

BIOGRAPHICAL SKETCH
Alexander van Oudenaarden

PROFESSIONAL PREPARATION

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|--|-----------------------------------|-------------|
| Delft University of Technology, The Netherlands | Materials Science and Engineering | M.S. 1993 |
| Delft University of Technology, The Netherlands | Physics | M.S. 1993 |
| Delft University of Technology, The Netherlands | Physics | Ph.D. 1998 |
| Stanford University, Stanford, CA | Biophysics | 1998 - 1999 |

APPOINTMENTS

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|-------------------|---|
| 05/2009 – present | Professor of Biology Department of Biology, Massachusetts Institute of Technology, Cambridge, MA. |
| 07/2008 – present | Professor of Physics Department of Physics, Massachusetts Institute of Technology, Cambridge, MA. |
| 06/2008 – 01/2009 | Visiting Professor Hubrecht Institute for Developmental Biology and Stem Cell Research, Utrecht, The Netherlands Collaborators: Hans Clevers and Hendrik Korswagen. |
| 07/2004 – 06/2008 | Associate Professor of Physics with tenure Department of Physics, Massachusetts Institute of Technology, Cambridge, MA. |
| 01/2000 – 06/2004 | Assistant Professor of Physics Department of Physics, Massachusetts Institute of Technology, Cambridge, MA. |
| 03/1998 – 12/1999 | Postdoctoral research Department of Chemistry, Stanford University, Stanford, CA. Laboratory of Prof. S.G. Boxer Micropatterning of supported phospholipid bilayers |
| 03/1998 – 12/1999 | Postdoctoral research Departments of Biochemistry and of Microbiology & Immunology, Stanford University School of Medicine, Stanford, CA. Laboratory of Prof. J.A. Theriot Force generation of polymerizing actin filaments |

HONORS AND AWARDS

- 2008 NIH Director's Pioneer Award
- 2008 Guggenheim Fellow
- 2007 School of Science Prize for Excellence in Graduate Teaching
- 2001 Keck Career Development Professor in Biomedical Engineering
- 2001 Alfred Sloan Research Fellow
- 2001 NSF CAREER award
- 2000 Edgerly Science Partnership Award
- 1998 Andries Miedema Award for best Ph.D.-research in the field of condensed matter physics in the Netherlands, awarded every other year by Fundamental Research on Matter (FOM).
- 1998 Dutch Organization for Scientific Research (NWO) NATO postdoctoral fellowship.
- 1998 Ph.D. Applied Physics, *cum laude*.
- 1994 Award for best undergraduate research in Materials Science, yearly award by Delft University of Technology.
- 1993 M.S. Materials Science and Engineering, *cum laude*.

OTHER EXPERIENCE

- 10/2009 – present Program Director of the MIT Center for Single-Cell Dynamics in Cancer (NIH/NCI funded U54 Physical Sciences-Oncology Center). The goal of this center is use both theoretical and experimental approaches inspired by Physics to attack important problems in cancer biology by developing novel technology and analytical/computational methods to track the dynamics of cancer at the single cell level.
- 06/2007 – present Organizer of CSB (Computational and Systems Biology) seminar series.
- 01/2005 – 12/2007 Associate Editor *Biophysical Journal*
- 06/2004 – 07/2006 Course Faculty at the Marine Biology Laboratory (Woods Hole) Summer Course '*Physiology: Modern Cell Biology Using Microscopic, Biochemical and Computational Approaches*'
- 09/2002 – present Lecturer and creator of MIT Graduate course 7.81/8.591/9.531 Systems Biology. This course is offered annually during the Fall semester. The course provides an introduction to the mathematical tools that are used to dynamically model gene and protein networks. The course is attended by about 60-70 Graduate students (about 50% having a background in biological sciences and 50% having a background in physical sciences).

PUBLICATION LIST

2009

S. Mukherji and A. van Oudenaarden,
Synthetic biology: Understanding biological design from synthetic circuits,
Nature Review Genetics, in press (2009).

D. Muzzey, C. Gomez-Uribe, J. T. Mettetal, and A. van Oudenaarden,
A systems-level analysis of perfect adaptation in yeast osmoregulation,
Cell **138**, 160 – 171 (2009).

D. Muzzey and A. van Oudenaarden,
Quantitative time-lapse fluorescence microscopy on single cells,
Annual Review of Cell and Developmental Biology **25**, 301 – 327 (2009).

A. M. Khalil, M. Guttman, M. Huarte, M. Garber, A. Raj, D. Rivea Morales, K. Thomas, A. Presser, B. E. Bernstein, A. van Oudenaarden, A. Regev, E. S. Lander, and J. L. Rinn,
Many human large intergenic noncoding RNAs associate with chromatin-modifying complexes and affect gene expression,
Proc. Natl. Acad. Sci. USA **106**, 11667 – 11672 (2009).

J. Gore, H. Youk, and A. van Oudenaarden,
Snowdrift game dynamics and facultative cheating in yeast,
Nature **459**, 253 – 256 (2009).

A. Raj and A. van Oudenaarden,
Single-molecule approaches to stochastic gene expression,
Annual Review of Biophysics **38**, 255 – 270 (2009).

G. Liti, D. M. Carter, A. M. Moses, J. Warringer, L. Parts, S. A. James, R. P. Davey, I. N. Roberts, A. Burt, V. Koufopanou, I. J. Tsai, C. M. Bergman, D. Bensasson, M. J. O'Kelly, A. van Oudenaarden, D. B. Barton, E. Bailes, A. N. Nguyen, M. Jones, M. A. Quail, I. Goodhead, S. Sims, F. Smith, A. Blomberg, R. Durbin, and E. J. Louis,
Population genomics of domestic and wild yeasts.
Nature **458**, 337 – 341 (2009).

S. A. James, M. J. O'Kelly, D. M. Carter, R. P. Davey, A. van Oudenaarden, and I. N. Roberts,
Repetitive sequence variation and dynamics in the ribosomal DNA array of *Saccharomyces cerevisiae* as revealed by whole genome resequencing,
Genome Research **19**, 626 – 635 (2009).

J. Gore and A. van Oudenaarden,
Synthetic biology: the yin and yang of nature,
Nature **457**, 271 – 273 (2009).

2008

A. Raj and A. van Oudenaarden,
Nature, nurture, or chance: Stochastic gene expression and its consequences,
Cell **135**, 216 – 226 (2008).

A. Raj, P. van den Bogaard, S. A. Rifkin, A. van Oudenaarden, and S. Tyagi,
Imaging individual mRNA molecules using multiple singly labeled probes,
Nature Methods **5**, 877 – 879 (2008).

M. Acar, J. T. Mettetal, and A. van Oudenaarden,
Stochastic switching as a survival strategy in fluctuating environments,
Nature Genetics **40**, 471 – 475 (2008).

J. T. Mettetal, D. Muzzey, C. Gomez-Urbe, and A. van Oudenaarden,
The frequency dependence of osmo-adaptation in *Saccharomyces cerevisiae*,
Science **319**, 482 – 484 (2008).

A. Upadhyaya, M. Baraban, J. Wong, A. van Oudenaarden, and L. Mahadevan,
Stochastic power-limited contraction dynamics of *Vorticella convallaria*: an ultrafast
biological spring,
Biophysical Journal **94**, 265 – 272 (2008).

2007

J. R. Chabot, J. M. Pedraza, P. Luitel, and A. van Oudenaarden,
Stochastic gene expression out-of-steady-state in the cyanobacterial circadian clock,
Nature **450**, 1249 – 1252 (2007).

J. T. Mettetal and A. van Oudenaarden,
Necessary noise,
Science **317**, 463 – 464 (2007).

B. B. Kaufmann, Q. Yang, J. T. Mettetal and A. van Oudenaarden,
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J. Tsang, J. Zhu, and A. van Oudenaarden,
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mammals,
Molecular Cell **26**, 753 – 767 (2007).

B. B. Kaufmann and A. van Oudenaarden,
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H. N. Lim and A. van Oudenaarden,
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Nature Genetics **39**, 269 (2007).

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D. Muzzey and A. van Oudenaarden,
When it comes to decisions, myeloid progenitors crave positive feedback,
Cell **126**, 650 (2006).

A. Samadani, J. T. Mettetal, and A. van Oudenaarden,
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Proceedings of the National Academy of Sciences USA **103**, 11549 (2006).

J. Tsang and A. van Oudenaarden,
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Molecular Systems Biology **2**, doi:10.1038/msb4100064 (2006).

J. T. Mettetal, D. Muzzey, J. M. Pedraza, E. M. Ozbudak, and A. van Oudenaarden,
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W. G. Tharp, R. Yadav, D. Irimia, A. Upadhyaya, A. Samadani, O. Hurtado, S. Y. Liu, S. Munisamy, D. M. Brainard, M. J. Mahon, S. Nourshargh, A. van Oudenaarden, M. G. Toner, M. C. Poznansky,
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Journal of Leukocyte Biology **79**, 539 (2006).

J. M. Pedraza and A. van Oudenaarden,
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in 'Complex Systems Science in BioMedicine' (Kluwer Academic, New York, 2006).

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E. M. Ozbudak, A. Becskei, and A. van Oudenaarden,
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Developmental Cell **9**, 565 (2005).

A. Becskei, B. B. Kaufmann, and A. van Oudenaarden,
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Nature Genetics **37**, 937 (2005).

M. Acar, A. Becskei, and A. van Oudenaarden,
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Nature **435**, 228 (2005).

J. M. Pedraza and A. van Oudenaarden,
Noise propagation in gene networks,
Science **307**, 1965 (2005).

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A. Upadhyaya and A. van Oudenaarden,
Actin polymerization: forcing flat faces forward,
Current Biology **14**, R467 (2004).

M. Thattai and A. van Oudenaarden,
Stochastic gene expression in fluctuating environments,
Genetics **167**, 523 (2004).

A. Becskei, M. G. Boselli, and A. van Oudenaarden,
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Nature Cell Biology **6**, 451 (2004).

B. Nguyen, A. Upadhyaya, A. van Oudenaarden, and M. P. Brenner,
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Biophysical Journal **86**, 2740 (2004).

E. M. Ozbudak, M. Thattai, H. N. Lim, B. I. Shraiman, and A. van Oudenaarden,
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Nature **427**, 737 (2004).

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N. Mittal, E. O. Budrene, M. P. Brenner and A. van Oudenaarden,
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A. Upadhyaya and A. van Oudenaarden,
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E. Ozbudak, M. Thattai, I. Kurtser, A. D. Grossman and A. van Oudenaarden,
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M. Thattai and A. van Oudenaarden,
Intrinsic noise in gene regulatory networks,
Proceedings of the National Academy of Sciences USA **98**, 8614 (2001).

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A. van Oudenaarden and J. A. Theriot,
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Nature Cell Biology **1**, 493 (1999).

A. van Oudenaarden and S. G. Boxer,
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L. A. Cameron, M. J. Footer, A. van Oudenaarden, and J. A. Theriot,
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C. Bruder, L. I. Glazman, A. I. Larkin, J. E. Mooij, and A. van Oudenaarden,
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S. G. Boxer, J. T. Groves, N. Ulman, A. van Oudenaarden, J. Johnson, L. Kung, P. Cremer,
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J. W. G. Wildoer, A. van Oudenaarden, C. J. P. M. Harmans, and H. van Kempen,
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A. van Oudenaarden, B. van Leeuwen, M. P. M. Robbens, and J. E. Mooij,
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Physical Review B **57**, 11684 (1998).

A. van Oudenaarden, Yu. V. Nazarov, and J. E. Mooij,
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Alexander van Oudenaarden, Michel H. Devoret, Yu.V. Nazarov & J.E. Mooij,
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Nature **391**, 768 (1998).

1997

A. van Oudenaarden, M. H. Devoret, E. H. Visscher, Yu. V. Nazarov, and J. E. Mooij,
Conductance fluctuations in a metallic wire interrupted by a tunnel junction,
Physical Review Letters **78**, 3539 (1997).

1996

A. van Oudenaarden, S.J.K. Vardy, and J.E. Mooij,
One-dimensional localization of quantum vortices in disordered Josephson junction arrays,
Physical Review Letters **77**, 4257 (1996).

A. van Oudenaarden and J.E. Mooij,
One-dimensional Mott insulator formed by quantum vortices in Josephson junction arrays,
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A. van Oudenaarden and J. E. Mooij,
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in 'Nanowires', NATO ASI Series,
edited by P. A. Serena and N. Garcia, 373 (1997).

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Bloch vortices in one-dimensional Josephson junction arrays,
in 'Proceedings of the 21st international conference on low temperature physics,
(Prague, 1996);
also published in *Czechoslovak Journal of Physics* **46** Suppl. S2, 707 (1996).

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One-dimensional Mott insulator formed by quantum vortices in Josephson junction arrays,
in 'Proceedings of 'Localization 96', edited by T. Dietl (Jaszowiec, Poland, 1996), p. 79.

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in 'Macroscopic quantum phenomena and coherence in superconducting networks',
edited by C. Giovannella and M. Tinkham (World Scientific, Singapore, 1995).

1994

M. de Jong, A. van Oudenaarden, J. Sietsma, M. Th. Rekveldt, and A. van den Beukel,
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Acta Physica Hungarica **75**, 91 (1994).

A. van Oudenaarden, M. de Jong, J. Sietsma, M. Th. Rekveldt, and A. van den Beukel,
Internal stress distribution in amorphous FeNiB studied by field dependent neutron depolarization,
Journal of Magnetism and Magnetic Materials **133**, 251 (1994).