

# Jayson Paulose

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- CONTACT INFORMATION      Instituut-Lorentz for Theoretical Physics      *E-mail:* paulose@ilorentz.org  
Leiden University      *Web:* <http://www.ilorentz.org/~paulose>  
Niels Bohrweg 2  
2311 TX Leiden, The Netherlands
- CURRENT POSITION      Postdoctoral research associate in the research group of Prof. Vincenzo Vitelli.
- RESEARCH INTERESTS      *Theoretical condensed matter physics*  
- Topological rigidity in mechanical metamaterials  
- Geometry, topology, and defects in soft matter  
- Mechanics and statistical mechanics of thin membranes and shells  
- Nonequilibrium statistical mechanics with applications in nanoscience
- EDUCATION      **Harvard School of Engineering and Applied Sciences**, Cambridge, MA, USA  
Ph.D. in Applied Physics      May 2013  
S.M. in Applied Physics      Nov 2009  
*Dissertation:* Cooperativity, fluctuations and inhomogeneities in soft matter  
*Advisor:* David R. Nelson  
*Collaborations:* Joanna Aizenberg, Vinodhan N. Manoharan, David A. Weitz
- Princeton University, Princeton, NJ, USA  
A.B. in Physics with high honors      May 2007  
Certificates in Engineering Physics and Applications of Computing  
*Undergraduate thesis:* Investigation of electronic eigenstates of positionally disordered systems in two dimensions  
*Advisor:* Ravindra N. Bhatt
- PUBLICATIONS AND PREPRINTS      Topological mechanics of origami and kirigami  
B. G. Chen, B. Liu, A. A. Evans, J. Paulose, I. Cohen, V. Vitelli, C. D. Santangelo, *arXiv:1508.00795* (2015)
- Selective buckling via states of self-stress in topological metamaterials  
J. Paulose, A. S. Meeussen, V. Vitelli, *Proc. Natl. Acad. Sci. USA* **112**, 7639 (2015)
- Topological modes bound to dislocations in mechanical metamaterials  
J. Paulose, B. G. Chen, V. Vitelli, *Nature Physics* **11**, 153 (2015)
- Elastic instability of a crystal growing on a curved surface  
G. Meng, J. Paulose, D. R. Nelson, V. N. Manoharan, *Science* **343**, 634 (2014)
- Buckling pathways in spherical shells with soft spots  
J. Paulose and D. R. Nelson, *Soft Matter* **9**, 8227 (2013)
- Theory of interacting dislocations on cylinders  
A. Amir, J. Paulose, D. R. Nelson, *Phys. Rev. E* **87**, 042314 (2013)
- Delayed buckling and guided folding of inhomogeneous capsules  
S. S. Datta, S.-H. Kim, J. Paulose, A. Abbaspourrad, D. R. Nelson, D. A. Weitz, *Phys. Rev. Lett.* **109**, 134302 (2012)
- Fluctuating shells under pressure  
J. Paulose, G. Vliegenthart, G. Gompper, D. R. Nelson, *Proc. Natl. Acad. Sci. USA* **109**, 19551 (2012)

Two-parameter sequential adsorption model applied to microfiber clustering  
J. Paulose, D. R. Nelson, J. Aizenberg, *Soft Matter* **6**, 2421 (2009)

RESEARCH  
EXPERIENCE

**Harvard University Physics Department**, Cambridge, MA, USA

*Postdoctoral Research Associate*

*Jun 2013 – Jul 2013*

Theoretically studied the deformations of cylindrical shells under the effects of pressure, defects and growth, as a model for the mechanics and growth of the bacterial cell wall.

**Harvard School of Engineering and Applied Sciences**, Cambridge, MA, USA

*Research Assistant in condensed matter theory*

*Feb 2009 – May 2013*

Performed theoretical and computational analysis of thin elastic shells, focusing on the effects of curvature, thermal fluctuations, inhomogeneities and defects.

*Research Assistant in the lab of Prof. Joanna Aizenberg*

*Summer 2008, Summer 2009*

Experimentally studied the actuation of uniform microarrays of flexible pillars under magnetic and surface tension forces. Skills acquired include optical and scanning electron microscopy, soft lithography, and metallic vapor deposition.

**Department of Electrical Engineering, Princeton University**, Princeton, NJ, USA

*Research Assistant to Prof. Ravindra Bhatt*

*Summer 2007*

Computed the electronic band structure of randomly distributed impurities in semiconductors using numerical methods and theoretical approximations.

*Engineering Physics Summer Fellow in the lab of Prof. Claire Gmachl*

*Summer 2006*

Modeled and measured losses in quantum cascade lasers.

**Technische Universität Ilmenau**, Ilmenau, Germany

*DAAD Research Internship in Science and Engineering*

*Summer 2005*

Fabricated and characterized diffractive optics elements using holography; performed a feasibility study of various spectral imaging systems.

**Department of Mechanical & Aerospace Engineering, Princeton University**

*Undergraduate Research Opportunities Program*

*Summer 2004*

Implemented a software algorithm to characterize optical wavefront quality for the Princeton/NASA Terrestrial Planet Finder project.

TEACHING  
EXPERIENCE

**Harvard University**, Cambridge, MA, USA

*Teaching Assistant*

*2008 – 2011*

- Statistical Thermodynamics [graduate] Fall 2011
- Statistical Thermodynamics and Quantitative Biology [advanced undergraduate] Spring 2011
- Advanced Classical Electromagnetism [graduate] Spring 2010
- Statistical Thermodynamics and Quantitative Biology [advanced undergraduate] Spring 2009
- Introduction to Solid-State Physics [advanced undergraduate] Fall 2008

Awarded *Harvard University Certificate of Distinction in Teaching* based on student evaluations, Spring 2009

HONORS & AWARDS

- Liviu Librescu Graduate Student Research Fellowship in Engineering, Harvard University 2009
- Jeffrey O. Kephart '80 Engineering Physics Award, Princeton University 2007
- Allen G. Shenstone Prize in Physics, Princeton University 2007
- PRISM Newport Award in Photonics, Princeton University 2007
- Kusaka Memorial Prize in Physics, Princeton University 2006
- Shapiro Prize for Academic Excellence, Princeton University 2005
- Shapiro Prize for Academic Excellence, Princeton University 2004
- Manfred Pyka Memorial Physics Prize, Princeton University Physics Department 2004

	Elected to Sigma Xi	2007
	Elected to Phi Beta Kappa	2007
CONFERENCE SUBMISSIONS	<u>Topological modes bound to lattice defects in mechanical metamaterials</u> J. Paulose, B. G. Chen, V. Vitelli, <i>Physics@FOM Veldhoven</i>	2015
	<u>Mechanics of thermally fluctuating pressurized shells</u> J. Paulose, G. Vliegthart, G. Gompper, D. R. Nelson, <i>Materials Research Society Fall Meeting</i>	2012
	<u>Folding and buckling pathways in spherical shells with soft spots</u> J. Paulose and D. R. Nelson, <i>American Physical Society March Meeting</i>	2012
	<u>Statistical Mechanics of Pressurized Shells</u> J. Paulose, G. Vliegthart, G. Gompper, D. R. Nelson, <i>American Physical Society March Meeting</i>	2011
	<u>Thermodynamics of sphere packings under different geometries</u> G. Meng, N. Arkus, J. Paulose, M. P. Brenner, D. R. Nelson and V. N. Manoharan, <i>Optimal Configurations on the Sphere and Other Manifolds (Vanderbilt University)</i>	2010
	<u>Two-parameter sequential adsorption model of microfiber clustering</u> J. Paulose, D. R. Nelson and J. Aizenberg, <i>American Physical Society March Meeting</i>	2010
	<u>Crystallography and Nucleation on Spherical Surfaces</u> G. Meng, J. Paulose, D. R. Nelson and V. N. Manoharan, <i>American Physical Society March Meeting (poster)</i>	2010
	<u>Computational studies of a 2D tight-binding model of randomly dispersed hydrogenic centers</u> J. Paulose and R. N. Bhatt, <i>American Physical Society March Meeting</i>	2008
	<u>Quenched singularity in the density of states of 2D random hydrogenic systems</u> R. N. Bhatt, E. Nielsen and J. Paulose, <i>American Physical Society March Meeting</i>	2008
	<u>Temperature-dependent Gain and Loss in High Performance Quantum Cascade Lasers</u> Z. Liu, G. Silva, J. Paulose, C. Gmachl, L. Cheng, F. Chua, R. Leavitt, F. Towner, X. Wang, J. Fan, <i>CLEO/QELS</i>	2007
SEMINARS & INVITED TALKS	<i>James Franck Institute Seminar, The University of Chicago</i>	12 Jan 2015
	<i>Widely Applied Mathematics Seminar, Harvard SEAS</i>	25 Nov 2014
	<i>MRSEC Seminar, Brandeis University</i>	24 Nov 2014
	<i>MRSEC Seminar, University of Pennsylvania</i>	21 Nov 2014
	<i>Theoretical Physics Seminar, Technische Universität Dortmund</i>	23 Apr 2014
	<i>IFB Seminar, Eidgenössische Technische Hochschule Zürich</i>	5 Feb 2013
	<i>Biophysics Seminar, École Normale Supérieure, Paris</i>	1 Feb 2013
	<i>Theory Group Seminar, Instituut-Lorentz, Leiden University</i>	29 Jan 2013
	<i>Soft Matter Seminar, Syracuse University</i>	3 Dec 2012
	<i>Junior Speaker, Outcomes in Graduate Education, The University of Chicago</i>	6 Oct 2012
	<i>Special Lecture, SCMS Institute of Bioscience and Biotechnology, Cochin, India</i>	6 Jan 2012
	<i>Widely Applied Mathematics Seminar, Harvard SEAS</i>	26 Apr 2011
	<i>Kavli Meeting, KIBST, Harvard University</i>	1 Apr 2010
	<i>Condensed Matter Theory Kids' Seminar, Harvard University</i>	2 Feb 2010
	<i>Group Seminar, Theoretical Soft Matter &amp; Biophysics, Forschungszentrum Jülich</i>	3 Dec 2009
	<i>Biocomplexity Meeting, CMOL, Niels Bohr Institute, Copenhagen</i>	18 Nov 2009

PROFESSIONAL  
ACTIVITIES

Participant, <i>Topological Mechanics: from metamaterials to robots</i> , Lorentz Center, Leiden University	Fall 2014
Participant, <i>Workshop on Sphere Packing and Amorphous Materials</i> , Abdus Salam International Centre for Theoretical Physics, Trieste	Summer 2011
Participant, <i>DynaSoft2010: Dynamics in soft condensed matter</i> , Institut d' Études Scientifiques de Cargèse , Corsica	Summer 2010
Visiting scholar, Neils Bohr Institute, Copenhagen	Fall 2009
Participant, <i>Boulder School for Condensed Matter and Materials Physics: Nonequilibrium Statistical Mechanics</i> , University of Colorado, Boulder	Summer 2009
Manuscript reviewer, <i>Proc. Natl. Acad. Sci. USA</i>	2014, 2012
Manuscript reviewer, <i>Nanoscale</i>	2013
Manuscript reviewer, <i>The European Physical Journal E: Soft Matter</i>	2011
Manuscript reviewer, <i>Soft Matter</i>	2010