

## General biographical information

### 1) Basic Data

**Thomas Richard Jarboe**

Professor, Aeronautics & Astronautics

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### 2) Educational History

- University of California, Berkeley  
Ph.D. Plasma Physics  
1974
- University of Illinois  
Urbana B.S. Engineering Physics  
1967

### 3) Employment History

- University of Washington  
Seattle, WA  
Professor, Aeronautics & Astronautics  
January 1991-Present
- University of Washington  
Seattle, WA  
Professor, Nuclear Engineering  
August 1989-December 1991
- Los Alamos National Laboratory, NM
  - Group leader, CTR-5  
1985-1989
  - Deputy group leader  
1983-1985
  - Associate group leader  
1982-1983
  - Task leader  
1980-1982
  - Staff member  
1974-1980
- Sabbatical leave, Culham Laboratory, UK  
1985-1986
- University of California, CA  
1969-1974
  - Research Assistant
  - Teaching Assistant  
1967-1969
  - Physicist, Naval Weapons Center,  
China Lake, CA  
Summer 1968

### 4) Awards and Honors

- Member, Sigma Tau and Tau Beta Pi
- Fellow, American Physical Society

### 5) Affiliations and other Appointments

- Adjunct Professor of Physics,
- University of Washington, Seattle, WA, 1991-Present

## REFERRED ARCHIVAL JOURNAL PUBLICATIONS

- A. J. Redd, **T. R. Jarboe**, W. T. Hamp, B. A. Nelson, R. G. O'Neill, and R. J. Smith "Flux Amplification in Helicity Injected Torus (HIT-II) Coaxial Helicity Injection Discharges" *Phys. Plasmas* **15**, 022506 (2008).
- R. Raman, **T. R. Jarboe**, B. A. Nelson, D. Mueller, M. G. Bell and M. Ono' "Plasma Start-Up in HIT-II and NSTX Using Transient Coaxial Helicity Injection" *J Fusion Energ.* **27**:96–99 (2008)
- A. J. Redd, **T. R. Jarboe**, R. Z. Aboul Hosn, C. Akcay, W. T. Hamp, G. J. Marklin, B. A. Nelson, R. G. O'Neill, P. E. Sieck, R. J. Smith, B. T. Stewart and J. S. Wrobel "Internal Fields in Helicity Injected Torus with Steady Inductive Helicity Injection (HIT-SI) Discharges" *J Fusion Energ.* **27**:100–103, June 2008
- R. Raman, **T. R. Jarboe**, D. Mueller, B. A. Nelson, M. G. Bell, M. Ono, T. Bigelow, R. Kaita, B. LeBlanc, R. Maqueda, J. Menard, S. Paul, and L. Roquemore "Plasma Startup in the National Spherical Torus Experiment Using Transient Coaxial Helicity Injection" *Phys. Plasmas*, **14**, 056106 (2007)
- A. J. Redd, **T. R. Jarboe**, B. A. Nelson, R. G. O'Neill, and R. J. Smith "Coaxial Helicity Injection in Open-Flux Low-Aspect-Ratio Toroidal Discharges" *Phys. Plasmas* **14**, 112511 (2007)
- D. Mueller, R. Raman, M. G. Bell, **T. R. Jarboe**, B. LeBlanc, R. Maqueda, S. Sabbagh, B. A. Nelson "NSTX plasma start-up using transient coaxial helicity injection" *Fusion Sci Tech.* **52**(3), 393-397, Oct 2007
- R. Raman, D. Mueller, **T.R. Jarboe**, B.A. Nelson, M.G. Bell, M. Ono, T. Bigelow, R. Kaita, B. LeBlanc, K.C. Lee, R. Maqueda, J. Menard, S. Paul and L. Roquemore "Non-Inductive Solenoid-Less Plasma Startup in NSTX Using Transient CHI" *Nucl. Fusion* **47**, 792 (2007)
- R. G. O'Neill, G. J. Marklin, **T. R. Jarboe**, C. Akcay, W. T. Hamp, B. A. Nelson, A. J. Redd, R. J. Smith, B. T. Stewart, and J. S. Wrobel "A Fully Relaxed Helicity Balance Model for an Inductively Driven Spheromak" *Phys. Plasmas* **14**, 112304 (2007)
- R. Raman, M.G. Bell, **T.R. Jarboe**, B.A. Nelson, D. Mueller, R. Maqueda, R. Kaita, B. LeBlanc, J. Menard, T. Bigelow, D. Gates, R. Maingi, M. Nagata, M. Ono, M. Peng, S. Sabbagh, M.J. Schaffer, V. Soukhanovskii, R. Wilson, "Solenoid-Free Plasma Start-Up in HIT-II and NSTX Using Transient CHI" *J Fusion Energ.* (2007)
- M. Nagata, R. Raman, V. Soukhanovskii, B. A. Nelson, R. E. Bell, D. Mueller, **T. R. Jarboe**, M. G. Bell and the NSTX Research Team "E × B Plasma Rotation and n=1 Oscillations Observed in the NSTX-CHI Experiments" *Plasma Fusion Research* **2**, 0035 (2007)
- R. G. O'Neill, R. J. Smith, C. Akcay, W. T. Hamp, R. Z. Aboul Hosn, **T. R. Jarboe**, A. J. Redd, P. E. Sieck, G. L. Sutphin, J. S. Wrobel and HIT-SI Team "Overview of HIT-SI Diagnostic Systems" *J Fusion Energ.* **26**, 1/2, June 2007
- R. Raman, **T. R. Jarboe**, W. T. Hamp, A. J. Redd, B. A. Nelson, R. G. O'Neill, P. E. Sieck, R. J. Smith "Transient Coaxial Helicity Injection for Solenoid-Free Plasma Startup in HIT-II" *Phys. Plasmas* **14**, 022504 February 2007

- T. R. Jarboe**, W. T. Hamp, G. J. Marklin, B. A. Nelson, R. G. O'Neill, A. J. Redd, P. E. Sieck, R. J. Smith, and J. S. Wrobel "Spheromak Formation by Steady Inductive Helicity Injection" *Phys. Rev. Lett.* **97**, 115003 (2006)
- C. T. Holcomb, **T. R. Jarboe**, D. N. Hill, S. Woodruff, and R. D. Wood "Sustained Spheromak Coaxial Gun Operation in the Presence of an n=1 Magnetic Distortion" *Phys. Plasmas*, 13, 022504, February 2006
- P.E. Sieck, **T.R. Jarboe**, V. A. Izzo, W.T. Hamp, B.A. Nelson, R.G. O'Neill, A.J. Redd and R.J. Smith "Demonstration of Steady Inductive Helicity Injection" *Nucl. Fusion*, 46, 254-261, January 2006
- R. Raman, B. A. Nelson, M. G. Bell, **T. R. Jarboe**, D. Mueller, T. Bigelow, B. LeBlanc, R. Maqueda, J. Menard, M. Ono, and R. Wilson "Efficient Generation of Closed Magnetic Flux Surfaces in a Large Spherical Tokamak Using Coaxial Helicity Injection" *Physical Review Letters*, **97**, 175002 (2006)
- D. A. Gates, R. Maingi, J. Menard, S. Kaye, S. A. Sabbagh, G. Taylor, J. R. Wilson, M. G. Bell, R. E. Bell, S. Bernabei, J. Bialek, T. Biewer, W. Blanchard, J. Boedo, C. Bush, M. D. Carter, W. Choe, N. Crocker, D. S. Darrow, W. Davis, L. Delgado-Aparicio, S. Diem, J. Ferron, A. Field, J. Foley, E. D. Fredrickson, R. Harvey, R. E. Hatcher, W. Heidbrink, K. Hill, J. C. Hosea, **T. R. Jarboe**, D. W. Johnson, , *et. al.* "Effect of plasma shaping on performance in the National Spherical Torus Experiment" *Phys. Plasmas* **13**, 056122 (2006)
- R. G. O'Neill, A. J. Redd, W. T. Hamp, R. J. Smith, and **T. R. Jarboe** "Ion Heating During Magnetic Relaxation in the Helicity Injected Torus-II Experiment" *Phys. Plasmas* 12, December 2005
- T. R. Jarboe** "The Spheromak Confinement Device" *Phys. Plasmas* **12**, 058103, May 2005
- P. E. Sieck, W. T. Hamp, V. A. Izzo, **T. R. Jarboe**, B. A. Nelson, R. G. O'Neill, A. J. Redd, and R. J. Smith "Initial Studies of Steady Inductive Helicity Injection on the HIT-SI Experiment" *IEEE Transactions on Plasma Science* **33**, April 2005
- H. Kim, V. Cellamare, **T. R. Jarboe**, and A. T. Mattick "Refractory Clad Transient Internal Probe for Magnetic Field Measurements in High Temperature Plasmas" *Review of Scientific Instruments* **76**, 053504-1, April 2005
- V. A. Izzo and **T. R. Jarboe** "Three-Dimensional Magnetohydrodynamics Simulations of the Helicity Injected Torus with Steady Inductive Drive" *Phys. Plasmas* 12, 0561009-1, April 2005
- R. Raman, **T.R. Jarboe**, R.G. O'Neill, W.T. Hamp, B.A. Nelson, V.A. Izzo, A.J. Redd, P.E. Sieck and R.J. Smith "Non-Inductive Solenoid-Free Plasma Start-Up Using Coaxial Helicity Injection" *Nucl. Fusion* 45, L15-L19, (2005)
- T. R. Jarboe**, K. M. Parker, T. A. Mattick, M. M. Craw, P. Gu, W. T. Hamp, A. A. Hwang, V. A. Izzo, P. D. Jewell, .*et al.* "Spheromak Fusion Propulsion for Future Solar System Exploration" (*AIAA Journal of Propulsion and Power* **21**, (2005)

- D. Mueller, B. A. Nelson, W. T. Hamp, A. J. Redd, **T. R. Jarboe**, R. G. O'Neill, and R. J. Smith "Observation of Persistent Edge Current Driven By Coaxial Helicity Injection" *Phys. Plasmas* **12**, 070702 (2005)
- R. J. Smith, E.E. Penniman, T. R. Jarboe "A Martin-Puplett Cartridge FIR Interferometer" *Review of Scientific Instrum.* **75**(10), p. 3426-8, October 2004
- R. Raman, **T. R. Jarboe**, B. A. Nelson, W. T. Hamp, V. A. Izzo, R. G. O'Neill, et al. "Experimental Demonstration of Plasma Startup by CHI" *Phys. Plasmas* **11**, 2565 (2004)
- R. Raman, H. W. Kugel, R. Gernhardt, and T. Provost, **T. R. Jarboe**, V. Soukhanovskii "Fast Neutral Pressure Gauges in NSTX, Review of Scientific Instrum" *Review of Scientific Instrum.* **75**, No 10, 4347 (2004)
- P. Gu, M. Nagata, K. J. McCollam, **T. R. Jarboe**, B. A. Nelson, and A. J. Redd "Compact High-Resolution Ion Doppler Spectrometer for Quartz Ultraviolet Line Emissions" *Review of Scientific Instrum.* **75**(5) PART 1, p. 1337-1340 May 2004
- M. Ono, M. Peng, C. Kessel, C. Neumeyer, J. Schmidt, J. Chrzanowski, D. Darrow, L. Grisham, P. Heitzenroeder, **T. Jarboe**, et al. "Next-Step Spherical Torus Experiment And Spherical Torus Strategy In The Course Of Development Of Fusion Energy" *Nucl. Fusion* **44**(3), p. 452-463, March 2004
- M. Ono, M.G. Bell, R.E. Bell, T. Bigelow, M. Bitter, W. Blanchard, J. Boedo, C. Bourdelle, C. Bush, W. Choe, J. Chrzanowski, D.S. Darrow, S.J. Diem, R. Doerner, P.C. Efthimion, J.R. Ferron, R.J. Fonck, E.D. Fredrickson, G.D. Garstka, D.A. Gates, T. Gray, L.R. Grisham, W. Heidbrink, K.W. Hill, D. Hoffman, **T.R. Jarboe**, D.W. Johnson, et al. "Progress Towards High-Performance, Steady-State Spherical Torus" *Plasma Physics and Controlled Fusion* **45**(12) A, p. A335-A350 December 2003
- "The National Spherical Torus Experiment (NSTX) research programme and progress towards high beta, long pulse operating scenarios" (with E.J. Synakowski, et al.) *Nucl. Fusion* **43**(12) p. 1653-64, December 2003
- "Recent Results From The National Spherical Torus Experiment" (with R. Maingi, et al.) *Plasma Physics and Controlled Fusion* **45**(5), p. 657-669, May 2003
- K.K Jain, A.J. Redd, **T.R. Jarboe**, B.A. Nelson and the HIT Team "Edge Plasma Characteristics In The Helicity Injected Torus (HIT-II) Spherical Tokamak" *Plasma Physics and Controlled Fusion* (2003)
- V. A. Izzo and **T.R. Jarboe** "A Numerical Assessment Of The Lundquist Number Requirement For Relaxation Current Drive" *Phys. Plasmas* **10**, 2903 (2003)
- P. D. Jewell, R. J. Smith, and **T. R. Jarboe** "Martin-Puplett Multichannel Far Infrared Heterodyne Interferometer on The Helicity Injected Torus" *Review of Scientific Instruments* **74**, (2003)
- R. Raman, H. W. Kugel, T. Provost, R. Gernhardt, **T. R. Jarboe**, and M. G. Bell "Fast Neutral Pressure Measurements on NSTX" *Review of Scientific Instruments* **74**, (2003)
- R. Raman, **T. R. Jarboe**, B. A. Nelson, V. A. Izzo, R. G. O'Neill, A. J. Redd, and R. J. Smith "Demonstration of Plasma Startup by Coaxial Helicity Injection" *Phys Rev Let*, **90**, (2003)

**INVITED PAPERS:**

“Spheromak Confinement Device” presented as an Invited Tutorial at APS, Nov. 2004.

“Relaxation in Magnetic Confinement Experiments” presented at the Innovative Confinement Concepts (ICC) Workshop, May 25, 2004.

“Steady Inductive Helicity Injection Current Drive”, presented at the Fusion Power Associates Annual Meeting and Symposium, Frontiers in Fusion Research, Washington D.C., September 25-26, 2001.

4th Symposium Current Trends in International Fusion Research, Washington, DC, March 2001.

Controlled Fusion poster presented at the 18th IAEA Conference in Sorrento, Italy, October 4-10, 2000.

“The Helicity Injected Torus with Steady Inductive Helicity Injection Current Drive (HIT-SI)”, Workshop on Confinement and Stability of Alternative Fusion Concepts, Varenna, Italy, October 15, 2000.