

Dr. Stefan Gerhardt
Princeton Plasma Physics Laboratory
Princeton, NJ 08543
sgerhard@pppl.gov

Education:

- Ph.D.: Electrical Engineering, U. of Wisconsin-Madison, 2004.
- M.S.: Electrical Engineering, U. of Wisconsin-Madison, 2001.
- B.S.: Interdisciplinary Degree in Applied Math, Engineering and Physics, U. of Wisconsin-Madison, 1998.

Awards:

- Presidential Early Career Award in Science and Engineering (PECASE), 2009
- American Physical Society Marshall Rosenbluth Award for Outstanding Doctoral Dissertation in Plasma Physics, 2005.
- Harold Peterson Award: Outstanding Dissertation in the U. of Wisconsin Electrical Engineering Department, 2005.
- DOE/Oak Ridge Associated Universities Award to attend the 51st Meeting of Nobel Laureates in Lindau, Germany, 2001.
- Albert Augustus Radtke Scholarship, UW-Madison Physics Department, 1998.
- Phi Beta Kappa, U. of Wisconsin-Madison, 1997.
- National Undergraduate Fellowship Program in Plasma Physics and Fusion Energy Sciences, 1996.

Work Experience:

- *2009-Present*: Research Physicist, National Spherical Torus Experiment (NSTX)
- *Spring 2007-2009*: Staff Research Physicist, National Spherical Torus Experiment (NSTX)
- *Fall 2006-Fall 2007*: Staff Research Physicist, Magnetic Reconnection Experiment, Princeton Plasma Physics Laboratory (PPPL)
- *Summer 2004-Fall 2006*: Associate Research Physicist, Magnetic Reconnection Experiment, Princeton Plasma Physics Laboratory
- *Summer 1998-Spring 2004*: Graduate Student at Helically Symmetric eXperiment, Madison, U. of Wisconsin.
- *Fall 1996-Spring 1998*: Undergraduate Researcher, Madison Symmetric Torus, Madison, U. of Wisconsin.
- *Summer 1996*: Summer Student, Magnetic Reconnection Experiment, PPPL.
- *Fall 1995-Spring 1996*: Undergraduate Hourly, Madison Symmetric Torus, Madison, Wisconsin.

Key Scientific Contributions:

- **Disruption halo currents**: Developed innovative halo current diagnostics and measurements of halo current characteristics, including characterization of the critical non-axisymmetric dynamics of these currents [[S.P. Gerhardt, et al., NF 53, 023005 \(2013\)](#)].
- **Disruption detection**: Development of physics-based disruption detection algorithms that synthesizes the results of many real time measurements but does not rely on neutral-network training, achieving a high detection rate with minimal late warnings and false positives – important for FNSF/ITER/DEMO [[S. P. Gerhardt, et al., NF 53, 063021 \(2013\)](#)].
- **Disruptivity studies in high-performance ST plasmas**: Demonstrated that the NSTX disruptivity is minimized in high- β_N scenarios with strong boundary shaping and broad plasma profiles. [[S.P. Gerhardt, et al., NF 53, 043020 \(2013\)](#)].

- **Plasma control development:** Implemented β_N control using pulse-width modulated neutral beams as an actuator, and implemented numerous improvements to both RWM and vertical position control systems [[S.P. Gerhardt, et al, Fusion Sci. Tech. 61, 11 \(2012\)](#)].
- **Predictive scenario modeling for NSTX-Upgrade:** Used new free-boundary TRANSP to complete a comprehensive study of NSTX-U scenarios, including a range of 100% non-inductive scenarios, high- β_t cases, and very long pulse examples; these simulations now being used for both diagnostic simulations for NSTX-U and development of coil and power supply operations requirements [[S.P. Gerhardt, et al, NF 52, 083020 \(2012\)](#)].
- **TAE avalanche induced current transport:** Developed phenomenological model of fast ion current redistribution due to TAE avalanches, eliminating discrepancies in the current profile modeling that occurred without the redistribution – motivates studies of TAE for NBI-CD redistribution for FNSF and ITER-AT [[S.P. Gerhardt, et al, NF 51, 033004 \(2011\)](#)].
- **Experimental development of high-performance ST scenarios:** Lead high- β_t (2008) and high- f_{NI} (2009) discharge development, including the highest sustained elongation in NSTX, development of the low internal-inductance scenarios used for RWM control, and NSTX-U scenario prototyping [[S.P. Gerhardt, et al, NF 51, 083047 \(2011\)](#)].
- **ST confinement scaling:** Quantified the scaling (with P_{inj} , n_e , B_t , I_p) of confinement and non-inductive current components over a wide range of NSTX H-mode scenarios. Experimental results used to inform modeling assumptions for NSTX-Upgrade and next-step STs [[S.P. Gerhardt, et al, NF 51, 083047 \(2011\)](#)].
- **Edge localized mode (ELM) control:** Demonstrated for the first time ELM pacing by vertical jogs in a ST [[S.P. Gerhardt, et al, NF 50, 064015 \(2010\)](#)].
- **Error field correction:** Helped develop the optimal $n>1$ error field correction strategy for NSTX, resulting in significantly improved routine operation [[S. P. Gerhardt, et al, Plasma Phys. Control. Fusion, 52, 104003 \(2010\)](#)].
- **Neoclassical tearing modes:** Used soft x-ray emission to understand the coupled mode structure of $m/n=1/1+2/1$ kink/tearing modes in NSTX high-performance discharges. Showed importance of rotation shear effects on the 2/1 NTM offset threshold [[S.P. Gerhardt, et al, NF 49, 032003 \(2009\)](#)].
- **Novel FRC formation:** Developed a new FRC formation scheme using co-helicity merging of noble-gas formed spheromaks + solenoid induction [[S.P. Gerhardt, et al, NF 48, 032001 \(2008\)](#)].
- **FRC stability:** Developed FRC equilibria that are stable to all $n=1$ modes (tilt, shift, axial) by proper shaping of the equilibrium field and (limited) use of passive conductors. [[S.P. Gerhardt, et al, Phys. Plasmas 13, 112058 \(2006\)](#)].
- **FRC sustainment:** Developed long-lived FRC sustained by solenoid induction and stabilized to $n=2-4$ modes by FLR and resistive effects [[S. P. Gerhardt, et al, PRL. 99, 245003 \(2007\)](#)].
- **Flow damping in a quasi-symmetric stellarator:** Demonstrated the reduction in flow damping with quasi-symmetry compared to traditional stellarators, using a novel interpretation of Mach probes and a new calculation of the non-orthogonal Hamada coordinate basis vectors to allow theory/experiment comparisons [[S. P. Gerhardt, et al, PRL. 94, 015002 \(2005\)](#)].

Leadership, Responsibilities & Service:

- Published recent first-author papers in numerous critical areas of spherical tokamak physics, including advanced scenario modeling & experimental development, ELM pacing, error field correction, plasma stability, plasma control, and disruption physics & detection.
- Referee for Nuclear Fusion, Physical Review Letters, Physics of Plasmas, Plasma Physics and Controlled Fusion, Review of Scientific Instruments, and Fusion Science & Technology.
- Cognizant physicist for mission-critical NSTX magnetic diagnostics and plasma control algorithms.
- Deputy leader for the NSTX Macroscopic Stability topical science group (2008).
- Leader of the NSTX Advanced Scenarios and Control topical science group (2009-present), and author of corresponding chapter in NSTX-U 2014-2019 5-year research plan (2013).
- Member of the DIII-D Physics Advisory Committee (2011-present).
- Member of the ITPA (International Tokamak Physics Activity) Integrated Operation Scenarios (IOS) group (2009-present).
- US Burning Plasma Organization, deputy (2012) and leader (2013) for the Integrated Scenarios topical group.
- National coordinator for the 2013 Three Fusion Facility Joint Research Target (JRT).
- Reviewer of major DOE proposals.
- Functioned as a primary interface between PPPL engineering and NSTX physics in areas of plasma control, diagnostics, magnetic materials, and the NSTX device configuration.
- Member of thesis committees in both MAE and Astrophysics departments.
- PPPL tour guide.

Peer Reviewed First Author Journal Publications:

1. **S.P. Gerhardt**, D.T. Anderson, J.M. Canik, and L. Owen, *H. detector system for the Helically Symmetric Experiment*, [Rev. Sci. Instrum. **75**, 2981 \(2004\)](#).
2. **S. P. Gerhardt**, J.N. Talmadge, J.M. Canik, and D.T. Anderson, *Experimental evidence of reduced plasma flow damping with quasisymmetry*, [Phys. Rev. Lett. **94**, 015002 \(2005\)](#).
3. **S.P. Gerhardt**, D.T. Anderson, F.S.B. Anderson, and J.N. Talmadge, *Electrode and Langmuir probe tools used for flow damping studies in the Helically Symmetric Experiment*, [Rev. Sci. Instrum. **75**, 4621 \(2004\)](#).
4. **S.P. Gerhardt**, D.T. Anderson, and J.N. Talmadge, *Calculations of neoclassical viscous damping on flux surfaces near magnetic islands in the Helically Symmetric Experiment*, [Phys. Plasmas **12**, 012504 \(2005\)](#).
5. **S.P. Gerhardt**, J. N. Talmadge, J.M. Canik, and D.T. Anderson, *Measurements and modeling of plasma flow damping in the Helically Symmetric Experiment*, [Phys. Plasmas **12**, 056116 \(2005\)](#).

6. **S.P. Gerhardt**, M. Inomoto, E. Belova, M. Yamada, H. Ji, Y. Ren, and A. Kuritsyn, *Equilibrium and stability studies of oblate field reversed configurations in the Magnetic Reconnection Experiment*, [Phys. Plasmas **13**, 112508 \(2006\).](#))
7. **S. P. Gerhardt**, E.V. Belova, M. Yamada, H. Ji, M. Inomoto, Y. Ren, and B. McGeehan, *Inductive sustainment of a field-reversed configuration stabilized by shaping, magnetic diffusion, and finite-Larmor-radius effects*, [Phys. Rev. Lett. **99**, 245003 \(2007\).](#)
8. **S.P. Gerhardt**, E.V. Belova, M. Yamada, H. Ji, M. Inomoto, Y. Ren and B. McGeehan, *New Method for inductively forming an oblate field reversed configuration from a spheromak*, [Nuclear Fusion **48**, 032001 \(2008\).](#)
9. **S. P. Gerhardt**, E.V. Belova, M. Yamada, H. Ji, M. Inomoto, C.M. Jacobson, R. Maqueda, B. McGeehan, and Y. Ren, *Inductive sustainment of oblate field-reversed configurations with the assistance of magnetic diffusion, shaping, and finite-Larmor radius stabilization*, [Phys. Plasmas **15**, 022502 \(2008\).](#)
10. **S.P. Gerhardt**, E.V. Belova, M. Yamada, H. Ji, Y. Ren, B. McGeehan, and M. Inomoto, *Field-reversed configuration formation scheme utilizing a spheromak and solenoid induction*, [Phys. Plasmas **15**, 032503 \(2008\).](#)
11. **S.P. Gerhardt**, J.E. Menard, and the NSTX Team, *Characterization of the plasma current quench during disruptions in the National Spherical Torus Experiment*, [Nuclear Fusion **49**, 025002 \(2009\).](#)
12. **S.P. Gerhardt**, D.P. Brennan, R. Buttery, R.J. La Haye, S. Sabbagh, E. Strait, M. Bell, R. Bell, E. Fredrickson, D. Gates, B. LeBlanc, J. Menard, D. Stutman, K. Tritz and H. Yuh, *Relationship between onset thresholds, trigger types and rotation shear for the $m/n = 2/1$ neoclassical tearing mode in a high- β spherical torus*, [Nuclear Fusion **49**, 032003 \(2009\).](#)
13. **S.P. Gerhardt**, J-W. Ahn, J.M. Canik, R. Maingi, R. Bell, D. Gates, R. Goldston, R. Hawryluk, B.P. Le Blanc, J. Menard, A.C. Sontag, S. Sabbagh and K. Tritz, *First observation of ELM pacing with vertical jogs in a spherical torus*, [Nuclear Fusion **50**, 064015 \(2010\).](#)
14. **S. P. Gerhardt**, J. E. Menard, J.-K. Park, R. Bell, D. A. Gates, B. P. Le Blanc, S. A. Sabbagh and H. Yuh, *Observation and correction of non-resonant error fields in NSTX*, [Plasma Phys. Control. Fusion, **52**, 104003 \(2010\).](#)
15. **S.P. Gerhardt**, E. Fredrickson, D. A. Gates, et al., *Calculation of the non-inductive current profile in high-performance NSTX plasmas*, [Nuclear Fusion **51**, 033004 \(2011\).](#)
16. **S.P. Gerhardt**, et al., *Recent progress toward an advanced spherical torus operating point in NSTX*, [Nuclear Fusion **51**, 083047 \(2011\).](#)
17. **S.P. Gerhardt**, D. Mastrovito, M.G. Bell, M. Cropper, D. A Gates, E. Kolemen, J. Lawson, B. Marsala, J.E. Menard, D. Mueller, T. Stevenson, *Implementation of β_N Control in the National Spherical Torus Experiment*, [Fusion Sci. Tech. **61**, 11 \(2012\).](#)
18. **S. P. Gerhardt**, E. Fredrickson, L. Guttadora, R. Kaita, H. Kugel, J. Menard, and H. Takahashi, *Techniques for the measurement of disruption halo currents in the National Spherical Torus Experiment*, [Rev. Sci. Instrum. **82**, 103502 \(2011\).](#)
19. **S.P. Gerhardt**, J. Menard, S. Sabbagh and F. Scotti, *Characterization of disruption halo currents in the National Spherical Torus Experiment*, [Nuclear Fusion **52**, 063005 \(2012\).](#)

20. **S.P. Gerhardt**, R. Andre, and J.E. Menard, *Exploration of the Equilibrium Operating Space for NSTX-Upgrade*, [Nuclear Fusion **52**, 083020 \(2012\)](#).
21. **S.P. Gerhardt**, R.E. Bell, A. Diallo, D. Gates, B.P. LeBlanc, J.E. Menard, D. Mueller, S.A. Sabbagh, V. Soukhanovskii, K. Tritz, H. Yuh, *Disruptions, Disruptivity, and Safer Operating Windows in the High- β Spherical Torus NSTX*, [Nuclear Fusion **53**, 043020 \(2013\)](#).
22. **S.P. Gerhardt**, *Dynamics of the Disruption Halo Current Toroidal Asymmetry in NSTX*, [Nuclear Fusion **53**, 023005 \(2013\)](#).
Note: This paper was selected as a Nuclear Fusion "LabTalk" highlight in March, 2013
23. **S. P. Gerhardt**, D. S. Darrow, R. E. Bell, B. P. LeBlanc, J.E. Menard, D. Mueller, A. L. Roquemore, S.A. Sabbagh, H. Yuh, *Detection of Disruptions in the High- β Spherical Torus NSTX*, [Nuclear Fusion **53**, 063021 \(2013\)](#).

Peer Reviewed Co-Authored Journal Publications:

1. B.E. Chapman, J.K. Anderson, T.M. Biewer, D.L. Brower, S. Castillo, P.K. Chattopadhyay, C.S. Chaing, D. Craig, D.J. Den Hartog, G. Fiksel, P.W. Fontanna, C.B. Forest, **S. P. Gerhardt**, A.K. Hansen, D. Holly, Y. Jiang, N.E. Lanier, S.C. Prager, J.C. Reardon, and J.S. Sarff, *Reduced edge instability and improved confinement in the MST reversed-field pinch*, Phys. Rev. Lett. **87**, 205001 (2001).
2. N.E. Lanier, **S.P. Gerhardt**, and D.J. Den Hartog, *Low-cost, robust, filtered spectrometer for absolute intensity measurements in the soft X-ray region*, Rev. Sci. Instrum. **72**, 1188 (2001).
3. D.T. Anderson, A.F. Almagri, F.S.B. Anderson, **S.P. Gerhardt**, J. Radder and J.N. Talmadge, *Initial experimental results from HSX*, J. Plasma and Fusion Research **78**, 209 (2002).
4. C. Deng, D.L. Brower, W.X. Ding, A.F. Almagri, D.T. Anderson, F.S.B. Anderson, **S.P. Gerhardt**, P. Probert, and J.N. Talmadge, *First results from the Multichannel interferometer system on HSX*, Rev. Sci. Instrum. **74**, 1625 (2003).
5. K.M. Likin, A. Abdou, A.F. Almagri, D.T. Anderson, F.S.B. Anderson, D. Brower, J. Canik, C. Deng, **S.P. Gerhardt**, W. Guttenfelder, S. Oh, J. Radder, V. Sakaguchi, J. Schmitt, J. Tabora, J.N. Talmadge, and K. Zhai, *Comparison of electron cyclotron heating results in the Helically Symmetric Experiment with and without quasi-symmetry*, Plasma Phys. Control Fusion **45**, A133 (2003).
6. J.N. Talmadge, K.M. Likin, A. Abdou, A. Almagri, D.T. Anderson, F.S.B. Anderson, J. Canik, C. Deng, **S.P. Gerhardt**, K. Zhai, *ASTRA modeling of electron cyclotron heating in HSX*, Fusion Science and Technology **46**, 255 (2004).
7. J.N. Talmadge, and **S.P. Gerhardt** *Numerical calculation of the Hamada basis vectors for three-dimensional toroidal magnetic configurations*, Phys. Plasmas **12**, 072513 (2005).
8. Y. Ren, M. Yamada, **S.P. Gerhardt**, H. Ji, R. Kulsrud, and A. Kuritsyn, *Experimental verification of the Hall effect during magnetic reconnection in a laboratory plasma*, Phys. Rev. Lett. **95**, 055003 (2005).
9. A. Kuritsyn, M. Yamada, **S.P. Gerhardt**, H. Ji, and Y. Ren, *Experimental measurements of the parallel and transverse Spitzer resistivities during collisional magnetic reconnection*, Phys. Plasmas, **13**, 055703 (2006).

10. M. Yamada, Y. Ren, H. Ji, J. Breslau, **S.P. Gerhardt**, R. Kulsrud, and A. Kuritsyn, *Experimental study of two fluid effects on magnetic reconnection in a laboratory plasma with variable collisionality*, Phys. Plasmas **13**, 052119 (2006).
11. M. Inomoto, **S.P. Gerhardt**, M. Yamada, H. Ji, E. Belova, Y. Ren, and A. Kuritsyn, *Coupling between global geometry and the local Hall effect leading to reconnection-layer symmetry breaking*, Phys. Rev. Lett. **97**, 135002 (2006).
12. M. Yamada, H. Ji, **S.P. Gerhardt**, E.V. Belova, R.C Davison, and D.R. Mikkelsen, *A self-organized plasma with induction, reconnection, and injection techniques: the SPIRIT concept for field reversed configuration research*, Plasma and Fusion Research **2**, 004 (2007).
13. A. Kuritsyn, H. Ji, **S.P. Gerhardt**, Y. Ren, and M. Yamada, *Effect of global boundary and local collisionality on magnetic reconnection in a laboratory plasma*, Geophys. Rev. Lett. **34**, L16106 (2007).
14. H. Ji, E. Belova, **S.P. Gerhardt**, and M. Yamada, *Recent advances in the SPIRIT (Self-organized Plasma with Induction, Reconnection, and Injection Techniques) concept*, Journal of Fusion Energy **26**, 93 (2007).
15. Y. Ren, M. Yamada, H. Ji, **S. P. Gerhardt**, and R. Kulsrud, *Identification of the electron-diffusion region during magnetic reconnection in a laboratory plasma*, Phys. Rev. Lett **101**, 085003 (2008).
16. Y. Ren, M. Yamada, H. Ji, S. Dorfman, **S. P. Gerhardt**, and R. Kulsrud, *Experimental study of the Hall effect and electron diffusion region during magnetic reconnection in a laboratory plasma*, Phys. Plasmas **15**, 082113 (2008).
17. H. Ji, Y. Ren, M. Yamada, S. Dorfman, W. Daughton, **S. P. Gerhardt**, *New insights into the dissipation in the electron layer during magnetic reconnection*, Geophys. Res. Lett., **35**, L13106 (2008).
18. R. Raman, T.R. Jarboe, D. Mueller, B.A. Nelson, M.G. Bell, R. Bell, D. Gates, **S. Gerhardt**, J. Hosea, R. Kaita, H. Kugel, B. LeBlanc, R. Maingi, R. Maqueda, J. Menard, M. Nagata, M. Ono, S. Paul, L. Roquemore, S. Sabbagh, V. Soukhanovskii and G. Taylor, *Solenoid-free plasma startup in NSTX using transient CHI*, Nuclear Fusion **49**, 065006 (2009).
19. J.-K. Park, A. H. Boozer, J. E. Menard, A. M. Garofalo, M. J. Schaffer, R. J. Hawryluk, S. M. Kaye, **S. P. Gerhardt**, S. A. Sabbagh, and NSTX Team, *Importance of plasma response to nonaxisymmetric perturbations in tokamaks*, Phys. Plasmas **16**, 056115, (2009).
20. H.W. Kugel, M. Bell, L. Berzak, A. Brooks, R. Ellis, **S. P. Gerhardt**, H. Harjes, R. Kaita, J. Kallman, R. Maingi, R. Majeski, D. Mansfield, J. Menard, R.E. Nygren, V. Soukhanovskii, D. Stotler, P. Wakeland, L.E. Zakharov, *Physics design requirements for the National Spherical Torus liquid lithium divertor*, Fusion Eng. And Design **84**, 1125, (2009).
21. R. Maingi, T. H. Osborne, B. P. LeBlanc, R. E. Bell, J. Manickam, P. B. Snyder, J. E. Menard, D. K. Mansfield, H. W. Kugel, R. Kaita, **S. P. Gerhardt**, S. A. Sabbagh, F. A. Kelly, and the NSTX research team, *Edge-Localized-Mode Suppression through Density-Profile Modification with Lithium-Wall Coatings in the National Spherical Torus Experiment*, Phys. Rev. Lett. **103**, 075001 (2009).
22. J.-K. Park, A. H. Boozer, J. E. Menard, **S. P. Gerhardt**, and S. A. Sabbagh, *Shielding of external magnetic perturbations by torque in rotating tokamak plasmas*, Phys. Plasmas **16**, 082512 (2009).

23. D. A. Gates et al, *Overview of results from the National Spherical Torus Experiment*, Nuclear Fusion **49**, 104016 (2009).
24. M.G. Bell, H.W. Kugel, R. Kaita, L.E. Zakharov, H. Schneider, B.P. LeBlanc, D. Mansfield, R.E. Bell, R. Maingi, S. Ding, S.M. Kaye, S.F. Paul, **S.P. Gerhardt**, J.M. Canik, J.C. Hosea, G. Taylor and the NSTX Research Team, *Plasma response to lithium-coated plasma-facing components in the National Spherical Torus Experiment*, Plasma Phys. Control. Fusion **51**, 124054 (2009).
25. H.W. Kugel, D. Mansfield, R. Maingi, M.G. Bell, R.E. Bell, J.P. Allain, D. Gates, **S. Gerhardt**, R. Kaita, J. Kallman, S. Kaye, B. LeBlanc, R. Majeski, J. Menard, D. Mueller, M. Ono, S. Paul, R. Raman, A.L. Roquemore, P.W. Ross, et al, *Evaporated lithium surface coatings in NSTX*, J. Nucl. Mat. **390**, 1000 (2009).
26. S.A. Sabbagh, J.W. Berkery, R.E. Bell, J.M. Bialek, **S.P. Gerhardt**, J.E. Menard, R. Betti, D.A. Gates, B. Hu, O.N. Katsuro-Hopkins, B.P. LeBlanc, F.M. Levinton, J. Manickam, K. Tritz and H. Yuh, *Advances in global MHD mode stabilization research on NSTX*, Nuclear Fusion **50**, 025020 (2010).
27. J. M. Canik, R. Maingi, T. E. Evans, R. E. Bell, **S. P. Gerhardt**, B. P. LeBlanc, J. Manickam, J. E. Menard, T. H. Osborne, J.-K. Park, S. F. Paul, P. B. Snyder, S. A. Sabbagh, H. W. Kugel, and E. A. Unterberg (the NSTX Team), *On Demand Triggering of Edge Localized Instabilities Using External Nonaxisymmetric Magnetic Perturbations in Toroidal Plasmas*, Phys. Rev. Lett. **104**, 045001 (2010).
28. J. W. Berkery, S. A. Sabbagh, R. Betti, B. Hu, R. E. Bell, **S. P. Gerhardt**, J. Manickam, and K. Tritz, *Resistive Wall Mode Instability at Intermediate Plasma Rotation*, Phys. Rev. Lett. **104**, 035003 (2010).
29. R. Raman, D. Mueller, B. A. Nelson, T. R. Jarboe, **S. Gerhardt**, H. W. Kugel, B. LeBlanc, R. Maingi, J. Menard, M. Ono, S. Paul, L. Roquemore, S. Sabbagh, and V. Soukhanovskii, *Demonstration of Tokamak Ohmic Flux Saving by Transient Coaxial Helicity Injection in the National Spherical Torus Experiment*, Phys. Rev. Lett. **104**, 095003 (2010).
30. J.M. Canik, R. Maingi, T.E. Evans, R.E. Bell, **S.P. Gerhardt**, H.W. Kugel, B.P. LeBlanc, J. Manickam, J.E. Menard, T.H. Osborne, J.-K. Park, S. Paul, P.B. Snyder, S.A. Sabbagh, E.A. Unterberg and the NSTX team, *ELM destabilization by externally applied non-axisymmetric magnetic perturbations in NSTX*, Nuclear Fusion **50**, 034012 (2010).
31. J.E. Menard, R.E. Bell, D.A. Gates, **S.P. Gerhardt**, J.-K. Park, S.A. Sabbagh, J.W. Berkery, A. Egan, J. Kallman, S.M. Kaye, B. LeBlanc, Y.Q. Liu, A. Sontag, D. Swanson, H. Yuh, W. Zhu and the NSTX Research Team, *Progress in understanding error-field physics in NSTX spherical torus plasmas*, Nuclear Fusion **50**, 045008 (2010).
32. J.M. Canik, A.C. Sontag, R. Maingi, R. Bell, D.A. Gates, **S.P. Gerhardt**, H.W. Kugel, B.P. LeBlanc, J. Menard, S. Paul, S. Sabbagh and V.A. Soukhanovskii, *Progress in the development of ELM pace-making with non-axisymmetric magnetic perturbations in NSTX*, Nuclear Fusion **50**, 064016 (2010).
33. R. Maingi, S.M. Kaye, R.E. Bell, T.M. Biewer, C.S. Chang, D.A. Gates, **S.P. Gerhardt**, J. Hosea, B.P. LeBlanc, H. Meyer, D. Mueller, G-Y. Park, R. Raman, S.A. Sabbagh, T.A. Stevenson and J.R. Wilson, *Overview of L-H power threshold studies in NSTX*, Nuclear Fusion **50**, 061010 (2010).
34. I.T. Chapman, R.J. Buttery, S. Coda, **S. Gerhardt**, J.P. Graves, D.F. Howell, A. Isayama, R.J. La Haye, Y. Liu, P. Maget, M. Maraschek, S. Sabbagh, O. Sauter, the ASDEX Upgrade, DIII-

- D, HL-2A, JT-60U , MAST , NSTX , TCV , Tore Supra Teams and JET-EFDA Contributors, *Empirical scaling of sawtooth period for onset of neoclassical tearing modes*, Nuclear Fusion **50**, 102001 (2010).
35. M. Ono, M.G. Bell, R.E. Bell, R Kaita, H.W. Kugel, B.P. Leblanc, J.M. Canik, S. Diem, S.P. Gerhardt, J. Hosea, S. Kaye, D. Mansfield, R. Maingi, J. Menard, S.F. Paul, R. Raman, S. Sabbagh, C.H. Skinner, V. Soukhanovskii, G. Taylor, *Implications of NSTX lithium results for magnetic fusion research*, Fusion Eng. Design. **85**, 882 (2010).
 36. E. Kolemen, D.A. Gates, C.W. Rowley, N.J. Kasdin, J. Kallman, **S. Gerhardt**, V. Soukhanovskii and D. Mueller, *Strike point control for the National Spherical Torus Experiment (NSTX)*, Nuclear Fusion **50**, 105010 (2010).
 37. J. W. Berkery, S. A. Sabbagh, H. Reimerdes, R. Betti, B. Hu, R. E. Bell, **S. P. Gerhardt**, J. Manickam, and M. Podestà, *The role of kinetic effects, including plasma rotation and energetic particles, in resistive wall mode stability*, Phys. Plasmas **17**, 082504 (2010).
 38. R. J. La Haye, D. P. Brennan, R. J. Buttery, and **S. P. Gerhardt**, *Islands in the stream: The effect of plasma flow on tearing stability*, Phys. Plasmas **17**, 056110 (2010).
 39. R. Maingi, R. E. Bell, J. M. Canik, **S. P. Gerhardt**, S. M. Kaye, B. P. LeBlanc, T. H. Osborne, M. G. Bell, E. D. Fredrickson, K. C. Lee, J. E. Menard, J.-K. Park, and S. A. Sabbagh, *Triggered Confinement Enhancement and Pedestal Expansion in High-Confinement-Mode Discharges in the National Spherical Torus Experiment* Phys. Rev. Lett. **105**, 135004 (2010).
 40. D. Mastrovito, D. Gates, S.P. Gerhardt, J. Lawson, C. Ludescher-Furth, R. Marsala, *Plasma control system upgrade and increased plasma stability in NSTX*, Fus. Eng. Design **85**, 447 (2010).
 41. V.A. Soukhanovskii, J.-W. Ahn, R.E. Bell, D.A. Gates, **S. Gerhardt**, R. Kaita, E. Kolemen, H.W. Kugel, B.P. LeBlanc, R. Maingi, R. Maqueda, A. McLean, J.E. Menard, D.M. Mueller, S.F. Paul, R. Raman, A.L. Roquemore, D.D. Ryutov, H.A. Scott, *"Snowflake" divertor configuration in NSTX*, J. Nucl. Mat. **415**, S365 (2011)
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Significant Presentations:

1. *Measurements and modeling of electrode-induced plasma flows in HSX*, Joint US-European Transport Task Force Meeting, Madison, Wisconsin, 2003.
2. *Studies of Bias Induced Plasma Flows in HSX*, 14th International Stellarator Workshop, Greifswald, Germany, 2003.
3. *Measurements and Modeling of Electrode Biased Discharges in the HSX Stellarator*. Joint Meeting of US-Japan Workshop and Kyoto University 21st COE Symposium on "New Approaches in Plasma Confinement Experiments in Helical Systems", Kyoto, 2004.
4. *Progress and Plans for FRC Studies in MRX-FRC*, US-Japan Exchange 2004: New Directions and Physics for Compact Toroids, Santa Fe, New Mexico, 2004.

5. *Measurements and Modeling of Electrode Biased Discharges in the HSX Stellarator*, Invited talk at the 20th IAEA Fusion Energy Conference, Vilamoura, Portugal, 2004.
6. *Measurements and Modeling of Plasma Flow Damping in the HSX Stellarator*, Invited talk at 46th Meeting of the Division of Plasma Physics, Savannah, Georgia, 2004.
7. *Reduced Neoclassical Flow Damping with Quasi-Symmetry: Measurements and Modeling from HSX*, Invited talk at 47th Meeting of the Division of Plasma Physics, Denver, Colorado, 2005.
8. *Equilibrium and Stability of Oblate Free-Boundary FRCs in MRX*, Innovative Confinement Concepts Conference, Austin, Texas, 2006
9. *Stability of Oblate Free-Boundary FRCs in MRX*, US/Japan Workshop on Compact Torus Plasmas, Swarthmore College, Philadelphia, Pennsylvania, 2007.
10. *Ohmic Sustainment of Free Boundary Compact Toroids in MRX*, Innovative Confinement Concepts Workshop, College Park, Maryland, 2007
11. *Studies of Resonant and Non-Resonant 3-D Fields in NSTX*, Invited talk at 14th Workshop on Active Control of MHD Stability, Active MHD Control in ITER, Princeton, NJ, 2009
12. *Development of High- Elongation, High- Beta Discharges for Steady State Spherical Torus Applications*, 37th European Physical Society Conference on Plasma Physics, Dublin, Ireland, 2010.
13. *Tools For Developing Advanced Spherical Tokamak Plasmas in NSTX*, Innovative Confinement Concepts 2010, Princeton, NJ, 2010.
14. *Developing the Core Physics Scenarios For Next Step STs*, Invited talk at 53rd Annual Meeting of the APS DPP, Salt Lake City, UT, 2011.
15. *Disruption Precursors and Detection in NSTX*, US BPO Disruption Mitigation Workshop, San Diego, CA, 2012.
16. *Disruptions in the High- β Spherical Torus NSTX*, Invited talk at the 24th IAEA Fusion Energy Conference, San Diego, USA, 2012.
17. *Disruption Detection and Halo Currents in NSTX*, Invited talk at 17th MHD Mode Control Workshop, New York, New York, 2012.

Seminars presented at U. of Wisconsin, U. of Maryland, Columbia University, PPPL, and MIT. Presentations at various ITPA meetings.

Presentations to the NSTX Physics Advisory Committee in 2009-2013, NSTX 5-Year Plan Review Committee in 2013.

Conference Proceedings (all with associated poster or oral presentation)

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