# Daniel M. Maruyama

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## Education

**PhD Physics**, University of Michigan, Ann Arbor, MI — Expected July 2015
Thesis Concentration: Systems Neuroscience

**BA Mathematics and Physics**, University of California, Berkeley, CA — Dec 2008
Thesis Concentration: Cosmology

## Research Experience

**Graduate Student Researcher**, Zochowski Lab — May 2010 - Present
Data analysis: Determined the functional connectivity between neurons in order to quantify the stability and evolution of neuronal networks.

**Impact**

- Discovered the first known indication of network level learning in mice via my stability measure.
- Through my techniques, network scale effect of theta oscillations were captured, suggesting the mechanism by which the brain encourages memory formation.

**Method Development**

- Created a new high-speed time series method for assessing functional connectivity between neurons. Highly accurate and ~10^4 times more efficient.
- Overhauled my group's clustering approach, increasing signal detection by 10x.
- Suggested and then implemented a novel, effective framework to study network dynamics.
- Devised high dimensional data visualization techniques.

Modeling: Simulated the effect of astrocytes on neuronal networks, which led to creation of the first astrocytic network model capable of matching biological firing properties.

**Undergraduate Researcher**, Smoot Lab — October 2006-May 2008, Sept 2008-July 2009
Working under Nobel laureate George Smoot, searched for cosmic strings and dark matter. Led to the first limits on string existence using gravitational lensing.

- Simulated the detection signature for cosmic strings.
- Calculated galaxy shear to improve gravitational lensing dark matter detection.

## Internships

**Summer Intern,** 3M, 3M Center Maplewood MN — Jun-Aug 2008
Team project in R&D aimed at developing ultra sensitive bacteria detectors utilizing surface plasmon resonance on gold nanostructures. Set up lab optics, measured intensities and spectra, analyzed performance, tested bacteria.

**Summer Intern**, Algae Fuel, Concord CA, Unpaid Internship — May-July 2009
Prototyped a commercial algae bioreactor.

## Additional Information

**Programming experience:** MATLAB, Python, R, C++, IDL, UNIX
**Publications, presentations, and teaching experience:** available upon request.