Sergio H. Cantu

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Education

Massachusetts Institute of Technology — **Physics Ph.D. Candidate**

- Thesis : *'Engineering Photon Quantum States using Rydberg Polaritons'* — Sep. 2014 – Present
  Advisor : Vladan Vuletić, Co-advisor : Mikhail Lukin
- *National Science Foundation Graduate Reseach Fellow (NSF-GRFP 2014)*

The University of Texas at Brownsville — **B.S. in Physics and B.S. in Mathematics**

- *Magna Cum Laude* (GPA = 3.813/4.0) — Sept. 2007 – May 2012
- *Center for Gravitatinal Wave Astronomy - NASA scholar*
- *Arecibo Remote Command Center (ARCC) scholar*

Experience

Massachusetts Institute of Technology — Cambridge, MA

- NSF Graduate Research Fellow at the Center of Ultra-cold atoms and Teaching Assistant — Sept 2012 - Present
  - **Research Assistant - Quantum Nonlinear Optics**: Research on machine learning for portfolio hedging and replication algorithms. Modeling low-risk & continuous-return strategies. Developed the python library QSTK.
  - **Teaching Assistant - Atomic Physics I and II (Graduate)**: The online course on Coursera, had more than 100,000 students enrolled. It was featured on the 11 Alive News and the Atlanta Journal Constitution. Involved in creating assignment, exams and conducting recitation sessions. Also taught the on-campus version of the course.
- Visiting Student — Sept. 2012 - Sept. 2014
  - **Research Assistant - Laser Trapping and Cooling of atoms**: Studied and implemented optical lattices for application in laser trapping and cooling of Rb atoms. Characterized and optimized optical systems of a dipole trap of Rb atoms to improve the measurement of quantum nonlinearities at the single photon level of the atomic Rydberg states.

University of Texas at Brownsville — Brownsville, TX

Undergraduate Research Assistant — May 2008 - July 2012

- **Research Assistant - Optical Mode Cleaners**: Conditioned a classroom into a optics lab, setup a computer cluster for theoretical experiments. Simulated the resonance stability of triangular ring resonators using novel ray tracing and Gaussian propagation techniques. Studied and modeled photonic crystal structures and related phenomena (i.e. Negative Index of refraction, Perfect mirrors, and silicon ring resonators).
- **Teaching Assistant - Teaching Physics with videogames**: Developed an experimental class for non-science majors centered around videogames. Students characterized the physics engine of a videogame.

Massachusetts Institute of Technology — Cambridge, MA

Undergraduate Summer Intern. Space Propulsion Laboratory — Jun-Aug 2011

- **Research Assistant:**: Development of an electrochemistry-free ionic liquid ion source (ILIS) for applications in space propulsion devices. Research involved the construction of super-critical dryers for the production of silica aerogel.

Massachusetts Institute of Technology — Cambridge, MA

Undergraduate Summer Intern. Laser Interferometer Gravitational-Wave Observatory — Jun-Aug 2010

- **Research Assistant:**: Constructed a prototype interferometer displacement sensor using frequency and intensity stabilization techniques. Project entailed design of both the optical configuration of my experiment as well as the control system of opto-mechanical components to achieve the desired stabilization results.

Laser Interferometer Gravitational-Wave Observatory — Cambridge, MA

Undergraduate Research Staff — Jun 2008 - Dec 2009

- **Research Assistant:**: Characterization and fabrication of triangular Fabry-Perot resonators. Design of optical mechanical components for optical setup. Characterization of 500 mW 1064nm Nd:YAG laser. Worked and studied the Pound-Drever-Hall technique for phase stabilization in a laser system.

Arecibo Remote Command Center — Cambridge, MA

Undergraduate Research Assistant — Jan 2009 - Jun 2009

- **Research Assistant:**: Obtained and characterized data from the Arecibo Radio Telescope searching for potential millisecond pulsars.