Christopher Maffeo

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Education

University of Illinois
Ph.D., Physics 8/2014
M.S., Physics 5/2009

University of California: Santa Barbara
B.S., Physics with highest academic honors 6/2006

Experience

Research Assistant 12/2006–8/2014
University of Illinois at Urbana–Champaign — Urbana, IL

Theoretical and computational modeling of biological systems

- Quantitatively studied DNA/protein interactions using all-atom and coarse-grain molecular dynamics simulations and analytical modeling
- Created my own adaptation of the umbrella sampling and weighted histogram analysis methods to obtain estimates of standard binding free energies
- Fitted custom chemical rate equations to simulation data to extract kinetic constants
- Led discussions of theoretical and computational challenges with fellow students and postdocs
- Supervised and supported the research activities of incoming students
- Contributed to research proposals that successfully secured an average of $\sim$10 M cpu hours (worth roughly 500,000 USD) annually 2007–2014

Workshop Instruction

- Designed and taught coursework for the Center for the Physics of Living Cells Summer School for biophysics graduate students and postdocs taking introductory and advanced courses (2010, 2011, 2013, 2014)

Teaching Assistant 8/2006–12/2007
University of Illinois at Urbana–Champaign — Urbana, IL

- Taught physics laboratory and discussion sections for both technical and non-technical students
- Received “Teaching Excellence” award

Grader 1/2005–5/2006
University of California: Santa Barbara — Goleta, CA

- Tutored small groups of students weekly

Summer researcher 6/2003–8/2003
University of California: Santa Barbara — Goleta, CA

- Assisted experimental group (repaired BNCs, prepared bone samples, produced AFM images)

Technical Skills

Common Software
Molecular Dynamics software (NAMD, VMD)
Adove CS Suite (Photoshop, Illustrator)
MS Office Suite (PowerPoint, Word, Excel)
Development tools (emacs, gdb, git, SVN)

Computer Languages
TCL, BASH, Matlab ..... *expert*
C/C++, Perl, GNU Make ..... *proficient*
Python, Mathematica ..... *proficient*

Computer Environments
Unix/Linux, Windows, Apple
High-Performance Computing Systems

Languages
English ..... *native*
German ..... *intermediate*

Analytics
Construct coarse-grained models
Solve ordinary and partial differential equations
Work with probability, Bayesian inference
Perform error analysis, parameter estimation
Select appropriate approximations

Publications & Presentations

Research articles

Maffeo C, Ngo T, Ha T, and Aksimentiev A. (2014) A Coarse-Grained Model of Unstructured Single-Stranded DNA Derived from Atomistic Simulation and Single-Molecule Experiment. *Journal of Chemical Theory and Computation*. doi:10.1021/ct500193u

Maffeo C, Luan B, and Aksimentiev A. (2012) End-to-end attraction of duplex DNA. *Nucleic Acids Research*, 40(9), 3812-21. doi:10.1093/nar/gkr1220

Maffeo C, Schöpflin R, Brutzer H, Stehr R, Aksimentiev A, Wedemann G, and Seidel R. (2010) DNA–DNA interactions in tight supercoils are described by a small effective charge density. *Physical Review Letters*, 105(15), 158101-5. doi:10.1103/PhysRevLett.105.158101

Maffeo C, and Aksimentiev A. (2009) Structure, dynamics, and ion conductance properties of the phospholamban pentamer. *Biophysical Journal*, 96, 4853-4865. doi:10.1016/j.bpj.2009.03.053

Review articles

Maffeo C, Jejoong Yoo and Jeffrey Comer and David Wells and Binquan Luan and Aleksei Aksimentiev. (2014) Close encounters with DNA. *Journal of Physics: Condensed Matter*

Maffeo C, Bhattacharya S, Yoo J, Wells D, and Aksimentiev A. (2012) Modeling and simulation of ion channels. *Chemical Reviews*, 112(12), 6250-84. doi:10.1021/cr3002609

Other publications

Maffeo C, Carr R, Aksimentiev A. (2010) Introduction to MD simulation of DNA–protein systems (tutorial). http://bionano.physics.illinois.edu/Tutorials

Maffeo C, and Aksimentiev A. (2010) Single molecule force measurements: Insights from molecular simulations. *Physics of Life Reviews*, 7(3), 353-354.

Presentations

“Coarse-grained modeling of single-stranded DNA and single-stranded DNA binding protein SSB,” (talk) *CPLC Post-doc and Graduate Student Symposium*, Urbana, Illinois, Feb. 2011.

“Bound to amaze: Molecular dynamics simulations of SSB,” (talk) *CPLC Post-doc and Graduate Student Symposium*, Urbana, Illinois, Feb. 2012.

“Molecular mechanics of DNA unwinding from single-stranded DNA binding protein” (poster) *CPLC Summer School*, Urbana, Illinois, Jun. 2011.

“Bound to amaze: Molecular dynamics simulations of SSB,” (talk) *CPLC Post-doc and Graduate Student Symposium*, Urbana, Illinois, Feb. 2011.

“Side-by-side and end-to-end attract ion of double-stranded DNA” (poster) *Biophysical Society Annual Meeting*, Boston, Massachusetts, Feb. 2009.

“Towards a model of the replisome: beta clamp and friends,” (talk) *CPLC Post-doc and Grad Student Symposium*, Urbana, Illinois, Feb. 2009.

“Wetting, ionic conductance and structural stability of the phospholamban pentamer” (poster) *Biophysical Society Annual Meeting*, Long Beach, California, Feb. 2008.

References

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