

**ROGER RAMAN**  
**Principal Research Scientist, Dept. of Aeronautics and Astronautics**  
Aerospace & Engineering Research Bldg. Rm.120, Box 352250  
University of Washington, Seattle, WA 98195; 609 243-2855  
[raman@aa.washington.edu](mailto:raman@aa.washington.edu)

Education and Training.

University of Washington, Department of Nuclear Engineering, Plasma Physics, Ph.D. (1990)  
University of Washington, Department of Aeronautics and Astronautics, Aerospace, M.S.A.A. (1988)  
McMaster University, Department of Engineering Physics, Eng. Physics, M.Eng. (1983)  
University of Toronto, Department of Applied Science and Engineering, Chem. Eng., B.A.Sc. (1981)  
Honors: Member - Alpha Nu Sigma Nuclear Engineering Honor Society,  
Ontario Scholar for excellence in academic performance (1977)

Research and Professional Experience:

January 1999 - present – Principal Research Scientist, Aeronautics & Astronautics, University of Washington  
Leader for the Coaxial Helicity Injection (CHI) Research program on NSTX at PPPL  
2006 & 2009: Experimental Run Coordinator for the National Spherical Torus Experiment (NSTX)  
2003 to present: NSTX Physics Operator  
Co-editor: 7<sup>th</sup> Symp. Current Trends in Int. Fusion Research [AIP press (2009): ISBN: 978-0-7354-0691-9]

Key achievements during this period:

First demonstration of plasma start-up using Transient CHI in HIT-II (PRL 2003), NF Letter (2005)  
Demonstration of CHI start up in NSTX (PRL 2006)  
Demonstration of CHI coupling to induction and flux savings in NSTX (PRL 2010)

October 1998 to December 1998: Japan Atomic Energy Research Institute, Visiting Scientist  
Conducted design study of a Compact Toroid Fuelling system for JT-60U [J Plas. Fus. Res. **76**, 1079 (2000)]

April 1998 to September 1998: University of Washington, Visiting Scientist  
Significantly improved the performance of the HIT-II device, leading to a post-deadline presentation at the IAEA FEC Conference, Yokohama, Japan (1998)

1991 to March 1998: Canadian Fusion Fuels Technology Project (CFFTP)  
Project Leader/Principal Investigator for the Compact Toroid Fueller project  
Conducted pioneering compact toroid fueling experiments on the TdeV tokamak (PRL 1994)  
Invited by ITER to perform a conceptual design study of a CT fueller for ITER [FE&Design **39**, 977 (1998)]

1984 - 1990: University of Washington, Teaching Assistant and Research Assistant  
1983: McMaster University, Research Assistant.

June 1981 – Aug. 1982: Atomic Energy of Canada Ltd (AECL), Chalk River Nuclear Laboratories,  
NRU Reactor, Reactor Shift Engineer/Supervisor for the NRU Research Reactor.  
Summer 1980: Ontario Hydro, Bruce Nuclear Power, Engineering Development Student.

Awards:

Mitchell Award for best overall student (1977)  
First prize, American Nuclear Society student conference for the best graduate paper (1987)  
Outstanding Graduate Presentation, ANS student conference (1990)

Partial list of Publications

- R. Raman, D. Mueller, B.A. Nelson, T.R. Jarboe, et al., Demonstration of Tokamak Ohmic Flux Savings using Transient Coaxial Helicity Injection in NSTX, *Phys. Rev. Lett.*, **104**, 095003 (2010)
- R. Raman, B.A. Nelson, M.G. Bell, T.R. Jarboe, D. Mueller, T. Bigelow, B. LeBlanc, R. Maqueda, J. Menard, M. Ono, R. Wilson, Efficient generation of closed magnetic flux surfaces in a large spherical tokamak using coaxial helicity injection, *Phys. Rev. Lett.*, **97**, 175002 (2006)
- R. Raman, T.R. Jarboe, B.A. Nelson, et al., Demonstration of plasma start-up by coaxial helicity injection, *Phys. Rev. Lett.*, **90**, 075005 (2003)
- R. Raman, et al., Experimental Demonstration of Non disruptive, Central Fueling of a Tokamak by Compact Toroid Injection, *Phys. Rev. Lett.*, **73** (23) 3101 (1994)
- R. Raman, T.R. Jarboe, et al., Non-inductive solenoid-free plasma start-up using coaxial helicity injection, *Nuclear Fusion - Letter*, **45**, L15-L19 (2005)
- R. Raman, T.R. Jarboe, D. Mueller, et al., Solenoid-free plasma startup in NSTX using transient CHI, *Nuclear Fusion* **49**, 065006 (2009): 2008 IAEA FEC Paper
- R. Raman, D. Mueller, T.R. Jarboe, B.A. Nelson et al., Non-inductive solenoid-less plasma current startup in NSTX using transient CHI, *Nuclear Fusion* **47**, 792 (2007): 2006 IAEA FEC Paper
- R. Raman, T.R. Jarboe, D. Mueller, B.A. Nelson, et al., Plasma startup in NSTX using transient coaxial helicity injection, *Physics of Plasmas*, **14**, 056106 (2007): 2006 APS Invited Speaker
- R. Raman, T. R. Jarboe, W.T. Hamp, et al., Transient coaxial helicity injection for solenoid-free plasma startup in HIT-II, *Physics of Plasmas*, **14**, 022504 (2007)
- R. Raman, T.R. Jarboe, B.A. Nelson, et al., Experimental Demonstration of plasma start-up by coaxial helicity injection, *Physics of Plasmas*, **11**, 2565 (2004): 2003 APS Invited Speaker
- R. Raman, et al., Fast Neutral Pressure Gauges in NSTX, *Rev. Sci. Instruments* **75**, No 10, 4347 (2004)
- R. Raman, T.R. Jarboe, D. Mueller et al., Non-inductive current generation in NSTX using coaxial helicity injection, *Nuclear Fusion* **41**, 1081 (2001): 2000 IAEA FEC Speaker
- R. Raman, T.R. Jarboe, D. Mueller et al., Initial results from coaxial helicity injection experiments in NSTX, *Plasma Phys. Control. Fusion* **43**, 305 (2001)
- R. Raman, B.A. Nelson, D. Mueller, T.R. Jarboe, et al., Solenoid-less plasma start-up in NSTX using Transient CHI, *Fusion Science and Technology*, **56**, 512 (2009)
- R. Raman, et al., Exp. demonstration of tokamak fuelling by CT injection, *Nucl. Fusion*, **37**, 967 (1997)
- R. Raman, Advanced fuelling system for use as a burn control tool in a burning plasma device, *Fusion Science and Technology*, **50**, 84 (2006)
- R. Raman, Advanced Fuelling System for ITER, *Fusion Engineering and Design*, **83**, 1368 (2008)
- R. Raman, et al., Design of the CT Fueller for Center Fuelling TdeV, *Fusion Technology*, **24**, 239 (1993)
- R. Raman, et al., Fast Neutral Pressure Measurements in NSTX, *Rev. Sci. Instruments* **74**, 1900 (2003)
- R. Raman, Adv. Fueling Sys. for Steady-State Oper. of a Fusion Reactor, *Fus. Sci. and Tech*, **54**, 71 (2008)
- R. Raman, Summary of the 16th International Atomic Energy Agency conference on Controlled Fusion Research, October 7 to 11 (1996), Montreal, Canada, *Fusion Technology*, **32**, 660 (1997)