

# Matthew Oberhardt

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**Present Address:**

102 Shamrock Road, apt 10  
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**Permanent Address:**

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**EDUCATION**

- **University of Virginia, BA in Physics, Minor in Mathematics.** Charlottesville VA, May 2005, *Cumulative GPA 3.47, Major GPA 3.65.*
- **Cary Academy High School, Cary NC,** High school diploma 2001
- **Alexander Muss High School in Israel,** Hod Hasharon, Israel, summer 2000

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**CURRENT ACTIVITIES**

- **Growth Experiments:** I am currently establishing protocols for running growth experiments with *Pseudomonas aeruginosa* in order to generate data for model comparison.
- **HPLC analysis:** I am currently establishing experimental methods with a Shimadzu Prominence HPLC system (LC Solutions software) to examine bacterial supernatants for quantifying metabolite concentrations, and thereby characterizing flux values for comparison with genome-scale metabolic models.
- ***Pseudomonas aeruginosa* analysis:** I am currently analyzing the recently published genome-scale model of *P. aeruginosa* metabolism, and assessing indicators of virulence.

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**EMPLOYMENT/RESEARCH EXPERIENCE**

- **Systems Biology research:** Currently PhD candidate in Jason Papin's Computational Systems Biology Lab, University of Virginia. Research focuses on reconstruction of bacterial metabolic pathways and investigation of interacting systems and biological objectives primarily through constraint based approach (2005-present).
- **Medical Imaging research:** Worked in Dr. William F. Walker's ultrasound lab, Department of Biomedical Engineering, University of Virginia, summer of 2004 and during school year (2004-2005).
  - constructed ultrasound phantoms, using polyacrylamide gels, to test new imaging hardware and software. Acknowledged in 3 papers and author on 1 paper for phantom work.
  - developed a 2-dimensional spline algorithm and associated delay-matching programs, enabling new ultrasound applications such as: increasing the resolution of images and tracking the movement of targets interrogated by radiation force.
- **Solid State Physics Research:** Worked in materials science lab under Dr. Joe Poon, Department of Physics, University of Virginia, summer 2003
  - formulated and tested amorphous metal alloys, particularly utilizing ball milling machine.
  - designed and monitored construction of a new high temperature furnace for the lab.
- **Camp Counselor:** Jewish Community Center Summer Camp, Raleigh NC (summers of 1999-2002)

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**LEADERSHIP**

- **International Relations Organization (IRO):**
  - Staff Director and member of secretariat for Virginia International Committee Simulation (VICS) Conference. Responsible for selecting and managing all staff and chairs for the intercollegiate VICS Conference in 2005.
  - Chair for Virginia Model UN (VAMUN) conference (2004). Led committee using parliamentary procedure.
  - Staff for VAMUN model UN Conference (2003) and VICS model UN conference (2004)

## EXTRACURRICULARS

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- **Volunteer at University of Virginia Hospital**, Orthopedics Unit (2003-2004):  
-interacted with patients and staff, handled communications
- **University of Virginia Madison House Volunteer Program**:  
-mentored a middle school student in science fair project
- **Washington Debate and Literary Society** (2003-2005)
- **Rock climbing (2001-present)**: Placed in Dixie Rock climbing competition (Chapel Hill, NC) in 2001, 2002, and 2003, 2005 competed in various other competitions; serious year-round climber.
- **Other activities (2003-present)**: kayaking, skiing, member of UVA outdoors club

## HONORS

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- Awarded **Transatlantic Biotechnology Fellowship** by the joint US-EU Taskforce on Biotechnology Research, for a 1-month research trip to Braunschweig, Germany, Spring, 2008.
- Awarded UVA **Award for Excellence in Scholarship in the Sciences & Engineering**, Fall 2007, a competitive award given to a select group of graduate students at UVA annually.
- Awarded NIH-funded **Biotechnology Training Grant**, 2007-2009.
- **Dean's List**, Spring 2005.
- **Dean's List**, Fall 2004.
- **Dean's List**, Spring 2004.
- **Dean's List**, Spring 2002.
- **National Society of Collegiate Scholars**, 2002
- **Dean's List**, Fall 2001.
- **Echol's Scholar**, 2001-2005.

## PUBLICATIONS

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- Robertson, S. H., Smith, C. K., Langhans, A. L., McLinden, S. E., **Oberhardt, M. A.**, Jakab, K. R., Dzamba, B., DeSimone, D. W., Papin, J. A., and Peirce, S. M. (2007). Multiscale computational analysis of *Xenopus laevis* morphogenesis reveals key insights of systems-level behavior. *BMC Syst Biol* 1, 46.
- Gianchandani, E. P.\*, **Oberhardt, M. A.\***, Burgard, A. P., Maranas, C. D., and Papin, J. A. (2008). Predicting biological system objectives de novo from internal state measurements. *BMC Bioinformatics* 9, 43.
- **Oberhardt, M. A.\***, Puchalka, J.\*, Fryer, K. E., Martins dos Santos, V. A., and Papin, J. A. (2008). Genome-scale metabolic network analysis of the opportunistic pathogen *Pseudomonas aeruginosa* PAO1. *J Bacteriol* 190, 2790-2803. *Cover illustration*.

\*equal authorship where applicable

## PRESENTATIONS

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- **Matthew A. Oberhardt\***, Erwin P. Gianchandani, Jong Min Lee, Jason A. Papin. Novel Framework for Identifying Objectives of Biological Systems. Platform presentation. The Biomedical Engineering Society (BMES) Annual Fall Meeting, Chicago IL, October 13, 2006. **\*Speaker**
- **Matthew A. Oberhardt**, Erwin P. Gianchandani\*, Jong Min Lee, Jason A. Papin. Novel Framework for Identifying Objectives of Biological Systems. Platform presentation. American Institute of Chemical Engineering (AIChE) Annual Meeting, San Francisco CA, November 14, 2006. **\*Speaker**
- **Matthew A. Oberhardt\***, Jacek Puchalka, Kimberly Fryer, Vitor Martins dos Santos, Jason A. Papin. *Genome-scale metabolic reconstruction of Pseudomonas aeruginosa PAO1*. Poster presentation. American Society for Microbiology (ASM) conference on Pseudomonas, Seattle WA, August 27, 2007. **\*Presenter**
- **Matthew A. Oberhardt**, Jacek Puchalka, Kimberly Fryer, Vitor Martins dos Santos, Jason A. Papin. Genome-scale network analysis of the opportunistic pathogen *Pseudomonas aeruginosa* PAO1. Platform presentation. The Biomedical Engineering Society (BMES) Annual Fall Meeting, Los Angeles CA, September 28, 2007.

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\*Presented by Arvind Chavali.

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#### CONFERENCE PRECEEDINGS

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- Abhay Patil, Chris D. Garson, **Matthew A. Oberhardt**, Peter C. Tay, John A. Hossack. *"3D Prostate Elastography: Simulations and Experiment."* Proceedings of IEEE Ultrasonic Symposium. p. 1230-1233. 2006.

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#### BOOK CHAPTERS

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- **Matthew A. Oberhardt**, Arvind Chavali, Jason A. Papin. *Flux Balance Analysis: analyzing intracellular metabolic states. In preparation for "Systems Biology", a Molecular Biology series book from Humana Press.* 2007.

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#### CONFERENCES ATTENDED

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- Biomedical Engineering Society 2006 Annual Fall Meeting, Chicago IL, USA (October 11-14, 2006)
- The First Maga Circe Conference on Metabolic Systems Analysis, Sabaudia Italy (March 26-29, 2006)
- American Society for Microbiology Conference on Pseudomonas 2007, Seattle WA, USA (Aug. 26-30, 2007)

Updated 04/11/08