# Thomas Gregor 2014-01-31


**Contact Information**

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**Education**

**Princeton University**, Princeton, NJ USA

Ph.D. in Biophysics, January 2005
- Thesis Topic: "Biophysics Problems in Embryonic Development."
- Advisor: Professor William Bialek

M.S. in Chemistry, January 2001

**Université de Genève**, Geneva, Switzerland

M.S. in Physics, November 1998

**Research Interests**

Biophysics; pattern formation and gene regulation in multicellular organisms; collective behavior in eukaryotic cell populations; quantitative measurement of cellular communication and animal behavior; development of theoretical models

**Professional Experience**

**Princeton University**, Princeton, NJ USA **06/2009 to present**
*Assistant Professor*, Department of Physics
Lewis-Sigler Institute for Integrative Genomics

**University of Tokyo**, Tokyo, Japan **11/2006 to 05/2009**
*JSPS Fellow*, Department of Basic Sciences

**Princeton University**, Princeton, NJ USA **02/2005 to 10/2006**
HHMI Postdoctoral Fellow, Department of Molecular Biology

**Honors and Awards**

- NIH R01 General Medicine: Controlling collective behavior in eukaryotic cell populations, 2012-2016
- NIH R01 General Medicine: The Biophysical and Molecular Mechanisms of Reliability in Development, 2011-2016
- 2010 Searle Scholar, 2010-2013
- NSF MRSEC seed award "Quantum-dot based bio-probes", 2009-2011
- Japanese Society for the Progress in Science Postdoctoral Fellowship, 2006-2009

**Teaching**

**Princeton University**

ISC 231, Integrated Science Curriculum/Physics, 2012-pres.
PHY 104, Electrodynamics, 2012-pres
MOL 410/510, Biological Dynamics, 2011-13
PHY 103, Mechanics, 2009-11
CHM 205, Advanced General Chemistry – Honors Course, 1999-2001

**Université de Genève**

General physics for biologists, 1996-1998

**Selected Invited Talks and Lectures**

- Workshop "Mechanics and growth of tissues", Institut Curie, Paris, 1/2014
- Symposium "Physics of the Embryo", University of Göttingen, 10/2013
- Colloquium at the Max-Planck Institute for Developmental Biology, Tübingen, 9/2013
- Lecturer and instructor at KITP workshop and summer school "New Quantitative Approaches to Morphogenesis", Santa Barbara, 7/2013
- IOP conference "Physics of Emergent Behaviour", Brighton, UK, 6/2013

- ◇ Lecturer in CSHL course "Physical Biology of the Cell, CSHL, 3/2013
- ◇ "One2many", Student invited symposium, Weizmann Institute of Science, 3/2013
- ◇ American Society for Developmental Biology meeting, Montreal, 7/2012
- ◇ MBL Physiology course instructor and lecturer, Woods Hole, 7/2012
- ◇ Symposium on Spatiotemporal Modeling, Biozentrum Basel, 6/2012
- ◇ Systems Biology "Theory-Lunch", Harvard Medical School, 5/2012
- ◇ Lecturer at EMBO/FEBS Lecture Course, Cargese, Corsica, 4/2012
- ◇ HHMI conference "Single molecules meet systems biology", Janelia Farm, 10/2011
- ◇ Center for Studies in Physics and Biology at Rockefeller University, 10/2011
- ◇ KITP Conference "Dynamics in Morphogenesis", 8/2011
- ◇ MBL Physiology course instructor and lecturer, Woods Hole, 7/2011
- ◇ Gordon Conference on Developmental Biology, 6/2011
- ◇ Annual meeting of the British Society of Cell and Developmental Biology, 4/2011
- ◇ Harvard University, "Home & Away" Seminar, 3/2011
- ◇ NIH, Bethesda, TCNP Symposium speaker, 4/2011
- ◇ MBL Embryology course lecturer, Woods Hole, 7/2010
- ◇ Stanford University, Applied Physics Graduate Student Invited Seminar, 2/2010
- ◇ University of Cambridge, "4th Symposium on the Physics of Living matter", 9/2009
- ◇ Los Alamos/Santa Fe Institute, "Q-bio Conference on Cellular Information", 8/2009
- ◇ Harvard University, Spring EPB Symposium, 4/2009

## Peer-reviewed Publications *


[1] Dima Krotov, Julien Dubuis, **Thomas Gregor**, and William Bialek. Morphogenesis at criticality. *Proc Natl Acad Sci USA*, in press, 2014. arXiv.org:1309.2614 [q-bio.MN], Sep 2013.

[2] Hernan G. Garcia, Mikhail Tikhonov, Albert Lin and **Thomas Gregor**. Quantitative imaging of transcription in living Drosophila embryos links polymerase activity to patterning. *Current Biology*, 23(21):2140–5, Nov 2013.

[3] Julien O. Dubuis*, Gasper Tkacik*, Eric F. Wieschaus, **Thomas Gregor** and William Bialek. Positional information, in bits. *Proc Natl Acad Sci USA*, 110:16301–8, Oct 2013.

[4] Shawn C. Little*, Mikhail Tikhonov* and **Thomas Gregor**. Precise developmental gene expression arises from globally stochastic transcriptional activity. *Cell*, 154:789–800, Aug 2013.

[5] Shawn C. Little and **Thomas Gregor**. Sorting sloppy sonic. *Cell*, 153:509–10, Apr 2013.

[6] Feng Liu, Alexander H. Morrison and **Thomas Gregor**. Dynamic interpretation of maternal inputs by the Drosophila segmentation gene network. *Proc Natl Acad Sci USA*, 110:6724–9, Apr 2013.

[7] Julien O. Dubuis, Reba Samanta and **Thomas Gregor**. Accurate measurements of dynamics and reproducibility in small genetic networks. *Molecular Systems Biology* 9:639, Jan 2013.

[8] Alexander H Morrison, Martin Scheeler, Julien Dubuis, and **Thomas Gregor**. *Imaging in Developmental Biology: A Laboratory Manual.*, chapter Quantifying the Bicoid morphogen gradient in living fly embryos. CSHL Press, Apr 2012.

[9] Shawn C. Little, Gasper Tkacik, Thomas Kneeland, Eric Wieschaus, and **Thomas Gregor**. The formation of the Bicoid morphogen gradient requires protein movement from anteriorly localized mRNA. *PLoS Biol*, 9(2), Mar 2011.

[10] Pankaj Mehta and **Thomas Gregor**. Approaching the molecular origins of collective dynamics in oscillating cell populations. *Curr Opin Genet Dev*, 20(6):574–80, Dec 2010.

[11] **Thomas Gregor**, Koichi Fujimoto, Noritaka Masaki, and Satoshi Sawai. The onset of collective behavior in social amoebae. *Science*, 328(5981):1021–5, May 2010.

[12] **Thomas Gregor***, Alistair P. McGregor*, and Eric F. Wieschaus. Shape and function of the Bicoid morphogen gradient in dipteran species with different sized embryos. *Dev Biol*, 316(2):350–8, Apr 2008.

[13] William Bialek, **Thomas Gregor**, David W. Tank, and Eric Wieschaus. Can we fit all of the data? *Cell*, 132(1):17–8, Jan 2008.

[14] Gasper Tkacik, **Thomas Gregor**, and William Bialek. The role of input noise in transcriptional regulation. *PLoS One*, 3(7):e2774, Jul 2008.

[15] **Thomas Gregor**, David W Tank, Eric F Wieschaus, and William Bialek. Probing the limits to positional information. *Cell*, 130(1):153–64, Jul 2007.

[16] **Thomas Gregor**, Eric F. Wieschaus, Alistair P. McGregor, William Bialek, and David W Tank. Stability and nuclear dynamics of the Bicoid morphogen gradient. *Cell*, 130(1):141–52, Jul 2007.

[17] **Thomas Gregor**, William Bialek, Rob R. de Ruyter van Steveninck, David W. Tank, and Eric F. Wieschaus. Diffusion and scaling during early embryonic pattern formation. *Proc Natl Acad Sci USA*, 102(51):18403–7, Dec 2005.

[18] **Thomas Gregor** and Roberto Car. Minimization of the potential energy surface of Lennard-Jones clusters by quantum optimization. *Chemical Physics Letters*, 412(1-3):125–30, Jun 2005.

[19] **Thomas Gregor**, Francesco Mauri, and Roberto Car. A comparison of methods for the calculation of NMR chemical shifts. *J. Chem. Phys.*, 111(5):1815–22, Aug 1999.

Publications in preparation
*

[1] Mariela Petkova, Feng Liu, and **Thomas Gregor**. Maternal origins of developmental reproducibility. arXiv.org:1309.6271 [q-bio.MN], Sep 2013. *In review.*

[2] Laurent Abouchar*, Mariela Petkova*, Cynthia Steinhardt, and **Thomas Gregor**. Precision and reproducibility of macroscopic developmental patterns. arXiv.org:1309.6273 [q-bio.TO], Sep 2013. *In review.*

[3] Allyson E. Sgro, David J. Schwab, Javad Noorbakhsh, Pankaj Mehta, and **Thomas Gregor**. Low-dimensional models describe universal collective behaviors in oscillating cell populations. *In preparation; preprint available on demand.*

[4] Feng Liu*, Eric M. Smith*, Mariela Petkova, Martin Scheeler, and **Thomas Gregor**. Bicoid is neither sufficient nor necessary for the spatial scaling of gap gene expression patterns. *In preparation; preprint available on demand.*