

James L. Terry

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OBJECTIVE

A position in teaching and research in which my knowledge of physics, spectroscopy, plasma physics, plasma diagnostics, or atomic physics can be put to use and transmitted to a new generation.

RESEARCH EXPERIENCE AND ACCOMPLISHMENTS

1978 to present - Research scientist at the Plasma Science and Fusion Center of the Massachusetts Institute of Technology, Cambridge, Massachusetts

My research has involved the **study of laboratory plasmas** with the goal of energy production by nuclear **fusion** (the process by which the sun burns). This has required a working knowledge of:

- **plasma physics** - my research has for the most part been carried out on three magnetic confinement devices (tokamaks) located at MIT.
- **atomic spectroscopy** - I have been responsible for the vacuum ultra-violet spectroscopy on each of the MIT tokamaks. This has meant, among other things, design and operation of custom multi-element detectors for the 20-2000 Å range. (See for example [Terry, *et al.*, "EUV impurity study of the Alcator Tokamak", *Nuclear Fusion* **18** (1978) p. 485].)
- **atomic physics** - knowledge of atomic/molecular physics is indispensable for interpretation of the spectra from plasmas. (See for example [Terry, *et al.*, "Volume recombination and opacity in Alcator C-Mod divertor plasmas", *Physics of Plasmas* **5** (1998) p.1759].)
- **plasma diagnostics** - generally, the diagnostic techniques I have employed have involved plasma spectroscopy (from the soft x-ray region to the infrared) and various particle tracers, e.g. pellet injectors. (See for example [Terry, *et al.*, "Measurement of internal magnetic field pitch using Li pellet injection on TFTR", *Review of Scientific Instruments*, **61** (1990) p. 2908].)
- **vacuum technology** - the tokamaks, the VUV spectrometers, and the high velocity pellet injectors have all maintained vacua in the 10^{-8} Torr range.
- **optics** - in addition to the various spectrometers I have operated, I have used IR imaging cameras and have designed and built systems using high power ruby lasers.
- **data analysis and computer programming** - proficient with VAX and UNIX operating systems, Macintosh- and Windows-based software, proficient at programming in IDL, Fortran and PLC-based ladder logic.

In addition to my work at MIT, I have conducted experiments at a number of major laboratories throughout the world:

- With Dr. E. Marmor, I designed, built, and operated a 1 km/s pellet injector at the **Princeton Plasma Physics Lab.** ('86-'93). This injector and my research with it were instrumental in generating a record 10.4 MW of fusion power on Princeton's tokamak TFTR. [Strachan, ... Terry, ... Zweben, "Fusion power production from TFTR plasmas fueled with deuterium and tritium", *PRL* **72** ('94) p. 3526].
- Spectroscopy experiments at the **Japanese Atomic Energy Research Inst.** ('97)
- Pulsed laser experiments and x-ray spectroscopy at the **Univ. of Kyoto** ('83, '85). Dr. J. Rice and I made the first measurements of impurity transport on the Heliotron-E plasma device. Later I took a VUV spectrometer to Japan to make impurity measurements on Heliotron-E and calibrate the spectrometers there.
- Spectroscopy experiments at the **Lawrence Livermore National Lab.** ('78)

SUPERVISORY/TEACHING/MANAGEMENT EXPERIENCE

Supervisor of the Plasma Science and Fusion Center's collaboration

experiments with The Johns Hopkins Univ. ('85 to present), Univ. of Md. ('95 to '98), Los Alamos Nat. Lab. ('96 to present). This has entailed setting up the collaborations, managing them, and facilitating results useful for both parties. It has required supervision of scientists, engineers, and technicians.

Supervisor to MIT Doctoral Students (2 graduates, 3 current) and MIT Masters Students (2 graduates). My experience with each thesis student has been enjoyable, intense, and fulfilling. I will never forget these students.

Responsible for designing, specifying and overseeing the 30 channel closed circuit, cable TV system in operation at the MIT facility. I am also responsible for the facility's audio/PA system. Both installations were completed on-time and on-budget.

Responsible for writing the Quarterly Reports to the project's funding agency, the Dept. of Energy ('97 to present). (See www.psf.mit.edu/cmod/quarterly/quarterly.plx)

PUBLICATIONS and INVITED PRESENTATIONS

I have authored or co-authored over 150 publications in refereed journals and edited one book, "Atomic Processes in Plasmas", AIP Conference Proceedings 257, Amer. Inst. of Phys. (NY) 1992. A partial list of publications follows and a complete list is available on request:

- **Terry JL, et al.**, "The experimental determination of the volume recombination rate in tokamak divertors", Journal of Nuclear Materials **266-269** (1999) pp.30-36,
- Lipschultz B, **Terry JL**, Boswell C, *et al.*, "Ultrahigh densities and volume recombination inside the separatrix of the Alcator C-Mod tokamak", PRL **81** (1998) pp.1007-10,
- **Terry JL, et al.**, "Volume recombination and opacity in Alcator C-Mod divertor plasmas", Physics of Plasmas **5** (1998) pp.1759-66,
- Rice JE, **Terry JL**, Fournier KB, *et al.*, "X-ray and VUV observations of Mo²³⁺-Mo³³⁺ brightness profiles from Alcator C-Mod plasmas", Journal of Physics B-Atomic Molecular & Optical Physics **29** (1996) pp.2191-208,
- **Terry JL, et al.**, "Impurity and deuterium pellet studies on TFTR", Plasma Physics and Controlled Nuclear Fusion Research 1990. Proceedings of the 13th International Conference on Plasma Physics and Controlled Nuclear Fusion Research. IAEA. 1991, pp. 393-402,
- Greenwald M, **Terry JL**, Wolfe SM, Ejima S, *et al.*, "A new look at density limits in tokamaks", Nuclear Fusion **28** (1988) pp.2199-207,
- **Terry JL, et al.**, "Observations of poloidal asymmetry in impurity-ion emission due to grad B drifts", PRL **39** (1977) pp. 1615-18

A partial list of invited presentations follows:

- "On the experimental determination of the volume recombination rate in tokamak divertors", invited talk at the 1998 13th International Conference on Plasma Surface Interactions (PSI), San Diego, California
- "Volume Recombination in Alcator C-Mod Plasmas", invited talk at the 1997 American Physical Society's Division of Plasma Physics Conference, Pittsburgh, Pennsylvania
- "Study of Volume Recombination and Radiation Opacity Effects in Alcator C-Mod", invited talk at the 1998 AIP Topical Conference on Atomic Processes in Plasmas, Auburn, Alabama
- "Li Pellet Injection into TFTR", colloquium at Columbia University, 1991
- "Measurement of the Internal Magnetic Field Pitch Using Li Pellet Injection", invited talk at the AIP Conference on the Diagnostics of High Temperature Plasmas, 1990, Portland, Maine

EDUCATION

Ph.D. - Physics ('78) - The Johns Hopkins University, Baltimore, Maryland
Master of Science - Physics ('75) - The Johns Hopkins University, Baltimore, Maryland
Bachelor of Arts with a major in Physics ('73) - Denison University, Granville, Ohio