

# Lee A. Weinstein

PhD candidate in Mechanical Engineering  
Massachusetts Institute of Technology

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	<b>Massachusetts Institute of Technology</b>	
Aug. 2017 (expected)	PhD in Mechanical Engineering	GPA: 5.00/5.00
Sept. 2013	MS in Mechanical Engineering	GPA: 5.00/5.00
	<b>University of California, Berkeley</b>	
May 2011	BS in Mechanical Engineering	GPA: 3.97/4.00

## Research

### Massachusetts Institute of Technology

#### NanoEngineering Group, Advisor: Gang Chen

2015 - Present

##### **Solar-Thermal Aerogel Receiver**

I am part of a team developing a novel solar-thermal aerogel receiver, which achieves efficient solar to thermal conversion using transparent silica aerogel. I am modeling system performance as well as fabricating and characterizing experimental prototypes of the receiver.

2014 - Present

##### **Hybrid PV-Thermal Solar Receiver**

I helped design a spectrum-splitting hybrid PV and thermal solar receiver, and developed an integrated model spanning the receiver sub-components to predict overall system performance.

2012 - 2015

##### **Macroscale Optical Cavity for Solar Receivers**

I designed an optical cavity to reduce radiative losses from solar receivers. As part of this project, I programmed a ray tracing code to predict cavity performance and experimentally demonstrated reduced thermal losses from a receiver at elevated temperature. I also used ray tracing to show an improvement in absorption of photovoltaic cells with the cavity.

2011 - 2015

### **Solar Thermoelectric Generator (STEG)**

I helped design an improved efficiency STEG using optical concentration and modeled the device efficiency using heat transfer analysis. I tested a prototype STEG with integrated thermal storage.

University of California, Berkeley

Berkeley Manufacturing Institute, Advisor: Paul Wright

2010 - 2011

### **Energy scavenger from fluid flow**

I helped develop a piezoelectric energy scavenger for use in HVAC ducts. My work on the project improved power output from 3  $\mu$ W to 2 mW, or approximately 700x increased performance. I modeled the fluid dynamics and solid mechanics of the system to optimize design, prototyped a variety of designs and completed performance and fatigue testing on prototypes.

## **Teaching**

Massachusetts Institute of Technology

Spring 2016

### **Teaching Assistant - 2.55: Advanced Heat and Mass Transfer**

I organized and led recitation sessions, office hours and exam review sessions for graduate level heat transfer.

## **Leadership**

Massachusetts Institute of Technology

Graduate Association of Mechanical Engineers (GAME)

2016 - Present

### **Webmaster**

I maintain GAME's online presence, and I am re-designing a website for the group ([game.mit.edu](http://game.mit.edu)).

2015

### **Intramural Chair**

I captained intramural teams for mechanical engineering graduate students and promoted a fun, inclusive environment to encourage all interested students to play intramurals.

- 2015 **GSC Representative**  
I represented mechanical engineering graduate students as part of the MIT Graduate Student Council, attending meetings and voting on resolutions.
- 2014 **President**  
I led GAME, which hosts social, academic and professional development events, by managing an executive committee of around 25 officers and chairs. As president, I planned and ran the inaugural research exhibition, with 60+ student presenters and 200+ attendees.
- 2013 **Muddy Monday Chair**  
I organized weekly social hour for mechanical engineering graduate students and coordinated with other departments to host monthly interdepartmental social hours.
- 2012 **Orientation Chair**  
I planned a week of events to help new mechanical engineering graduate students transition to life at MIT and led social events during prospective student visit weekends. I also organized a mentoring program to pair matriculating students with incoming students.
- MITxplore**
- 2014 - Present **Mentor**  
I mentor about ten 4th – 6th grade students during weekly math outreach sessions. I also develop lessons to make complex math topics accessible and engaging for young students which are used in the sessions.
- 2013 - Present **Webmaster**  
I designed and developed the MITxplore website (mitxplore.org) using HTML and CSS, and continue to maintain MITxplore's web presence.

## Intramural Executive Board

2014 - Present

### Graduate Member at Large

I represent graduate student interests in the intramural program at MIT. During my board membership, I started paid referee soccer leagues and implemented 7v7 outdoor soccer leagues. I was awarded the 2017 Harold J. Pettegrove award, an Institute Award recognizing outstanding service to intramural athletics, for my contributions in this position.

## DAPER Advisory Board

2015 - Present

### Member

I represent graduate student interests on the DAPER advisory board, which advises the MIT department in charge of all campus athletics.

## University of California, Berkeley

### Pi Tau Sigma, Mechanical Engineering Honor Society

Spring 2011

#### Student Relations Chair

I established new academic services (review sessions and tutoring hours) for mechanical engineers and launched a freshman mentoring program where PTS members are paired with new students. I was awarded "Officer of the Semester" among a corps of over 30 officers for my contributions.

2010

#### Pledge Project Chair

I created design projects for prospective members to develop their engineering skills and organized a feedback system to improve group dynamics of the design project groups.

### Tau Beta Pi, Engineering Honor Society

Fall 2010, Spring 2011

#### Student Relations Officer

I organized events for the engineering student body and social events with other student groups. I also assisted in providing services for engineering students, such as a test bank and an online information desk.

Spring 2011	<b>Course Coordinator, E98 "Insider's Guide to Berkeley Engineering"</b> I managed the logistics for a student taught course for engineering freshmen, and selected 39 instructors to teach thirteen sections serving 260 students.
Spring 2010, Spring 2011	<b>House Leader</b> I coordinated group of around fifteen students during events and planned three social events per semester to foster camaraderie among members.

## Awards and Honors

2017	Harold J. Pettegrove Award
2015	MIT Mechanical Engineering Research Exhibition - Audience Choice Award
2011 - 2012	Warren M. Rohsenow Fellowship recipient
2011, 2012	National Science Foundation GRFP Honorable Mention
Spring 2011	Pi Tau Sigma - Officer of the Semester
2007 - 2011	Regents' and Chancellor's Scholar

## Publications

- D. Kraemer, Q. Jie, K. McEnaney, F. Cao, W. Liu, L.A. Weinstein, J. Loomis, Z. Ren and G. Chen. "Concentrating solar thermoelectric generators with a peak efficiency of 7.4%" *Nature Energy*, **1**, 16153, 2016.
- S.V. Boriskina, L.A. Weinstein, J.K. Tong, W.C. Hsu and G. Chen. "Hybrid Optical-Thermal Antennas for Enhanced Light Focusing and Local Temperature Control." *ACS Photonics*, **3** (9), 1714-1722, 2016.
- L.A. Weinstein, J. Loomis, B. Bhatia, D.M. Bierman, E.N. Wang and G. Chen. "Concentrating Solar Power." *Chemical Reviews*, **115** (23), 12797-12838, 2015.
- J. Loomis, L. Weinstein, S.V. Boriskina, X. Huang, V. Chiloyan and G. Chen. "Diverging polygon-based modeling (DPBM) of concentrated solar flux distributions." *Solar Energy*, **122**, 24-35, 2015.
- L.A. Weinstein, W.C. Hsu, S. Yerci, S.V. Boriskina, G. Chen, "Enhanced absorption of thin-film photovoltaic cells using an optical cavity," *Journal of Optics*, **17** (5), 055901, 2015.

L. Weinstein, D. Kraemer, K. McEnaney, G. Chen, "Optical cavity for improved performance of solar receivers in solar-thermal systems," *Solar Energy*, **108**, 69-79, 2014.

L.A. Weinstein, K. McEnaney, G. Chen, "Modeling of thin-film solar thermoelectric generators," *Journal of Applied Physics*, **113** (16), 164504, 2013.

L.A. Weinstein, M.R. Cacan, P.M. So, P.K. Wright, "Vortex shedding induced energy harvesting from piezoelectric materials in heating, ventilation and air conditioning flows," *Smart Materials and Structures*, **21** (4), 045003, 2012.

J. Bakhshi, L. Weinstein, K.S. Poksay, B. Nishinaga, D.E. Bredesen, R.V. Rao, "Coupling endoplasmic reticulum stress to the cell death program in mouse melanoma cells: effect of curcumin," *Apoptosis*, **13** (7), 904-914, 2008.

## Published Conference Proceedings

L.A. Weinstein, D.M. Bierman, E.N. Wang and G. Chen, "Directional selectivity as an alternative to concentration for high efficiency solar thermal systems," TFESC-12752, ASTFE Thermal and Fluid Engineering Summer Conference, August 9-12, 2015, New York City, NY

## Conference Presentations

L. Weinstein, V. Chiloyan, S. Boriskina and G. Chen, "Limit on the Performance of Spectrally Selective Surfaces for Solar Applications," MRS-NM4.6.04, MRS Fall Meeting, November 27 - December 2, 2016, Boston, MA

L. Weinstein, S. Fay, C. Douglas, C. Jiang, A. Hosoi and C. Clanet, "Dribbling as a Particle-Particle Interaction," Sports Physics, June 8 - June 10, 2016, Paris, France

L. Weinstein, S. Yang, L. Zhao, B. Bhatia, E. Strobach, D. Bierman, T. Cooper, L. Meroueh, S.B. Boriskina, E.N. Wang and G. Chen, "A Solar-Thermal Aerogel Receiver (STAR) for Cost-Effective Electricity Generation," MRS-EE3.1.08, MRS Spring Meeting, March 28 - April 1, 2016, Phoenix, AZ

L. Weinstein, J. Loomis, X. Huang, S. Yang, L. Zhao, Y. Huang, F. Cao, T. Sun, B. Bhatia, D. Bierman, E. Strobach, W.C. Hsu, G. Ni, L. Tang, S. Boriskina, Z. Ren, E. Wang and G. Chen, "Hybrid PV and Thermal Solar Receiver Using Silica Aerogel and Thin-Film Multi-Layer Spectral Splitting," MRS-OO11.02, MRS Fall Meeting, November 29 - December 4, 2015, Boston, MA

K. McEnaney, D. Kraemer, L.A. Weinstein, Q. Jie, W.S. Liu, F. Cao, Z. Ren and G. Chen, "Demonstrated high efficiency of concentrating solar thermoelectric generators," MRS-CC8.01, MRS Fall Meeting, November 30 - December 5, 2014, Boston, MA

L.A. Weinstein, W.C. Hsu, S. Boriskina and G. Chen, "External Cavity for Enhanced Absorption in Thin-Film Photovoltaics", ES-FuelCell2014-6865, ASME International Conference on Energy Sustainability, June 30 - July 2, 2014, Boston, MA

L.A. Weinstein, D. Kraemer, K. McEnaney and G. Chen, "Angularly dependent emissivity using optical cavities", IMECE2013-64894, ASME International Conference and Exhibition, November 15 - 21, 2013, San Diego, CA

## Patents

G. Chen, E.N. Wang, S.V. Boriskina, K. McEnaney, H. Ghasemi, S. Yerci, A. Lenert, S. Yang, N. Miljkovic, L.A. Weinstein, D. Bierman. Internally-Heated Thermal and Externally-Cool Photovoltaic Cascade Solar Energy System for Full Solar Spectrum Utilization, Application #: US 14/464,103

S. Boriskina, D. Kraemer, K. McEnaney, L.A. Weinstein, G. Chen. Solar power conversion system with directionally-and spectrally-selective properties based on a reflective cavity, Application #: US 13/972,261