BENOIT BOULAT, PH.D.

EDUCATION
Primary School: St Xavier School, New Dehli, India and St. Croix de Neuilly, Paris, France.
High School: College Champittet, Pully-Lausanne, Switzerland.
Engineer Physicist: Swiss Federal Institute of Technology, Lausanne, Switzerland, 1984.
http://www.epfl.ch/
PH.D. in Physics: Department of Theoretical Physics, University of Geneva, Switzerland, 1989.
Title of the thesis: Mechanics in phase space, the point of view of algebraic deformation theory.
Ph.D. advisor: Prof. Constantin Piron.
http://www.unige.ch/

SKILLS
Physics: Classical and quantum mechanics. Foundations and applications.
Physics underlying Nuclear Magnetic Resonance (NMR) and Magnetic Resonance Imaging (MRI). Product operator formalism. Dynamics of small quantum networks.
Mathematics: Algebraic structures, geometry, differential equations. Hilbert space.
NMR: Theory and experiments. Operation of NMR spectrometers (Bruker and Varian), pulse programming, data processing, troubleshooting, homo- and hetero-nuclear multidimensional techniques, design of new experiments aimed at characterizing structural and dynamic parameters of molecules.
MRI: Theory and experiments. Operation of MRI imagers (Bruker), pulse programming, data processing, images manipulation, design of new experiments. Live animal imaging and spectroscopy.
Software: development in C (15 years experience) and C++ (4 years exp.). Java programming (1 year experience). Perl scripting (7 years experience). Unix internals. Multithreading (Posix threads). Client-Server modeling.
Scientific application programming. Mathematica and Matlab programming.
Languages: French (native), English (fluent), German.

WORK EXPERIENCE
11-2002/Present
California Institute of Technology, http://www.caltech.edu/**, Staff Scientist, Biological Imaging Center,** http://bioimaging.caltech.edu**/ .**
Maintenance of MRI imagers. Setting up of live animals for MR experiments. Development of new experimental, theoretical and numerical methods to expand and improve the collection of magnetic resonance images in biological systems and live animals. High-resolution MRI images of the gastrulation process in the developing frog (Xenopus Laevis) embryo, fixed quail and mice embryos, live mice and fixed mouse brains. Diffusion tensor imaging (DTI) experiments and processing. High-resolution MR spectroscopy (MRS) and its quantification in the live mouse brain (PRESS, IZQ spectroscopy). Application of magnetization transfer techniques to various systems.
09-2000/10-2002
Jet Propulsion Laboratory, http://www.jpl.nasa.gov/**, Scientific Programmer, Ionospheric and Remote Sensing Group,** http://iono.jpl.nasa.gov/ .
Development of C/C++ programs and Perl scripts to perform the fitting of measurements obtained through the configuration satellite of the Global Positioning System(GPS).
12-1999/09-2000
Netconstruct, Engineer. http://www.netconstruct.com/ .
Development of a software platform to benchmark the stress applied to a network consisting of a large number of connected computers.
07-1997/11-1999
Beckman Research Institute and National Medical Center of the City of Hope. http://www.coh.org/**, NMR facility manager and Unix system administrator, Immunology Department,** http://www.cityofhope.org/immunology/ .

Maintenance of two NMR spectrometers and of several Unix systems. Programming in C and C++, implementing abstract algebraic concepts to derive optimized and reusable numerical programs with special emphasis directed towards the simulation of the dynamics of small quantum systems.

11-1995/06-1997
National High Magnetic Field Laboratory (NHMFL), http://www.magnet.fsu.edu/ **Visiting Assistant Scholar/Scientist, Center for Interdisciplinary Magnetic Resonance,** http://www.magnet.fsu.edu/science/cimar/nmr/ .
Development of new experimental, theoretical and numerical methods for liquid and solid state NMR in collaboration with members of various research group at the NHMFL. Maintenance of two NMR spectrometers.

09-1992/10-1995
The SCRIPPS Research Institute, La Jolla, CA, http://www.scripps.edu/. **Research Fellow, Department of Molecular Biology,** http://www.scripps.edu/mb/ .
Creation of a numerical program written in C, implementing abstract algebraic concepts to optimize the simulation of nuclear spin dynamics. Design and implementation of NMR experiments specifically developed to obtain structural and dynamic characterization of biomolecules

01-1991/08-1992
University of Lausanne, http://www.unil.ch/,.**joint position between the Department of Chemistry (moved to:)** http://isic.epfl.ch/ **and the Department of Biochemistry,** http://www.unil.ch/ib/
Learning of NMR while deriving the 3D spatial structure of a synthetic antigenic pentaproline peptide binding to the H2K^d class I MHC molecule. Development of new experimental, theoretical and numerical methods for liquid state NMR.

GRANTS
Grant for advanced researcher (Swiss National Foundation, 1992-1994).
http://www.snf.ch/

Current Compensation
Not much!

PERSONEL
Swiss and US citizen. Married, three grown-up children.

PUBLICATIONS
19 publications in internationally peer-reviewed magazines.

1) B. Boulat, Mechanics in phase space, the point of view of algebraic deformation theory, Helvetica Physica Acta, 63, 1990, 941. In French.
2) B. Boulat, L. Emsley, N. Muller, J.L. Mariansky, G.P. Corradin and G. Bodenhausen, NMR studies of an oligoproline-containing peptide analog that binds specifically to the H-2kd hitocompatibility complex, Biochemistry 30, 1991, 9429.
3) B. Boulat, R. Konrat, I.Burghardt and G. Bodenhausen, Measurement of relaxation rates in crowded NMR spectra by selective coherence transfer, J.Am.Chem.Soc.114, 1992, 5412.
4) B. Boulat and G. Bodenhausen, Cross-relaxation in magnetic resonance an extension of the Solomon equations for a consistent description of saturation, J.Chem.Phys. 97 (9), 1992, 6040.
5) B. Boulat, I. Burghardt and G. Bodenhausen, Measurement of Overhauser effects in magnetic resonance of proteins by synchronous nutation, J.Am.Chem.Soc. 114, 1992, 10679.
6) I. Burghardt, R. Konrat, B. Boulat, S.V.J.Vincent and G. Bodenhausen, Measurement of cross-relaxation between two selected nuclei by synchronous nutation of magnetization in nuclear magnetic resonance, J.Chem.Phys. 98, 1993, 1721.
7) B. Boulat and G. Bodenhausen, Measurement of proton relaxation rates in magnetic resonance of proteins, J.Biomol.NMR 3, 1993, 335.

8) B. Boulat, C.Zwahlen, S. Vincent, S. Nicula, I. Burghardt, R. Konrat and G. Bodenhausen, Selective measurement of proton relaxation in biological macromolecules, Journal of Cellular Biochemistry, Suppl. 17C 1993, 247.

9) B. Boulat and M.Rance, Monitoring of slow conformational exchange by doubly selective irradiation in Nuclear Magnetic Resonance, J.Chem.Phys. 101, 1994, 7273.

10) B..Boulat and M. .Rance, Algebraic formulation of the product operator formalism in the numerical simulation of the dynamical behavior of multispin system, Molecular Physics, 83, 1994, 1021.

11) B. Boulat and M. Rance, Selective transfer of magnetization by incoherent processes in nuclear magnetic resonance spectroscopy, J. Magn. Res. B110, 1996, 288.

12) B. Boulat, I. Najfeld and M. Rance, A theoretical analysis of the synchronous nutation experiment, J.Magn.Res A120, 1996, 223.

13) D. Jeannerat, A. Blue, B. Boulat, B. Cutting, H. Desvaux, I. Felli, R.Q. Fu, J. Huth, T. Meersmann, N. Murali, P. Mutzenhardt, J.A. Palmer, P. Pelupessy, C. Peng , M. Schwager, S. Smith, S.J.F. Vincent, C. Zwahlen, G. Bodenhausen, Two years of NMR developments at the national high magnetic field laboratory in Tallahassee, USA, Chimia 50, 1996, 633.

14) B. Boulat, D.M. Epstein and M. Rance, Selective injection of magnetization by slow chemical exchange in NMR, J.Magn.Res. 138, 1999, 268.

15) B. Boulat, Experimental control of spin diffusion in NMR, a comparison of methods, J.Magn.Res. 139, 1999, 354. 16) C. Papan , B. Boulat, S.S. Velan, S.E. Fraser and R.E. Jacobs, Time-lapse tracing of mitotic cell divisions in the early Xenopus embryo using microscopic MRI, Development Dynamics 235 (11), 2006, 3059.

16) C. Papan , B. Boulat, S.S. Velan, S.E. Fraser and R.E. Jacobs, Time-lapse tracing of mitotic cell divisions in the early Xenopus embryo using microscopic MRI, Development Dynamics 235 (11), 2006, 3059

17) C. Papan , B. Boulat, S.S. Velan, S.E. Fraser and R.E. Jacobs, Two-dimensional and three-dimensional time-lapse microscopic magnetic resonance imaging of Xenopus gastrulation movements using intrinsic tissue-specific contrast, Development Dynamics 236 (2), 2007, 494.

18) C. Papan , B. Boulat , S.S. Velan, S.E. Fraser and R.E. Jacobs , Formation of the dorsal marginal zone in Xenopus laevis analyzed by time lapse microscopic magnetic resonance imaging, Developmental Biology, Developmental Biology 305 (1), 2007, 161.

19) E.L. Bearer, X. Zhang, D. Janveylian, B. Boulat and R.E. Jacobs, Reward Circuitry is perturbed in the Absence of the Serotonin Transporter, NeuroImage 46 (4), 2009, 1091.

RECENT POSTER PRESENTATIONS

1. B. Boulat, P.T. Narasimhan and R. E. Jacobs, Intermolecular Zero Quantum Spectroscopy in the Live Mouse Brain Using a MR Imager, 47th ENC conference, Asilomar, California, 2006.

2. B. Boulat, P.T. Narasimhan and R.E. Jacobs, Magnetization Transfer Effects in Localized IZQ Spectroscopy in the Live Mouse Brain, 49th ENC conference, Asilomar, California, 2008.

3. B. Boulat, P.T. Narasimhan and R.E. Jacobs, Magnetization Transfer and Adiabatic $T1\rho$ in the Live Mouse Brain at High Field, 50th ENC conference, Asilomar, California, 2009.