Jens von der Linden

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Education

University of Washington
PhD, Aeronautics & Astronautics - Plasma Physics *2017*
Dissertation Title: Investigating the Dynamics of Canonical Flux Tubes
Committee: Bruce Balick, Antonio Ferrante, Brian Nelson, Uri Shumlak, Setthivoine You (Chair)

University of Pennsylvania
BA, Physics & Astronomy *2009*

Research

Research Associate **Max Planck Institute for Plasma Physics**
A Positron-Electron eXperiment (APEX) collaboration *2021 – Present*

- Develop gamma detector array and FPGA processing pipeline to relate annihilation to electron-positron plasma properties.
- Manage international collaboration to inject record number of positrons into magnetic dipole trap at AIST positron-beam facility in Japan.
- Study scattering, cooling, and charge-exchange of magnetically confined positrons with neutral gases.
- PI – Department of Energy Opportunities in Frontier Plasma Science: Develop novel multi-point Mach-Bdot probe to measure evolution of canonical vorticity during sawtooth events.

Staff Scientist **Lawrence Livermore National Laboratory**
Fusion Energy Sciences *2020*

- Co-I on LDRD: Designed magnetic mirror to trap relativistic electrons with single-particle and PIC simulations.
- Led laser experiments to generate and trap relativistic electron-positron pairs.
- Supervised graduate student calibrating magnetic spectrometers for National Ignition Facility with medical accelerator.

Postdoctoral Researcher **Lawrence Livermore National Laboratory**
Advisor: Jason Sears, Fusion Energy Sciences *2017 – 2020*

- Developed multi-physics computational model of electrical discharges in volcanic eruptions with adaptive mesh refinement (AMRex) framework.
- Conducted shock tube experiments to validate code and study shock-discharge interaction.
- Coordinated simulation, experiments, and geoscience research efforts.

Research Assistant **University of Washington**
Advisor: Setthivoine You, Aeronautics & Astronautics *2009 – 2017*

- Designed, built, and operated pulsed power plasma jet experiment with rotating boundary conditions mimicking astrophysical disk-jet system.
- Investigated stability of plasma jets with azimuthal shear rotation with Bdot probe array (135 coils) and ion Doppler spectroscopy (32 lines of sight).
- As advisor's first graduate student, mentored all following students: 1 PhD student, 5 Master's students, and 8 undergraduate students.

Office of Science Graduate Student Research Fellow (SCGSR) **Department of Energy**
Advisor: Jason Sears, Lawrence Livermore National Laboratory, Fusion Energy Sciences *2015 – 2016*

- Reconstructed 3D evolution of magnetic and ion flow vorticity flux tubes and their helicity from internal Mach & Bdot probe measurements of a gyrating kinked flux rope across 3,000 experiment shots.

Research Assistant **University of Pennsylvania**
Advisor: Mark Devlin, Experimental Cosmology Group, Physics *2006 – 2009*

- Identified star-forming regions in cosmic infrared background radiation.

National Undergraduate Fellow in Plasma Physics (NUF) **Department of Energy**
Adivsor: Anthony Leonard, Magnetic Fusion Energy, General Atomics *2008*

- Determined numerically the dependence of tokamak stability limit on plasma shape.

Summer Undergraduate Laboratory Intern (SULI) **Oak Ridge National Laboratory**
Advisor: Sarah Cousineau, Spallation Neutron Source *2007*

- Developed application to determine accelerator beam parameters from wire scan measurements.

Awards & Fellowships

Runner-up, Research Fellowship
Japanese Society for the Promotion of Science *2023*

Research Fellowship
Alexander von Humboldt Foundation, 90,000 EUR *2021-2023*

- Individual support to develop diagnostics for magnetized positron-electron pair plasma.

Poster Prize
Postdoctoral Research Symposium, Lawrence Livermore National Laboratory *2018*

Office of Science Graduate Student Research Program Fellowship
US Department of Energy, 36,000 USD *2015-2016*

- Supplemental thesis funding for research on flux rope invariants at Lawrence Livermore National Laboratory.

Honorable Mention, Graduate Research Fellowship
US National Science Foundation *2010*

Joel M. Kenney Fellowship
College of Engineering, University of Washington *2009*

Grants

PI: Opportunities in Frontier Plasma Science
Department of Energy, 240,000 USD *2020-2024*

- Grant to develop novel multi-point, 3D Bdot-Mach probe to study plasma relaxation.

Co-I: Laboratory Directed Research & Development (LDRD) Labwide Award
Lawrence Livermore National Laboratory, 550,000 USD *2019-2021*

- Internal funding to develop magnetic confinement of relativistic positron-electron pair plasma. Co-authored proposal.

Facility User Time Awards

MagNetUS
Wisconsin Plasma Physics Laboratory (WiPPL) *2020 – Present*
Six weeks deploying novel multi-point probe at WiPPL.

Advanced Beam Measurement Group
National Institute of Advanced Industrial Science and Technology (AIST, Japan) *2023 – 2024*
Four weeks deploying permanent magnet trap at AIST positron beam.

Multi-Scale Laboratories - Transnational Access
European Plate Observing Systems (EPOS) *2019*
Two-week run studying shock-discharge interactions at LMU Munich.

Publications

Undergraduate students mentored.
Graduate students mentored.

1. **J. von der Linden**, S. Nißl, A. Deller, M. Singer, N. Belmore, C. P. Huggenschmidt, T. Sunn Pedersen, H. Saitoh, and E. V. Stenson. Injection, confinement, and diagnosis of electrons and positrons in a permanent magnet dipole trap. *European Physical Journal D*, 78(12), 2024. doi:10.1140/epjd/s10053-024-00821-x

2. A. Card, A. Deller, M. R. Stoneking, **J. von der Linden**, E. V. Stenson. FPGA-stabilized magnetic levitation of the APEX-LD high-temperature superconducting coil. *IEEE Transactions on Applied Superconductivity*, 34(9), 2024. doi:10.1109/TASC.2024.3462796.

3. A. Deller, **J. von der Linden**, S. Nißl, K. Michishio, N. Oshima, H. Higaki, E. V. Stenson. Injection and confinement of positron bunches in a magnetic dipole trap. *Physical Review E*, 110(2), 2024. doi:10.1103/physreve.110.l023201.

4. H. Himura, A. F. Almagri, J. S. Sarff, Y. Ashida, S. Inagaki, H. Fujiwara, T. Inoue, A. Sanpei, **J. von der Linden**, K. J. McCollam, N. C. Hurst, C. B. Forest. All-in-one probe for exploring self-organized two-fluid equilibria in toroidal plasmas. *Review of Scientific Instruments*, 95(8), 2024. doi:10.1063/5.0215750.

5. **A. M. Sellner**, **J. von der Linden**, H. Himura, R. Reksoatmodjo, J. Sears, S. You, A. F. Almagri, K. J. McCollam, M. Reyfman, **C. C. Rouda**, and J. S. Sarff. An octahedral Mach B-dot probe for 3D flows and magnetic fields in the edge of reversed field pinches. *Review of Scientific Instruments*, 95(7), 2024. doi:10.1063/5.0219516.

6. **J. von der Linden**, S. Nißl, A. Deller, J. Horn-Stanja, J. R. Danielson, M. R. Stoneking, A. Card, T. Sunn Pedersen, and E. V. Stenson. Annihilation-Gamma-based Diagnostic Techniques for Magnetically Confined Electron-Positron Pair Plasma. *Journal of Plasma Physics*, 89(5), 2023. doi:10.1017/s0022377823001009.

7. **J. von der Linden**, C. Kimblin, I. McKenna, **S. Bagley**, H.-C. Li, R. Houim, C. S. Kueny, A. Kuhl, D. Grote, M. Converse, C. E. J. Vossen, S. Stern, C. Cimarelli, and J. Sears. Standing shock prevents propagation of sparks in supersonic explosive flows. *Communications Earth & Environment*, 2(1), 2021. doi:10.1038/s43247-021-00263-y.

8. **J. von der Linden**, G. Fiksel, J. Peebles, M. R. Edwards, L. Willingale, A. Link, D. Mastrosimone, and H. Chen. Confinement of relativistic electrons in a magnetic mirror, en route to a magnetized relativistic pair plasma. *Physics of Plasmas*, 28(9):092508, 2021. doi:10.1063/5.0057582.

9. J. L. Peebles, G. Fiksel, M. R. Edwards, **J. von der Linden**, L. Willingale, D. Mastrosimone, and H. Chen. Magnetically collimated relativistic charge-neutral electron–positron beams from high-power lasers. *Physics of Plasmas*, 28(7):074501, 2021. doi:10.1063/5.0053557.

10. C. Burcklen, **J. von der Linden**, A. Do, B. Kozioziemski, M.-A. Descalle, and H. Chen. Design of multilayer-based diagnostics for measurement of high energy x rays and gamma rays. *Review of Scientific Instruments*, 92(3):035105, 2021. doi:10.1063/5.0043539.

11. **J. von der Linden**, J. Ramos-Méndez, B. Faddegon, **D. Massin**, G. Fiksel, J. P. Holder, L. Willingale, J. Peebles, M. R. Edwards, and H. Chen. Dispersion calibration for the national ignition facility electron–positron–proton spectrometers for intense laser matter interactions. *Review of Scientific Instruments*, 92(3):033516, 2021. doi:10.1063/5.0040624.

12. M. R. Stoneking, T. Sunn Pedersen, P. Helander, H. Chen, U. Hergenhahn, E. V. Stenson, G. Fiksel, **J. von der Linden**, H. Saitoh, C. M. Surko, J. R. Danielson, C. Hugenschmidt, J. Horn-Stanja, A. Mishchenko, D. Kennedy, A. Deller, A. Card, S. Nißl, M. Singer, M. Singer, König S., L. Willingale, Peebles J., M. R. Edwards, and K. Chin. A new frontier in laboratory physics: magnetized electron-positron plasmas. *Journal of Plasma Physics*, 86(6):155860601, 2020. doi:10.1017/S0022377820001385.

13. **J. von der Linden**, J. Sears, T. Intrator, and S. You. Measurements of the canonical helicity of a gyrating kink. *Physical Review Letters*, 121(3), jul 2018. doi:10.1103/physrevlett.121.035001.

14. S. You, **J. von der Linden**, E. S. Lavine, E. G. Carroll, A. Card, M. Quinley, and M. Azuara-Rosales. The mochi LabJet experiment for measurements of canonical helicity injection in a laboratory astrophysical jet. *The Astrophysical Journal Supplement Series*, 236(2):29, 2018. doi:10.3847/1538-4365/aaba6f.

15. **J. von der Linden** and S. You. Sausage instabilities on top of kinking lengthening current-carrying magnetic flux tubes. *Physics of Plasmas*, 24(5):052105, 2017. doi:10.1063/1.4981231.

Invited Conference Orals

J. von der Linden. *Received Invitation.* 51st European Physical Society (EPS) Conference on Plasma Physics, Vilnius, Lithuania, 2025.

J. von der Linden. *Received Invitation.* 20th International Conference on Positron Annihilation (ICPA), Takamatsu, Japan.

J. von der Linden. *Applying Positron-Emission Diagnostic Techniques to Magnetically Confined Electron–Positron Pair Plasma* 5th Jagiellonian Symposium on Advances in Particle Physics and Medicine, Jangiellonian University, Krakow, Poland, 2024.

J. von der Linden, H. Chen, F. Fiuza. *Creating Relativistic Electron-Positron Pair Jets and Plasmas on Apollon Lasers* Scientific opportunities with APOLLON facilities: from fundamental physics to societal applications, Paris, France, 2023.

Invited Seminars

J. von der Linden. *Standing Shock Regulates Sparks in Supersonic Explosive Flows.* Discovery Plasma Science Seminar, Princeton Plasma Physics Laboratory, Princeton, NJ, USA, 2022.

J. von der Linden. *Exploring the New Electron-Positron Plasma Frontier: the Annihilation Signature of Cold Magnetically-Confined Pairs and Accessing the Relativistic and Magnetized Regime.* Seminar in Plasma Physics, University of Wisconsin, Madison, WI, USA, 2022.

J. von der Linden. *Canonical Flux of Ropes, Toroids, and Mirror-Trapped Relativistic Pairs.* Plasma Science & Technology Seminar, Princeton Plasma Physics Laboratory, Princeton, NJ, USA, 2022.

J. von der Linden, G. Fiksel, J. Peebles, M. Edwards, L. Willingale, H. Chen. *Trapping Relativistic Pair Plasma.* Positron Seminar, Technical University of Munich, Garching, Germany, 2021.

J. von der Linden. *Measuring Canonical Flux Tubes and their Dynamics in a Self-Organized Plasma.* Wisconsin Plasma Physics Laboratory Seminar, University of Wisconsin, Madison, WI, USA, 2020.

J. von der Linden, J. Sears, A. Card, E. S. Lavine, M. Azuara-Rozales, E. G. Carroll, T. Intrator, and S. You. *Introduction to Canonical Helicity and Its Dynamics.* Electrical Engineering Seminar, Kyoto Institute of Technology, Kyoto, Japan, 2019.

J. von der Linden, J. Sears, A. Card, E. S. Lavine, M. Azuara-Rozales, E. G. Carroll, T. Intrator, and S. You. *Measuring Canonical Helicity Dynamics.* ORIGINS Seminar, Max Planck Institute, Garching, Germany, 2019.

J. von der Linden, J. Sears, A. Kuhl, D. Grote, M. Converse, C. Kueney, and B. Poole. *Modeling Discharges in Dusty Supersonic Flow.* Geology Seminar, Ludwig-Maximilian University, Munich, Germany, 2019.

J. von der Linden, J. Sears, A. Card, E. S. Lavine, M. Azuara-Rozales, E. G. Carroll, T. Intrator, and S. You. *Sausage Instabilities on top of Kinking Lengthening Current-Carrying Magnetic Flux Tubes.* Fusion Energy Sciences Program Seminar, Lawrence Livermore National Laboratory, Livermore, CA, USA, 2016.

Contributed Conference Orals

J. von der Linden. *Non-Adiabatic Transport of Magnetically Confined Positrons in the Laboratory and Space.* Julius-Maximilians-University of Würzburg & Max Planck Institute of Plasma Physics Plasma-Astrophysics Workshop, Wërzburg, Germany, 2024.

J. von der Linden, A. Deller, H. Saitoh, H. Higaki, K. Michishio, T. Hori, N. Oshima, S. Nißl, E. V. Stenson. *Commissioning a Gamma-Detector Array with Lifetime Spectroscopy of a Pulse of 10^5 Positrons in a Dipole Trap: Efficient Injection, Toroidal Homogenization, and Radial Diffusion to the Wall.* Heinz Maier-Leibnitz Zentrum User Meeting, Munich, Germany, 2023.

J. von der Linden, A. Deller, H. Saitoh, H. Higaki, K. Michishio, T. Hori, N. Oshima, S. Nißl, E. V. Stenson. *Fast Toroidal and Slow Radial Expansion of Positrons in a Magnetic Dipole Trap.* 16th International Workshop on Slow Positron Beam Techniques and Applications, Orleans, France, 2023.

J. von der Linden. *Magnetic Manipulation Techniques for Relativistic Electron-Positron Pair Plasma.* 7th Workshop on Magnetic Fields in High-Energy Density Laboratory Plasma, Paris, France, 2022.

J. von der Linden, C. Kimblin, I. McKenna, S. Bagley, R. Houim, C. Kueny, A. Kuhl, D. Grote, M. Converse, C. Vossen, S. Stern, C. Cimarelli, J. Sears. *Standing Shock Regulates Sparks in Explosive Flows.* American Physical Society Division of Fluid Dynamics Meeting, Virtual, 2020.

J. von der Linden, J. Sears, A. Kuhl, D. Grote, M. Converse, C. Kueney, B. Poole, C. Cimarelli, D. Gaudin, S. Bagley, R. Houim, C. Kimblin, I. McKenna. *The Effect of Particles on Standing Shockwaves Regulating Spark Discharges in Volcanic Eruptions.* American Physical Society Division of Plasma Physics Meeting, Fort Lauderdale, FL, USA, 2019.

J. von der Linden. *Using COMSOL Particle Tracing to Design a Relativistic Pair Plasma Mirror.* COMSOL Muiltiphysics User Meeting, Livermore, CA, USA, 2019.

J. von der Linden, J. Sears, A. Kuhl, D. Grote, M. Converse, C. Kueney, and B. Poole. *Modeling Volcanic Shocktube Lightning.* American Geophysical Union Fall Meeting Washingon, DC, USA, 2018.

J. von der Linden, J. Sears, T. Intrator, and S. You. *Measurements of the Canonical Helicity of a Gyrating Kink.* US-Japan Compact Toroid Workshop, Portland, OR, USA, 2018.

J. von der Linden, J. Sears, T. Intrator, and S. You. *Investigating the Dynamics of Canonical Flux Tubes.* American Physical Society Division of Plasma Physics Meeting, San Jose, CA, USA, 2016.

J. von der Linden, J. Sears, A. Card, E. S. Lavine, M. Azuara-Rozales, E. G. Carroll, T. Intrator, and S. You. *Investigating the Dynamics of Canonical Flux Tubes.* US-Japan Compact Toroid Workshop, Irvine, CA, USA, 2016.

Skills

Numerical modeling: PIC, magnetohydrodynamics, adaptive mesh refinement, COMSOL

Software & data management: Python, Matlab, IDL, Fortran, C, Unix, Git, MDS+, HDF5, Spark

Hardware design: plasma diagnostics, ultra-high vacuum systems, 3D CAD, machining

Electronics & control: Circuit Design, PCB Layout, FPGA, LabVIEW

Mentorship: scientific outreach, science communication, career mentoring

Teaching

Workshop Instructor

Software Carpentry *2013 – Present*

Develop materials and teach two-day programming workshops for researchers covering good programming practices, shell, Python, Git version control, and testing. Taught workshops at: University of Washington, University of Wisconsin, Stanford University, California Institute of Technology, Lawrence Berkeley National Laboratory, and Lawrence Livermore National Laboratory.

Scientific Boot Camp Instructor
Woodruff Scientific *2013 – 2016*
Introduced graduate and undergraduate students to plasma physics research codes and taught high-performance computing skills: Bash, build management, parallel programming, and scheduling.

Mentoring

Postdoc at Lawrence Livermore National Laboratory
Richard Reksoatmodjo *2023 – Present*
Devise experimental campaign, analyze data from multi-point Bdot-Mach plasma probe, and constrain experimental uncertainty. Co-author on Review of Scientific Instruments article.

Undergraduate Student at University of Wisconsin
Constance C. Rouda *2023 – Present*
CAD design and assemble multi-point 3D Mach-Bdot plasma probe. Co-author on Review of Scientific Instruments article.

Undergraduate Student at University of Wisconsin
Allyson M. Sellner *2020 – 2023*
CAD designed and assembled octahedral and tetrahedral 3D Mach-Bdot plasma probes. First author on Review of Scientific Instruments article.

Graduate Student Intern at Lawrence Livermore National Laboratory
Devin Massin *2020*
Developed and validated COMSOL model of magnetic spectrometers for National Ignition Facility. Co-author on Review of Scientific Instruments article.

Graduate Student at University of Florida
Skyler Bagley *2019 – 2020*
Implemented and validated shock tube experiment geometry in adaptive mesh refinement code. Co-author on Communications Earth & Environment article.

Outreach

Communicator
High Energy Density Science Center, Lawrence Livermore National Laboratory *2020*
Developed outreach video demonstrating how to build a cloud chamber to observe cosmic rays and discussing current efforts to create antimatter-matter plasma.

Science Communication Fellow
Pacific Science Center *2011 – 2014*
Developed and facilitated hands-on inquiry based learning activity, "Tying Plasma Knots on the Surface of the Sun".

Co-Director
Engage Science, University of Washington *2011 – 2012*
Coached scientists in giving compelling public outreach talks and organized annual speaker series.

Media

Phys.org: Stark, A.M. (2021), Shock waves in outflow gases could regulate 'volcano lightning', Phys.org, https://phys.org/news/2021-09-outflow-gases-volcano-lightning.html.

Eos, Science News by AGU: Derouin, S. (2019), Sparks may reveal the nature of ash plumes, Eos, 100, https://doi.org/10.1029/2019EO136482.

Professional Service

Career Mentoring Fellow: American Physical Society 2022 – Present

Program Committee: IEEE Pulsed Power & Plasma Science Conference, Berlin, Germany 2025

Organizing Committee, Early Career Workshop: American Geophysical Union Fall Meeting 2018

Reviewer: Physics of Plasmas, Review of Scientific Instruments, IEEE Transactions on Plasma Science

Affiliations: American, European, & German Physical Society; American Geophysical Union

Professional Development

Leading Teams in a Research Enviroment: German Helmholtz Association Course 2024

Background

English & German: bilingual

French: working knowledge

US citizen

References

Eve V. Stenson Scientist - APEX collaboration lead
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Hui Chen Scientist
Lawrence Livermore National Laboratory
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Setthivoine You Chief Scientist
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