CURRICULUM VITAE

Greg Huber

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Education

1993 Ph.D. (Physics), Boston University
Thesis topic: "The onset of vortex turbulence"
Advisor: Professor H. Eugene Stanley

1983 B.S. (Physics), Massachusetts Institute of Technology
Sr-thesis topic: "Bubble nucleation in the inflationary universe model"
Advisor: Professor Alan H. Guth

Present Position

2000 - now Assistant Professor of Physics, University of Massachusetts - Boston
2003 - now Adjunct Professor of Physics, University of Massachusetts - Amherst

Research Interests

Biological physics and mechanics:	Cellular structure, organelles, and propulsion lipid membranes, membrane structures, biopolymers, elastohydrodynamics and biofluiddynamics.
Biocomplexity:	Theoretical bases of bioinformatics, informatic chaos neutral theories, genomic ecology, network dynamics.
Soft condensed matter:	Interplay of statistical mechanics, elasticity, and flow.
Nonequilibrium and nonlinear physics:	Pattern formation, chaos, turbulence.

Research Experience

1997-2000	Postdoc/Lecturer, University of Arizona (Physics)
1995-1997	Postdoc, University of Chicago (James Franck Institute & Comput and Appl Math Prog)
1993-1995	Lewy fellow, University of California, Berkeley (Dept of Mathematics & LBNL)
1992	Visiting faculty, Pittsburgh Supercomputing Center & University of Pittsburgh
1991	Summer research assistant, Los Alamos National Lab (CNLS)
1988-1993	Research assistant, Boston University (Center for Polymer Studies)
1985-1987	Programmer and researcher with Prof. Hofstadter, University of Michigan

Teaching Experience

UMass Boston	College Physics II	fall 2003
	Fundamental Physics I	spring 2004
	Fundamental Physics II	spring 2001, fall 2001-2
	Intro to Computational Sci	spring 2004
	Intro to Astronomy	fall 2001-2
	Planetary Astronomy	spring 2001-2
	Advanced Electromagnetism	fall 2003
	Graduate Math Methods	spring 2002
	Graduate Electrodynamics	fall 2000
Univ of Arizona	Theoretical Mechanics	fall 1999
	Thermodynamics and Stat Mechanics	fall 1998
	Theoretical Condensed Matter Physics	fall 1997
Summer schools/courses	Soft-Condensed Matter	June 2003 (SMC Ctr, U. Roma)
	Soft geometry	Feb 2003 (IMPA Biomath School)
	Statistical Physics	July 2001 (SFI Summer Sch.)
	Geometry and Physics	July 1997 (Univ of Chicago - YSP)
	Computers and Chaos	July 1996 (Univ of Chicago - YSP)

Grants*, Honors and Awards

National Merit Scholar, and Presidential Scholar finalist (high school)
*DARPA-NASA grant in parallel processing, $40K (1991-93)
Visiting Professor, Physics Dept, University of Pittsburgh (1992)
Lewy Fellow, University of California, Berkeley (1993-95)
SNF Fellow, Niels Bohr Institute, Univ of Copenhagen (1994)
MIT Educational Council (1994-97)
Co-organizer, Physics Urbanafest, Univ of Chicago/Univ of Illinois (1997)
Organizer, Spiral-wave minisymposium, SIAM Dynamical Systems, Snowbird Meeting (1997)
*Univ of Chicago-ANL collaborative grant, $75K (1997)
Chair, Molecular Motors minisymposium, APS March Meeting (2001)
Faculty, Complex Systems Summer School, Santa Fe Institute (2001)
*DARPA-DSO Biomolecular Motors grant (with Berg, Breuer & Powers) $1.7M (2002)
Faculty, Biomathematics Summer School, IMPA, Rio de Janeiro, Brazil (2003)
Organizer and chair, Bacterial Chemotaxis special focus session, APS March Meeting (2003)
Organizer and host, New England Complex Fluids Workshop, UMass Boston (2003)
National Institutes of Health (NIH/NIGMS) Centers of Complexity review panel (2003)
Visiting Professor, Stat Mech & Complexity Ctr, Universita di Roma (2003)
Patent application (with Berg, Breuer & Powers), Flagellar propulsion in microfluidics (2003)

Papers in preparation

(34) Complex feedback, functioning designs, and informatic turbulence from nested recursion. (2004) (With DR Hofstadter.)

(33) Numerical studies of bacterial-carpet dispersion and flow. (2004) (With TR Powers and DT Tillberg.)

(32) Micropropulsion in lattice-gas microflows. (2004) (With GJ Lapeyre.)

(31) Dispersion and diffusion in lattice-gas automata. (2004) (With GJ Lapeyre.)

(30) Geometrical measures for scalar fields in 2d stratified turbulence. (2004) (With J Kondev, DF Reeves and SE Wunsch.)

(29) Membrane tether junctions. (2004)

(28) From Euclid to $U^{+}U$: Elementary aspects of Harper's equation. (2004) (With F Claro.)

(27) A progress report on the Rupert problems. (2003) (With TJ Ligocki.)

(26) Statistical topography of noisy affine surfaces. (2003) (With E Klein and J Kondev.)

Publications

(25) Periodic chirality transformations propagating on bacterial flagella. *Phys. Rev. Lett.* **89** 118102 (2002). (With D Coombs, JO Kessler and RE Goldstein.)

(24) Fluid-membrane tethers: Minimal surfaces and elastic boundary layers. *Phys. Rev. E* **65** 041901 (2002). (With TR Powers and RE Goldstein.)

(23) Postage stamp poses a Fermi problem. *Science* **294** 53 (2001).

(22) Critical geometry of two-dimensional passive scalar turbulence. *Phys. Rev. Lett.* **86** 5890 (2001). (With J Kondev.)

(21) Swimming in Flatsea. *Nature* **408** 777 (2000).

(20) Contact line deposits in an evaporating drop. *Phys. Rev. E* **62** 756 (2000). (With RD Deegan, O Bakajin, TF Dupont, SR Nagel and TA Witten.)

(19) Bistable helices. *Phys. Rev. Lett.* **84** 1631 (2000). (With RE Goldstein, A Goriely and CW Wolgemuth.)

(18) Capillary flow as the cause of ring stains from dried liquid drops. *Nature* **389** 827 (1997). (With RD Deegan, O Bakajin, TF Dupont, SR Nagel and TA Witten.)

(17) Spiral domains and shocks in the 2d complex Ginzburg-Landau equation. *Physica D* **106** 95 (1996). (With T Bohr and E Ott.)

(16) Self-diffusion and relative diffusion in defect turbulence. *Physica D* **96** 1 (1996). (With E Schröder and P Alstrøm.)

(15) The structure of spiral domain patterns. *Europhys. Lett.* **33** 589 (1996). (With T Bohr and E Ott.)

(14) A dimension formula for self-affine and self-similar distributions. Reprinted in *Fractal Geometry and Analysis: The Mandelbrot Festschrift*, edited by CJG Evertsz *et al.* (World Scientific, Singapore: 1996) 121. (With MH Jensen and K Sneppen.)

(14) A dimension formula for self-affine and self-similar distributions. *Fractals* **3** 525 (1995). (With MH Jensen and K Sneppen.)

(13) Distributions of self-intersections and voids in (1+1)-d directed percolation. *Phys. Rev. E* **52** R2133 (1995). (With MH Jensen and K Sneppen.)

(12) Mass distribution on clusters at the percolation threshold. *Phys. Rev. E* **51** 2632 (1995). (With M Gyure, MV Ferer and BF Edwards.)

(11) Vortex solids and vortex liquids in a complex Ginzburg-Landau system. In *Spatio-temporal Patterns in Nonequilibrium Complex Systems*, edited by PE Cladis and P Palffy-Muhoray. SFI Studies, Proceedings vol. **21** (Addison-Wesley, Menlo Park, 1994) 51.

(10) Rough surfaces and directed percolation. LBL Report 33518 (1993). (With SV Buldyrev, S Havlin and HE Stanley.)

(9) Universal decay of vortex density in two dimensions. *Physica A* **195** 448 (1993). (With P Alstrøm.)

(8) Nucleation and transients at the onset of vortex turbulence. *Phys. Rev. Lett.* **69** 2380 (1992). (With P Alstrøm and T Bohr.)

(7) Imbibition in porous media: Experiment and theory. In *Surface Disordering: Growth, Roughening & Phase Transitions*, edited by R Jullien *et al.* (Nova Science, New York: 1992) 193. (With AL Barabási, SV Buldyrev, S Havlin, HE Stanley and T Vicsek.)

(6) Statistical properties of aggregation with injection. *J. Stat. Phys.* **65** 725 (1991). (With H Takayasu, M Takayasu and A Provata.)

(5) The dimension of turbulence. *J. Phys. A: Math. Gen.* **24** L1105 (1991); **25** 1019 (1992). (With P Alstrøm.)

(4) Scheidegger's rivers, Takayasu's aggregates and continued fractions. *Physica A* **170** 463 (1991).

(3) Scaling in Apollonian gaskets. In *Correlations and Connectivity: Geometric Aspects of Physics, Chemistry and Biology*, edited by HE Stanley and N Ostrowsky (Kluwer, Dordrecht: 1990) 322.

(2) Measuring the onset of spatio-temporal intermittency. *Phys. Rev. Lett.* **64** 3007 (1990). (With D Stassinopoulos and P Alstrøm.)

(1) Number of scaling factors in incommensurate systems. *J. Phys. A: Math. Gen.* **22** L279 (1989). (With P Alstrøm and HE Stanley.)

Invited talks (except where noted) listed by topic

Anomalous diffusion in bacterial carpets
- 10th Int Wkshp on Instab & Noneq Struct (Viña del Mar, Chile), Dec 2003
- MIT (Mech E, Hatsopoulos seminar), Nov 2003
- Boston Area Stat Mech Mtg (Brandeis Univ), Oct 2003 (contrib)

Lectures on Soft-condensed matter
- Stat Mech & Complexity Ctr (Univ di Roma, Italy), Jun 2003

Lectures on Soft geometry: mathematical bases of cellular structures
- IMPA Biomath Summer School (Rio de Janeiro, Brazil), Feb 2003

Poking membrane, necking tether
- Brandeis Univ (Condensed Matter Physics), Sep 2003
- Dynamics & Singularities Wkshp (Inst Henri Poincaré, Paris), Jul 2003
- Clark Univ (Biophysics), May 2002
- APS March Mtg, Lipid membranes (Indianapolis IN) Mar 2002 (contrib)

Physics of flagella
- Univ di Roma – La Sapienza (Physics), Jun 2003
- Univ of Michigan (Biophysics), Nov 2002
- Boston Area Stat Mech Mtg (Brandeis Univ), Oct 2002

Q theory: From the integers to informatic turbulence
- Univ di Roma – La Sapienza (Physics), Jun 2003
- Eőtvős Institute (Budapest, Hungary), Jun 2003
- Clark Univ (Physics), April 2001
- Boston Area Stat Mech Mtg (Brandeis Univ), Oct 2000 (contrib)

Fluid membrane tethers: minimal surfaces & elastic boundary layers
- Caltech (Mech E), Dec 2002
- Univ of Michigan (Complex Fluids, Chem E), Nov 2002
- 50th Annual SIAM Mtg, Geom in Biophysics (Philadelphia PA), Jul 2002

Tutorial: Bacterial flagellar physics
- APS March Mtg, Nonlin Meth in Cell Biophys (Indianapolis IN) Mar 2002

Chirality transformations propagating on bacterial flagella
- IMPA (Rio de Janeiro, Brazil), Nov 2002
- Indiana Univ (Physics), April 2002
- ITP program on Complex Fluids, UCSB (ITP), Feb 2002
- Horizons in Complex Systems (Messina, Italy), Dec 2001
- MIT (Applied Math), Nov 2001

Caltech (CDS), Nov 2001

Lectures on Statistical Physics
Complex Systems Summer School (Santa Fe Institute), Jun 2001

Passive-scalar turbulence and the geometry of loops
APS Fluids Mtg (San Diego CA) Nov 2001 (contrib)
StatPhys 21 (Cancun, Mexico), Jul 2001 (contrib)
APS Computational Physics mtg (MIT), Jun 2001 (contrib)
85th Stat Mech Conference (Rutgers Univ), May 2001
Brown Univ (Physics), Mar 2001

Dynamics of flow-induced flips in bacterial flagella
Univ of Chicago (Physics), Oct 2001
Northeastern Univ (Physics), Oct 2001
Latin American Wkshp in Nonlin Phenom (Cocoyoc, Mexico), Jul 2001
6th SIAM Dyn Systems Mtg (Snowbird UT), May 2001
APS March Mtg, Front Dyn/Patt Form Symp (Minneapolis MN), Mar 2000

Alien Technology 101: Flip-flopping bacterial flagella
UMass Amherst (Physics), Nov 2000
Boston Univ (Physics), Nov 2000
Univ of Pittsburgh (Physics), Sep 2000
Martin Weiner Lecture, Brandeis Univ (Physics), Sep 2000
Univ of New Mexico (Math), May 2000

Flips in bacterial flagella, and other problems in alien technology
Georgetown Univ (Physics), Apr 2000
UMass Boston (Physics), Apr 2000
George Washington Univ (Physics), Mar 2000
Harvey Mudd College (Math), Feb 2000
P. Universidad Católica de Chile (Physics), Dec 1999
8th Int Wkshp on Instab & Noneq Struct (Viña del Mar, Chile), Dec 1999
Nonlinear Science Festival (Niels Bohr Inst, Copenhagen), Dec 1998

Degrees of order and chaos emerging from nested recursion
Univ of Maryland (Math/IPST), Apr 2000
Univ of Toronto (Math), Mar 2000
PDEs & Applications (Cargese, Corsica), Jun 1999 (contrib)
Univ of Houston (Math), Apr 1999

Cubing the square: A progress report on the Rupert problems
Glasses Wkshp (Brandeis Univ), Jun 2001 (contrib)
Geometry seminar, Univ of Arizona (Math), Apr 1999

AMS Mtg, Recent Prog in Elem Geometry (UIUC, Urbana IL), Mar 1999

When whorls collide
4th SIAM Dyn Systems Mtg (Snowbird UT), May 1997 (contrib)
Univ of Pittsburgh (Math), Mar 1997
Temple Univ (Math), Feb 1997
San Diego State Univ (Physics), Feb 1997

A theory of coffee rings
Colorado State Univ (Physics), Jun 1998
NIST (CTCMS, Gaithersburg), Apr 1997
APS March Mtg, Nonlin Dyn Symp (Kansas City MO), Mar 1997
Univ of Arizona (Math), Feb 1997
Univ of Pittsburgh (Physics), Feb 1997
Brown Univ (Physics), Nov 1996
Duke Univ (Math), Nov 1996

Ring-like deposits in drying drops
Notre Dame Univ (Physics), May 1996
Northwestern Univ (Appl Math), Mar 1996

Spiral domains and domain walls
Univ of Chicago (Applied Math), Dec 1995

Defects and turbulence in the complex Ginzburg-Landau equation
NIST (CTCMS, Gaithersburg), Apr 1995
Colorado State Univ (Math), Mar 1995
Univ of Chicago (JFI), Feb 1995

Punctuated dynamics, jumping interfaces and percolation
UC Berkeley (Physics), Oct 1994

Passive scalars in defect turbulence
IMACS Internat Conf on Comput Physics (Danish Tech Univ), Aug 1994
Technical Univ of Budapest (Physics), Apr 1994
Motion on the Edge of Disorder Wkshp (Niels Bohr Inst), Jan 1994

Scales of the butterfly
ENFISOL IV, Incommens Matter Wkshp (Univ Católica de Chile), Jan 1994

Vortex glasses and vortex liquids
NATO Adv Res Wkshp (Santa Fe NM), Apr 1993

Two mathematical dialogues

Workshop on Mathematical Thinking (Indiana Univ), Mar 1993

The onset of vortex turbulence
NSF Sympos on Patt Formation (Harvey Mudd), Feb 1993 (contrib)
UC Berkeley (Physics), Feb 1993
Brookhaven National Lab (Physics), Mar 1992
Univ of Pittsburgh (Physics), Jan 1992

Vortex decay
Supercomputing 1992 (Minneapolis MN), Nov 1992

Topological turbulence
UC Berkeley (Math), Apr 1992

Pattern formation, turbulence and coupled circle maps
Supercomputing 1991 (Albuquerque NM), Nov 1991

References

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