

MATTHEW COLIN THOMPSON

Office:
University of California, Los Angeles
3-166 Knudsen Hall
Los Angeles, CA 90095-1547
e-mail: mct@physics.ucla.edu
Phone: 310 825-9982

EDUCATION

Doctor of Philosophy

Physics, June 2004, University of California, Los Angeles
Dissertation: "Plasma Density Transition Trapping of Plasma Electrons in a Plasma Wake Field Accelerator."
Advisor: Prof. James Rosenzweig

Master of Science

Physics, December 1998, University of California, Los Angeles

Bachelor of Science with Departmental Honors

Physics, June 1997, Stanford University

PROFESSIONAL EXPERIENCE

Postdoctoral Researcher

Researcher with Prof. James Rosenzweig,
University of California, Los Angeles, June 2004 - Present.

- Designed and constructed a time resolved underdense plasma lens experiment now underway in collaboration with the Fermilab NICADD Photoinjector Laboratory.
- Developed 100 micron scale hollow tube dielectric accelerating structures for a new collaboration with the Stanford Linear Accelerator Center on a ultra-high accelerating field experiment.
- Supervised and mentored undergraduate research assistants who work on these projects.

Graduate Student

Graduate Student Researcher under Prof. James Rosenzweig,
University of California, Los Angeles, September 1998 - June 2004

- Developed and built the first experiment designed to test the concept of trapping and accelerating plasma electrons out of a plasma using wave breaking at a step density transition.
- Analyzed the theoretical potential of plasma based electron beam sources and developed general scaling laws that predict achievable beam parameters.
- Fostered an experimental collaboration with the Fermilab NICADD Photoinjector Laboratory to secure their help with my dissertation research.
- Supervised and mentored two undergraduate research assistants for a period of two years while they worked on technical aspects of my dissertation project.

Teaching Assistant,
University of California, Los Angeles, September 1997 - June 1999

- Taught a one hour weekly discussion section for the upper division undergraduate course: Physics of Charged-Particle and Laser Beams.
- Taught a one hour weekly discussion section for the undergraduate course: Physics for Life Science Majors.
- Twice taught a one hour weekly discussion section for the general education undergraduate course: Physics.

Undergraduate Student

Teaching Assistant,
Stanford University, September 1996 - June 1997

- Teaching assistant for the upper division laboratory course: Modern Physics with Technical Writing Concentration.

- Taught a one hour weekly discussion section for the general education undergraduate course: Physics for Poets.

REFEREED PUBLICATIONS

- “Creation of plasma density transitions short compared to the plasma skin depth,” **M.C. Thompson**, J.B. Rosenzweig, G. Travish, *The Review of Scientific Instruments* **76**, 013303 (2005).
- “Velocity bunching of high-brightness electron beams,” S.G. Anderson, P. Musumeci, J.B. Rosenzweig, W.J. Brown, R.J. England, M. Ferrario, J.S. Jacob, **M.C. Thompson**, G. Travish, A.M. Tremaine, R. Yoder, *Physical Review Special Topics Accelerators and Beams* **8**, 014401 (2005).
- “Plasma Density Transition Trapping as a Possible High-Brightness Electron Beam Source,” **M.C. Thompson**, J.B. Rosenzweig, and H. Suk, *Physical Review Special Topics Accelerators and Beams* **7**, 011301 (2004).
- “Energy Loss of a High Charge Bunched Electron Beam in a Plasma: Simulations, scaling, and accelerating wakefields,” J.B. Rosenzweig, N. Barov, **M.C. Thompson**, R. Yoder, *Physical Review Special Topics Accelerators and Beams* **7**, 061302 (2004).
- “Energy Loss of a High Charge Bunched Electron Beam in a Plasma: Analysis,” N. Barov, J.B. Rosenzweig, **M.C. Thompson**, R. Yoder, *Physical Review Special Topics Accelerators and Beams* **7**, 061301 (2004).
- “Horizontal Phase-Space Distortions Arising from Magnetic Pulse Compression of an Intense, Relativistic Electron Beam,” S.G. Anderson, J.B. Rosenzweig, P. Musumeci, and **M.C. Thompson**, *Physical Review Letters* **91**, 074803 (2003).

CONFERENCE PROCEEDINGS

- “Status of the UCLA/NICADD Plasma Density Transition Trapping Experiment,” **M.C. Thompson**, J.B. Rosenzweig, G. Travish, N. Barov, H. Edwards, P. Piot, J. Santucci, and R. Tikhoplav, *Advanced Accelerator Concepts: Eleventh Advanced Accelerator Concepts Workshop*, AIP Conf. Proc. **737**, 440 (AIP, 2004).

- “Plasma Density Transition Trapping as a Possible High-Brightness Electron Beam Source,” **M.C. Thompson** and J.B. Rosenzweig, In *The Physics and Applications of High Brightness Electron Beams*, (World Scientific, 2003).
- “The UCLA/NICADD Plasma Density Transition Trapping Experiment,” **M.C. Thompson**, N. Barov, W. Lu, W. Mori, J.B. Rosenzweig, G. Travish, *Proceedings of the 2003 Particle Accelerator Conference*, 1870 (IEEE, 2003).
- “Plasma Density Transition Trapping as a Possible High-Brightness Electron Beam Source,” **M.C. Thompson** and J.B. Rosenzweig, *Advanced Accelerator Concepts Tenth Workshop Conference Proceedings*, AIP Conf. Proc. **647**, 600 (AIP, 2002).
- “Longitudinal Beam Shaping and Compression Scheme for the UCLA Neptune Laboratory,” R.J. England, J.B. Rosenzweig and **M.C. Thompson**, *Advanced Accelerator Concepts Tenth Workshop Conference Proceedings*, AIP Conf. Proc. **647**, 884 (AIP, 2002).
- “Velocity Bunching Experiment at the Neptune Laboratory,” P. Musumeci, R.J. England, **M.C. Thompson**, R. Yoder, and J.B. Rosenzweig, *Advanced Accelerator Concepts Tenth Workshop Conference Proceedings*, AIP Conf. Proc. **647**, 858 (AIP, 2002).
- “Plasma Wakefield Experiments,” N. Barov, **M.C. Thompson**, K. Bishofberger, J.B. Rosenzweig, H. Edwards, and J. Santucci, *Advanced Accelerator Concepts Tenth Workshop Conference Proceedings*, AIP Conf. Proc. **647**, 71 (AIP, 2002).
- “Energy Loss of a High Charge Bunched Electron Beam in Plasma: Non-linear Plasma Response and Linear Scaling,” J.B. Rosenzweig, N. Barov, **M.C. Thompson**, and R. Yoder, *Advanced Accelerator Concepts Tenth Workshop Conference Proceedings*, AIP Conf. Proc. **647**, 577 (AIP, 2002).
- “Beam-Plasma Interaction Experiments at the UCLA Neptune Laboratory,” **M.C. Thompson**, C.E. Clayton, J. England, J.B. Rosenzweig, H. Suk, *Proceedings of the 2001 Particle Accelerator Conference*, 4014 (IEEE, 2001).

“Production and synchronization of electron beams from RF photoinjector/compressor systems for ultra-fast applications,” **M.C. Thompson** and J.B. Rosenzweig, *Advanced Accelerator Concepts Ninth Workshop Conference Proceedings*, AIP Conf. Proc. **569**, 374 (AIP, 2001).

“Commissioning of the Neptune Photoinjector,” S.G. Anderson, R. Agustsson, S. Boucher, A. Burke, C.E. Clayton, J. England, M. Loh, P. Musumeci, J.B. Rosenzweig, H. Suk, **M.C. Thompson**, *Proceedings of the 2001 Particle Accelerator Conference*, 89 (IEEE, 2001).

“Dynamics of a Driver Beam Propagating in an Underdense Plasma with a Downward Density Transition,” H. Suk, N. Barov, J. England, J.B. Rosenzweig, **M.C. Thompson**, *Proceedings of the 2001 Particle Accelerator Conference*, 4011 (IEEE, 2001).

“Commissioning and Measurements of the Neptune Photo-injector,” S.G. Anderson, M. Loh, P. Musumeci, J.B. Rosenzweig, H. Suk, **M.C. Thompson**, *Advanced Accelerator Concepts Ninth Workshop Conference Proceedings*, AIP Conf. Proc. **569**, 487 (AIP 2001).

PRESENTATIONS

“The UCLA/NICADD Plasma Density Transition Trapping Experiment,” invited presentation at the Advanced Accelerator Concepts Eleventh Workshop, Stony Brook, NY, 2004.

“Emittance Growth in Intense Beams Due to Collective Effects at Metallic Boundaries,” 27th ICFA Advanced Beam Dynamics Workshop, Chia Laguna, Sardinia, 2002.

“Plasma Density Transition Trapping as a Possible High-Brightness Electron Beam Source,” 27th ICFA Advanced Beam Dynamics Workshop, Chia Laguna, Sardinia, 2002.

“Plasma Density Transition Trapping as a Possible High-Brightness Electron Beam Source,” Advanced Accelerator Concepts Tenth Workshop, Oxnard, CA, 2002.

“Production and synchronization of electron beams from RF photoinjector/compressor systems for ultra-fast applications,” Advanced Accelerator Concepts Ninth Workshop, Santa Fe, NM, 2000.

“Electron Beam Photocathode Cleaning,” 2nd ICFA Advanced Accelerator Workshop, Los Angeles, CA, 1999.

REFERENCES

Prof. James Rosenzweig
University of California Los Angeles
Dept. of Physics & Astronomy
Knudsen Hall 6-137B
Box 951547
Los Angeles, CA 90095-1547
Telephone: 310-206-4541
e-mail: rosenzweig@physics.ucla.edu
Relationship: Advisor

Dr. Gil Travish
University of California Los Angeles
Dept. of Physics & Astronomy
Knudsen Hall 6-137A
Box 951547
Los Angeles, CA 90095-1547
Telephone: 310 825-3507
e-mail: travish@physics.ucla.edu
Relationship: Laboratory Manager

Prof. Claudio Pellegrini
University of California Los Angeles
Dept. of Physics & Astronomy
Knudsen Hall 6-137C
Box 951547
Los Angeles, CA 90095-1547
Telephone: 310-206-1677
e-mail: pellegrini@physics.ucla.edu
Relationship: Senior Professor of the Particle Beam Physics Lab