 American Geophysical Union Fall Meeting*. San Francisco, CA, December 5-9, 2011.

Professional Skills

Mechanical Engineering

Strength of materials and stresses. Stress and vibration analysis, analytical methods and finite element software. Vibration measurement, analysis, and mitigation. Machine design including design of shafts, bearings, seals, belt drives. Some rotor-dynamics including critical speed analysis and dynamic balancing. Technical drawing and 3D modeling. Heating design and heat transfer engineering. Cooling system design. Gear design. Piping and pump design. Reinforced concrete design. Ventilation system design.

Electrical and Electronic Engineering

Electronic circuit design specializing in low noise analog circuits/signal conditioning. Electromechanical systems. Radio frequency circuits. Antennas. Electrical interference mitigation. Electrical wiring installation and troubleshooting. Variable speed motor drive design. Circuit troubleshooting. Finite element antenna/RF circuit analysis. Hardware/software interfaces. Microcontroller programming. C and Python programming. Wireless data networks. Power electronics.

Instrumentation Development

Wireless, battery powered instrumentation design. Low cost sensor design (multi-channel constant temperature anemometer using inexpensive platinum RTD sensors). Microcontroller based positioning and control systems. Acoustic mode tomography for contained fluid flows.

Fabrication, Construction, Etc.

Machining including considerable experience with lathe and milling work. 3D printing. Large scale metal fabrication including gas metal arc welding (MIG welding) of steel and stainless steel, gas tungsten arc welding (TIG welding) of steel, stainless, and aluminum, stick welding of steel, soldering, oxyfuel and plasma torch cutting. Circuit board and circuit fabrication including small-scale surface mount reflow work. Machine repair. Plumbing, including welded steel pipe.

Special

Alkali metal safety, transfer, and handling. Acoustic techniques for velocity measurements in opaque fluids.

Related Activities

Professional Memberships

American Physical Society (APS), American Geophysical Union (AGU), European Geosciences Union (EGU)

Public Outreach

Scientific demonstrations, including construction and demonstration of smoke ring vortex cannons for Physics Department's Maryland Day demonstrations.

Amateur radio website: <http://www.n3ox.net>. Several articles promote and guide quantitative experimental measurements of antenna patterns and performance, etc. without expensive, difficult to obtain test equipment. Articles emphasize comparison between numerical model predictions and quantitative measurements.

Other Interests

Amateur radio, especially antenna design. Hobby electronics/DIY. Music; guitar, bass, songwriting. Bicycling and bike building and repair.

References

Professor Daniel P. Lathrop. *Associate Dean for Research, College of Computer, Mathematical, and Natural Sciences, University of Maryland.* Phone (301) 405-1594, e-mail: lathrop@umd.edu.

Professor Henri-Claude Nataf. *Directeur de Recherche 1^{ère} classe, CNRS Laboratoire de Géophysique Interne et Tectonophysique (LGIT), Université Joseph-Fourier.* Phone +33 4 76 63 51 77, e-mail: henri-claude.nataf@ujf-grenoble.fr.

Professor Jonathan Aurnou. *Associate Professor of Geology, Department of Earth and Space Sciences, UCLA.* Phone (310) 825-2054, e-mail: jona@ess.ucla.edu.