

Chris H. Rycroft

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Personal details

Full name: Christopher Harley Rycroft

Date of Birth: March 7th 1980

Place of Birth: Blackpool, Lancashire, United Kingdom

Nationality: British

Marital Status: Single

Positions

2007–present *Department of Mathematics, Lawrence Berkeley National Laboratory*
Department of Mathematics, University of California, Berkeley

Working with Prof. Jon Wilkening and Prof. James Sethian as a Visiting Postdoctoral Fellow.

Education

2002–2007 *Massachusetts Institute of Technology* *Ph.D. Mathematics*

Attended the graduate program at MIT on the Robert M. Rose Presidential Fellowship. Completed a doctorate in mathematics under the supervision of Prof. Martin Z. Bazant, carrying out research into granular flow and granular materials, with an emphasis on high-performance parallel simulation and multiscale modeling.

2001–2002 *Pembroke College, University of Cambridge* *Certificate of Advanced Studies in Mathematics*

Completed the Part III Mathematical Tripos: a one year course equivalent to a Masters. Specialized in general relativity, black holes, and cosmology and their links with differential geometry. Also took courses in population dynamics, quantum information theory, and computer aided geometric design. Attained grade of distinction.

1998–2001 *Pembroke College, University of Cambridge* *B.A. (Hons) Mathematics*

<i>Date</i>	<i>Examination</i>	<i>Grade</i>
June 1999	Part Ia Mathematics	First
June 2000	Part Ib Mathematics	First
June 2001	Part II(B) Mathematics	First

Awarded Legg Prize, Summer 1999. Elected to a Foundation Scholarship, Summer 2000. Awarded Foundress Prize, Summer 2001.

Experience

2007–2009 *Department of Physics, University of California – Santa Barbara* *Academic Visits*

Making regular visits to work with Prof. Jim Langer (Department of Physics) and Prof. Frederic Gibou (Departments of Mechanical Engineering and Computer Science). Carrying out continuum simulations using the STZ model of amorphous plasticity.

Spring 2008 *Quest Productions and Kikim Media* *Scientific Consulting*

Worked on the script for the NOVA documentary *Hunting the Hidden Dimension*, broadcast on PBS on October 28, 2008. (<http://www.pbs.org/wgbh/nova/fractals/>)

Journal publications

Chris H. Rycroft, Yeelok Wong, and Martin Z. Bazant, *Fast spot-based multiscale simulations of granular flow*, submitted to Powder Technology.

Chris H. Rycroft, *Voro++: a three-dimensional Voronoi cell library in C++*, to appear in Chaos, December 2009.

Chris H. Rycroft, Ashish V. Orpe, and Arshad Kudrolli, *Physical test of a particle simulation model in a sheared granular system*, Phys. Rev. E. **80**, 031305 (2009).

Chris H. Rycroft, Ken Kamrin, and Martin Z. Bazant, *Assessing continuum relationships in simulations of granular flow*, J. Mech. Phys. Solids. **57**, 828–839 (2009).

Ken Kamrin, Chris H. Rycroft, and Martin Z. Bazant, *The Stochastic Flow Rule: A Multi-Scale Model for Granular Plasticity*, Modelling Simul. Mater. Sci. Eng. **15**, S449–S464 (2007).

Chris H. Rycroft, Gary S. Grest, James W. Landry, and Martin Z. Bazant, *Analysis of Granular Flow in a Pebble-Bed Nuclear Reactor*, Phys. Rev. E **74**, 021306 (2006).

Chris H. Rycroft, Martin Z. Bazant, James W. Landry, and Gary S. Grest, *Dynamics of Random Packings in Granular Flow*, Phys. Rev. E **73**, 051306 (2006).

Other publications

Chris H. Rycroft, Matthias Koeppel, and Fumei Lam, *Recombination Lower Bounds for Missing and Circular Data: A Branch and Bound Approach*, submitted to RECOMB 2010.

Chris H. Rycroft, *Voro++: a three-dimensional Voronoi cell library in C++*, January 23rd 2009, Lawrence Berkeley National Laboratory, Paper LBNL-1430E.

Software

Proficient in C++, C, Perl, Fortran 90, Pascal, Maple, and BASIC. Experienced in parallel programming using the MPI library.

Author of Voro++ – a software library for three-dimensional cell-based calculations of the Voronoi tessellation. (<http://math.lbl.gov/voro++/>)

Coauthor of RCBranch – a software library for branch and bound calculations of lower recombination bounds. (<http://math.lbl.gov/rcbranch/>)

Contributing author of PSLIB – a library for pseudospectral methods. (<http://www.princeton.edu/~ktchu/software/pslib.html>)

Invited seminars

- Multiscale Modeling in Granular Flow*, Complex Fluids Seminar, University of Michigan, May 2, 2008.
- Multiscale Modeling in Granular Flow*, Department of Physics, University of California – Santa Barbara, April 4, 2007.
- Multiscale Modeling in Granular Flow*, Department of Applied and Computational Mathematics, Caltech, March 30, 2007.
- Multiscale Modeling in Granular Flow*, Department of Physics, Clark University, March 19, 2007.
- Multiscale Modeling in Granular Flow*, Department of Mathematics, University of California – Berkeley, February 28, 2007.

Selected conference talks

- Real-time control of mixing in dense granular flow*, Bay Area Scientific Computing Day, Lawrence Berkeley National Laboratory, Berkeley, May 9, 2009.
- Anisotropies in granular temperature in a dense sheared granular flow*, APS March Meeting, Pittsburgh, March 16–20, 2009.
- A multiscale simulation technique for granular flow*, IMA Conference on Dense Granular Flows, Isaac Newton Institute, University of Cambridge, January 5–9, 2009.
- A multiscale simulation technique for granular flow*, Canadian Mathematical Society Winter 2008 Meeting, Ottawa, December 6–8, 2008.
- A multiscale simulation technique for optimization of granular mixing*, Applied Mathematics Principal Investigators Meeting, October 15–17, 2008.
- A coupled continuum/discrete model of dense granular flow*, Bay Area Scientific Computing Day, MSRI, Berkeley, March 29, 2008.
- Stress, Strain Rate, and Packing Fraction in Granular Flow*, APS March Meeting, Denver, March 2007.
- Voronoi Volumes in Dense Granular Flow*, APS March Meeting, Baltimore, March 2006.
- Dynamics of Random Packings in Granular Flow*, APS March Meeting, Los Angeles, March 2005.

Teaching

Carried out teaching assistantships for six semesters at MIT, providing support to five graduate classes and two undergraduate classes:

<i>Semester</i>	<i>Class</i>	<i>Instructor</i>
Spring 2007	18.311 Principles of Applied Mathematics (undergraduate)	Prof. Martin Bazant
Fall 2006	18.366 Random Walks and Diffusion	Prof. Martin Bazant
Spring 2006	18.337 Applied Parallel Computing	Prof. Alan Edelman
Spring 2005	18.366 Random Walks and Diffusion	Prof. Martin Bazant
Spring 2005	18.311 Principles of Applied Mathematics (undergraduate)	Prof. Martin Bazant
Spring 2004	18.336 Numerical Methods of Applied Mathematics II	Dr. Plamen Koev
Fall 2003	18.435 Quantum Computation	Prof. Peter Shor

Professional activities

Reviewer for *Physical Review E*, the *Journal of the Mechanics and Physics of Solids*, and *Physics of Fluids*. Organizer of the MIT Simple Person's Applied Math Seminar, 2005–2006. Organizer of the Berkeley Applied Math Seminar, 2008–2009. Member of the American Physical Society.