# Andrew Y. Wang

University of California, Los Angeles Department of Physics & Astronomy Box 951547 Los Angeles, CA 90095-1547 Date of Birth: September 6, 1982 Citizenship: United States Address: 11130 Rose Ave #203, Los Angeles, California 90034 Office: (310)206-0715 Mobile: (310)998-7501 Email: ayjwang@physics.ucla.edu

# Education

University of California, Los Angeles, California.

• Ph.D. in physics, 2005–2010 (expected).

Thesis titled *Manipulation of Molecular Processes with Molecular Springs: Elastic Energy Induced Polymerization and Spring Controlled Ion Channels.* Advisor: Prof. Giovanni Zocchi.

National Taiwan University, Taipei, Taiwan.

**B.S. in Physics** (the first major), 2000–2004. **B.S. in Life Science** (the second major), 2000–2004.

## Honors

Dissertation Year Fellowship, University of California, Los Angeles, 2009–2010.

GAANN Fellowship, University of California, Los Angeles, 2005–2007.

Summer Research Fellowship, University of California, Los Angeles, Summer 2007.

Taiwan Merit Scholarship, National Science Council, Taiwan, 2005–2006.

Dean's List, National Taiwan University, Taiwan, 2004.

### **Publications**

Chiao-Yu Tseng, **Andrew Wang**, Giovanni Zocchi, Biljana Rolih and Alex J. Levine. (2010) The Elastic Energy of Protein-DNA Chimeras. *Physical Review E*. In press.

Andrew Wang and Giovanni Zocchi. (2009). Elastic Energy Driven Polymerization. *Biophysical Journal*, **96**, 2344.

Yong Wang, Andrew Wang, Hao Qu and Giovanni Zocchi. (2009). Protein-DNA Chimeras: Synthesis of Two-Arm Chimeras and Non-Mechanical Effects of the DNA Spring. *Journal of Physics: Condensed Matter*, **21**, 335103.

Chiao-Yu Tseng, **Andrew Wang**, Giovanni Zocchi. (2010). Anisotropic response of the enzyme Guanylate Kinase to mechanical stress. In preparation.

# **Research Experiences**

University of California, Los Angeles. Department of Physics.

Ph.D. in physics, 2005–Present. Advisor: Prof. Giovanni Zocchi.

• Controlling a Single Ion Channel by a Molecular Spring, Jul 2008–Present.

I am conducting single molecule experiments on a voltage-gated potassium channel, which is mechanically and externally controlled by a DNA molecular spring.

Designed and built from scratch an artificial membrane system and electronics with picoampere sensitivity for measuring currents from a single ion channel.

Performed mutagenesis, protein expression and purification of the ion channel, and bioconjugation of the ion channel with the molecular spring.

#### • Protein-DNA Chimeras Synthesis and Elastic Energy Measurements, Sep 2006–Jun 2008.

The first measurement of the equilibrium elastic energy of protein-DNA chimeras.

Demonstrated the phenomenon of elastic energy driven polymerization, which forms the theoretical basis of elastic energy measurements above.

Developed new synthesis scheme for biochemical conjugation between DNA molecular springs and protein molecules to improve synthesis yields.

Investigated the non-mechanical interactions between the enzyme guanylate kinase and the DNA attached to it.

#### • Probing Conformation-Function Relation by Molecular Springs, Sep 2005–Present.

Initiated and mentored the measurements of kinetic parameters (substrate affinities and catalytic rate) of guanylate kinase under different mechanical perturbations (interdomain or intradomain) by molecular springs.

Performed and mentored mutagenesis, expression and purification of guanylate kinase.

National Central University, Taoyuan, Taiwan. Department of Physics.

Research Assistant, 2004–2005. Advisor: Prof. Lin I.

#### • Synchronous Firing of Neural Networks, July 2004–August 2005.

Studied the influence of connectivity on synchronous firing by mechanically removing connections between neurons.

Participated in programming IDL-based graphic analysis tool for assessing firing synchronousness of large numbers of neural clusters in the network.

Participated in the preparation of primary cell cultures of embryonic rat cortex.

# Technical and Specialized Skills

#### Instrumentations

Amplifier electronics, general material machining, optical alignment.

Molecular biology and biochemistry experiments

Cell culture, protein purification, gel electrophoresis, site-directed mutagenesis, biochemical conjugation, absorbance/fluorescence/luminescence spectroscopy, light microscopy, high performance liquid chromatography (HPLC).

#### Software and programming

Microsoft Office Word/PowerPoint/Excel, Origin, RasTop, Mathematica, Maple, ImageJ, LaTEX, Labview and IDL.

#### Language

English (proficient) and Chinese (mother tongue).

### **Teaching Experience**

University of California, Los Angeles. Department of Physics.

Teaching Assistant, *Physics for Life Sciences Majors: Light, Fluids, Thermodynamics, Modern Physics*, seven quarters (three quarters of lead TA experience), Winter 2008–Summer 2009.

Teaching Assistant, *Physics Laboratory for Scientists and Engineers: Electricity and Magnetism*, two quarters, Fall 2006 and Fall 2007.

Teaching Assistant, Physics for Life Sciences Majors: Mechanics, one quarter, Summer 2006.

### **Oral Presentations**

**Andrew Wang**, Chiao-Yu Tseng, Biljana Rolih, Alex J. Levine, and Giovanni Zocchi. (2010). Partitioning of elastic energy in protein-DNA chimeras. Oral presentation at the 2010 APS March Meeting, Portland, OR.

**Andrew Wang**, Yong Wang and Giovanni Zocchi. (2008). Mapping the Mechanical Response of the Enzyme Guanylate Kinase with the Allosteric Spring Probe. *Biophysical Journal*, **94(2S)**, 612. Oral presentation at the 52th Biophysical Society Annual Meeting, Long Beach, CA.

**Andrew Wang** and Giovanni Zocchi. (2008). Measurement of the Elastic Energy with a Protein-DNA Chimera. Abstract presentation at the CNID/DMEA Semi-Annual Grant Review Meeting in UCSB, Santa Barbara, CA.

**Andrew Wang** and Giovanni Zocchi. (2007). Elastic-Energy-Induced Polymerization. Oral presentation at the CNID/DMEA Semi-Annual Grant Review Meeting in UCLA, Los Angeles, CA.

**Andrew Wang** and Giovanni Zocchi. (2006). Mechanical Response of the Enzyme Guanylate Kinase. Oral presentation at the CNID/DMEA Semi-Annual Grant Review Meeting in UCR, Riverside, CA.

### **Poster Presentations**

**Andrew Wang**, Chiao-Yu Tseng, Biljana Rolih, Alex J. Levine, and Giovanni Zocchi. (2010). Partitioning of elastic energy in protein-DNA chimeras. Poster presentation at the 54th Biophysical Society Annual Meeting, San Francisco, CA.

Chiao-Yu Tseng, **Andrew Wang**, and Giovanni Zocchi. (2010). Anisotropic mechanical response of the enzyme guanylate kinase perturbed by the DFNA molecular spring. Poster presentation at the 54th Biophysical Society Annual Meeting, San Francisco, CA.

Yong Wang, **Andrew Wang** and Giovanni Zocchi. (2008). Characterizing the Attachment of a DNA Molecular Spring to a Protein. *Biophysical Journal*, **94(2S)**, 672. Poster presentation at the 52th Biophysical Society Annual Meeting, Long Beach, CA.

### **Professional Activities**

Biophysical Society, Student Member, 2006-Present.

American Physical Society, Student Member, 2009-Present.

# References

Giovanni Zocchi Associate Professor of Physics University of California, Los Angeles (310) 206-0715 zocchi@physics.ucla.edu

Dolores Bozovic Assistant Professor of Physics University of California, Los Angeles (310) 825-6176 bozovic@physics.ucla.edu

Yaroslav Tserkovnyak Associate Professor of Physics University of California, Los Angeles (310) 794-9520 yaroslav@physics.ucla.edu

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