

# ASA S. HOPKINS

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## EDUCATION

### CALIFORNIA INSTITUTE OF TECHNOLOGY

#### PhD, Physics

November 2008 (expected)

*Thesis:* "Reduced-order Filters for Real-time Control of Quantum Systems"

#### MS, Physics

June 2007

*Selected Coursework:* Physics and Chemistry of Renewable Energy, significant coursework in Control and Dynamical Systems including Introduction to Dynamics, Geometry of Nonlinear Systems, and Geometric Mechanics. GPA 4.0/4.0.

### HAVERFORD COLLEGE

#### BS, Physics (*summa cum laude*, GPA: 3.96/4.0)

May 2001

*Minors:* Computer Science, Growth and Structure of Cities (Bryn Mawr College)

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## SUMMARY OF QUALIFICATIONS & HIGH-END PROFICIENCIES

- *Programming Languages:* Matlab, Ruby (and Rails), C, C++
- *Operating Systems:* Mac OS X, various Linux distributions, Windows XP
- *Databases:* Design, querying, and administration of PostgreSQL and MySQL databases
- *Laboratory skills:* Analog electronic circuit design, construction, and evaluation; Simple RF circuit design; Ultra-high vacuum system design and construction; Photolithography; Computer control of experimental apparatus and data acquisition

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## PROFESSIONAL EXPERIENCE

### LAWRENCE BERKELEY NATIONAL LABORATORY, *Energy Analysis Department*

#### Environmental Energy Policy Postdoctoral Fellow

1/2009-present

*Project:* Economic and technical analysis to support U.S. Department of Energy rulemaking process for appliance energy conservation standards. Development of techniques to measure appliance lifetime based on national survey data. Research and modeling of the potential impacts of energy efficiency programs and standards on national electricity consumption.

- Currently focused on refrigerator and small electric motor rulemaking analyses.

### CALIFORNIA INSTITUTE OF TECHNOLOGY, *Dept. of Physics*

#### Graduate Research Assistant, Theoretical and Experimental Quantum Optics

9/2002-12/2008

*Advisor:* Prof. Hideo Mabuchi

*Project:* Design of reduced-order approximate models to enable real-time feedback control of useful quantum-optical systems.

Systems whose dynamics are governed by quantum mechanics, such as single atoms and photons, have the potential to be faster and more sensitive than classical systems, but are exponentially more complex to simulate and control exactly. As optical switches and computers become faster and smaller, they will enter regimes where quantum mechanics matters to their operation. Simple models which accurately duplicate relevant system dynamics, while being easy to calculate, will be required for practical applications of quantum mechanics.

*Achievement:* Extended model-reduction techniques developed in other fields for use in quantum systems and designed controllers which enable real-time feedback and control of switching behavior in simulated systems.

#### *Other projects:*

- Designed novel "magneto-electrostatic" atom chips which have the potential to create interesting states of matter (one-dimensional rings), investigate atom-surface dynamics, and enable atomic-state-dependent trapping for quantum computing.

- Built complete magneto-optical trapping apparatus for use with chip-based atom traps ("home-made" diode laser control electronics, ultra-high vacuum and optical systems, simple RF circuitry, computer control and data acquisition through Matlab).
- Utilized photolithography and clean room skills for atom chip fabrication.

#### **CALIFORNIA INSTITUTE OF TECHNOLOGY**

##### **Sustainability Council Member**

5/2007-6/2008

*Project:* An administration committee dedicated to measuring and increasing Caltech's environmental sustainability.

- Represented graduate student views in institute policy-making discussions, such as choice of sustainability metrics, hiring of institute "sustainability program manager", choice of appropriate content and organization for sustainability website (<http://sustainability.caltech.edu>), and outreach efforts to the campus community.
- Actively contributed to the selection and design of sustainability metrics for internal and external use, with particular emphasis on accurately measuring Caltech's greenhouse gas emissions (with an inclusive definition of our impact).
- Co-coordinated 2008 Caltech Earth Day Fair which featured local food at reduced cost if community members brought their own plate, and featured student research posters and tables from campus and off-campus organizations urging energy efficiency, alternative transportation options, and solar power.
- Co-coordinated Caltech participation in Focus the Nation; Developed graphics for the dining hall showing where that day's food came from, and the energy cost of transportation.

#### **CALIFORNIA INSTITUTE OF TECHNOLOGY, Prof. Richard Murray**

##### **Teaching Assistant**

9/2004-12/2004

*Course:* Introduction to Control Theory

- Led weekly recitation sections, including developing examples from the physical sciences and electronics.

#### **LOS ALAMOS NATIONAL LABORATORY**

##### **Post-Baccalaureate Student**

6/2001-6/2002

*Project:* Research on quantum mechanics and feedback cooling of nano-mechanical devices, with potential applications in coupling of nano-mechanical to electronic and optical systems for communications, sensitive measurement, and computation, as well as the fundamental question of applicability of quantum mechanics to "large" objects such as nano-resonators with of millions to billions of atoms.

*Other projects:*

- Computer support for group Linux network (~20 computers) and Beowulf cluster.

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#### **BUSINESS, LEADERSHIP & POLITICAL EXPERIENCE**

#### **CALIFORNIA INSTITUTE OF TECHNOLOGY, Caltech Y**

##### **Social Activism Speaker Series Committee Chair Member**

12/2003-6/2006

2/2003-present

*Project:* SASS brings 4-6 visiting speakers to Caltech each school year in order to expose students to important topics otherwise absent from our science- and engineering- focused curriculum.

- Facilitated meetings, coordinated the efforts of our committee to invite and schedule speakers, applied for funding from on-campus sources, and managed our budget of roughly \$15,000 per year.
- Invited speakers and coordinated events including U.S. Sen. (then Rep.) Bernie Sanders (I-VT), science journalist Chris Mooney, charter school founder Steve Barr, and Union of Concerned Scientists co-founder Kurt Gottfried.

#### **PASADENA AREA UNITED DEMOCRATIC HEADQUARTERS**

##### **Technology Chair and Member of the Steering Committee**

5/2004-1/2008

*Organization:* Local independent Democratic campaign headquarters, which opens an office every 2 years to increase turnout among local Democratic voters.

- Coordinated technology needs, including web site design and maintenance and database management, (extended into Open Campaigns).

- Assisted in the design of a successful voter targeting strategy, maximizing the impact of the campaign's limited resources by targeting increased turnout among registered Democrats who vote occasionally.
- Designed and implemented a controlled experiment to evaluate effectiveness of the 2006 get-out-the-vote campaign, showing contact with our campaign increases turnout by 5.6%.
- Research to be presented at the 2008 American Political Science Association Conference, and submitted for journal publication.

#### OPEN CAMPAIGNS

##### **Founder and Sole Proprietor**

1/2007-Present

*Organization:* Independent web application development for progressive political campaigns.

<http://www.opencampaigns.net>

- Developed web applications in Ruby on Rails which allow political organizations to track and communicate with their volunteers and donors, as well as keep financial records. "Manager" application released under the Affero GPL v3. Manager has over 8000 lines of code, uptime well over 99%, and over 20 current users, who store data on almost 7000 volunteers and donors.

Created simple "caucus math" website (using Merb) for the 2008 Iowa and Nevada Democratic Caucuses.

#### COALITION FOR CIVIL LIBERTIES

##### **Founding Steering Committee Member**

3/2003-11/2007

*Organization:* Coalition of grassroots groups and individuals committed to protecting civil liberties in the post 9/11 era, particularly regarding the USA PATRIOT Act

- Successes include the passage of an anti-Patriot Act resolution by the Pasadena City Council
- Recruited groups and endorsements, made public presentations, spoke before Pasadena city commissions and the Pasadena City Council

#### CALIFORNIA INSTITUTE OF TECHNOLOGY, *Graduate Review Board*

##### **Board Member**

5/2003-Present

- Member of board which hears cases regarding suspected violations of the Caltech Honor Code by graduate students.

#### JOHN EDWARDS FOR PRESIDENT, *CA Congressional Districts 26 and 29*

##### **2008 Volunteer Campaign Coordinator**

3/2007-1/2008

- Organized and coordinated grassroots campaign organization for John Edwards One Corps until the suspension of the Edwards campaign.
- Built a volunteer-driven campaign and service organization from inception to over 30 volunteers.

#### DRINKING LIBERALLY, *Pasadena chapter*

##### **Founder and Host**

8/2005-Present

*Organization:* National network, dedicated to "promoting democracy, one pint at a time"

- Built local chapter from start to regular weekly attendance of about 15.

#### PASADENA YOUNG DEMOCRATS (PYD)

##### **Member, Treasurer, Vice President**

1/2003-Present

- Active leader in local Young Democrats club, working on fundraising, membership growth, relations with other local Democratic organizations.
- PYD delegate to the Pasadena Area United Democratic Headquarters Steering Committee.
- As Treasurer, helped regional Young Democrats club raise over \$1000 in 2004, and have completed all filings with the Federal Elections Commission from 2004-present.

#### PUBLICATIONS

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*Physics:*

A. HOPKINS, B. Lev and H. Mabuchi. "Proposed magneto-electrostatic ring trap for neutral atoms", *Physical Review A*, **70**, 053616, (2004).

A. HOPKINS, K. Jacobs, S. Habib and K. Schwab. "Feedback cooling of a nanomechanical resonator", *Physical Review B*, **68**, 235328 (2003).

*Posters:*

A. HOPKINS, B. Lev and H. Mabuchi. "Magneto-electrostatic ring traps for neutral atoms", *Kochi Summer School on Quantum Information Science*, Kochi, Japan. 2005.

A. HOPKINS, B. Lev and H. Mabuchi. "Magneto-electrostatic ring traps for neutral atoms", *Southwest Quantum Information Technology (SQInT) Conference*, Albuquerque, NM. 2006.

*Political Science:*

R. M. Alvarez, A. HOPKINS, and B. Sinclair. "Mobilizing the Base: Measuring the Effects of Partisan Campaign Contacts", To be presented at Am. Poli. Sci. Assoc. Conference, August 28-31, 2008. Also submitted to *Journal of Politics*.

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## HONORS AND AWARDS

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**REGION 12 VOLUNTEER OF THE YEAR 2008**, California Democratic Party

Honored at the 2008 California Democratic Party Convention for my volunteer efforts on behalf of Democrats in the 4-Assembly-District region containing Pasadena, in particular the design and execution of the Pasadena Area United Democratic Headquarters get-out-the-vote experiment, the development of software for the UDH and others through Open Campaigns, and for my leadership of the John Edwards campaign in our area.

**FRANKLIN AND ELEANOR ROOSEVELT DEMOCRAT OF THE YEAR 2005**, 44th Assembly District

Honored by the Los Angeles County Democratic Party for my service to the Democratic Party in 2004, largely through my efforts as the Technology Chair and member of the Steering Committee for the Pasadena Area United Democratic Headquarters.

**DISTRICT-LEVEL DELEGATE**, 2004 Democratic National Convention

Elected by fellow grassroots Edwards supporters from the 29<sup>th</sup> Congressional District to represent them and John Edwards at the Democratic National Convention in Boston, MA.

**LOS ALAMOS NATIONAL LABORATORY STUDENT DISTINGUISHED PERFORMANCE AWARD**, 2002

Recognition of outstanding performance as a student employee, including completion of publishable research.

**NATIONAL SCIENCE FOUNDATION GRADUATE FELLOWSHIP**, 2002-2005 (awarded 2001)

Highly competitive national graduate fellowship program supporting approximately 1000 graduate students in math, science and engineering for three years each.

**PHI BETA KAPPA**, 2000

Oldest undergraduate honors organization in the United States. One of two students elected early, in our junior year.

**BARRY M. GOLDWATER SCHOLAR**, 1999-2001

Highly competitive national undergraduate scholarship program supporting approximately 300 upper-class undergraduates in math, science and engineering.

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## SPECIAL INTERESTS & EXTRACURRICULARS

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Two-time First Team Academic All American (fencing) (2000, 2001)

William Ambler Award, 2001 (top scholar-athlete in the senior class)

Avid cyclist (including commuting), hiker, and gardener

Regular attendee of weekly "Environmental Science and Society" lectures/discussions at Caltech

Member of Caltech Engineers for a Sustainable World

*References available upon request.*