Benoit Boulat, Ph.D

EDUCATION

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

MRI/MRS: Theory and experiments. Operation of MRI imagers (Bruker (12years)), pulse programming, data processing, images manipulation, design of new experiments. Live animal (anesthetized or awake) imaging, spectroscopy and functional imaging.

NMR: Theory and experiments. Operation of NMR spectrometers (Bruker (8 years) and Varian (3 years)), pulse programming, data processing, troubleshooting, homo- and hetero-nuclear multidimensional techniques, design of new experiments aimed at characterizing structural and dynamic parameters of molecules.

Physics: Foundations of classical and quantum mechanics. Physics underlying Nuclear Magnetic Resonance (NMR), Magnetic Resonance Imaging (MRI) and Spectroscopy (MRS).

Mathematics: Algebraic structures, differential equations. Hilbert space.

Software: development in C (15 years experience) and C++ (4 years exp.). Perl scripting (9 years experience). Unix internals. Scientific application programming. Matlab programming. SPM (statistical parameter mapping) and R programming.

Languages: French (native), English (fluent), German (fair).

WORK EXPERIENCE

07-15-2016/Present

Max-Planck Institute für Psychiatrie, München, Scientific collaborator, Neuroimaging https://www.psych.mpg.de/en

MRI/S in small animals, experiments and processing. Development of a pipeline to process diffusion imaging experiments in animals and in humans.

01-02-2015/06-30-2016

Technische Universität Dresden, Scientific collaborator, Neuroimaging Center, Psychology Department, NIC-TUD.

Functional MRI in humans, support for the processing and the analysis of the data, Transmagnetic Cranial Stimulation experiments. Development of a quality control program.

11-01-2011/11-07-2014

Ruhr-Universität Bochum, Scientific collaborator, Mercator Research Group, https://www.ruhr-uni-bochum.de/mrg/,

MRI and functional MRI in anesthetized, sedated or awake rodents and pigeons. Data acquisition and processing with multiple software tools (C, Perl, ImageJ, SPM, FSL, R). Handling of animals.

11-01-2002/03-16-2011

California Institute of Technology, https://www.caltech.edu

Staff Scientist, Biological Imaging Center.

Maintenance of MRI imagers (Bruker, Paravision). Setting up of live animals for MR experiments. Development of new experimental, theoretical and numerical methods (C, Perl, Matlab) to expand and improve the collection of magnetic resonance images and spectra in biological systems and live animals.

09-2000/10-2002

Jet Propulsion Laboratory, https://www.jpl.nasa.gov Scientific Programmer

Ionospheric and Remote Sensing Group, https://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 https://www.cityofhope.org NMR facility manager and Unix system administrator, Immunology Department, 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)

https://www.magnet.fsu.edu/ Visiting Assistant Scholar/Scientist, Center for Inter-disciplinary Magnetic Resonance

Development of new experimental, theoretical and numerical (C, C++) 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://ww.snf.ch

PERSONEL

Swiss and US citizen, Married, three (grown up) children.

PUBLICATIONS

22 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.

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.
20) X. Zhang, E.L. Bearer, B. Boulat, F. S. Hall, G. R. Uhl and R.E. Jacobs, Altered Neurocircuitry in the Dopamine Transporter knockout Mouse Brain, PloS One, 5 (7), 2010, e11506.
21) A.J. MacKenzie-Graham, G.A. Rinek, A. Avedisian, L. B. Morales, E. Umeda, B. Boulat, R. E. Jacobs, A. W. Toga, R. R. Voskuhl, Estrogen treatment Prevents Gray Matter Atrophy in Experimental Autoimmune Encephalomyelitis, Journal of Neuroscience Research 90 (7), 2012, 1310.
22) S.V. Trossbach, ..., B. Boulat, ..., C. Korth (30 authors total), Misassembly of full-length Disrupted-in-schizophrenia 1 (DISC1) protein is linked to altered dopamine homeostasis and behavioral deficits, Molecular Psychiatry, 21, 2016, 1561.
23) C. Engelhardt, B. Boulat, M. Czisch, M.V, Schmidt, Lack of FKBP51 Shapes Brain Structure and Connectivity in Male Mice, Journal of Magnetic Resonance Imaging 53 (5), 2020, 1358.
24) T. Ebert; D. E. Heinz; S. Almeida-Correa; R. Cruz; F. Dethloff; T. Stark; T. Bajaj; O. M. Maurel; F. M. Ribeiro; S. Calcagnini; K. Hafner; N. C. Gassen; C. W. Turck; B. Boulat; M. Czisch and C. Wotjak, Myo-inositol levels in the dorsal hippocampus serve as glial prognostic marker of mild cognitive impairment in mice, Neurobiology of Disease, submitted.

RECENT POSTER PRESENTATION

Society for Neuroscience, Annual meeting, November 15-19 2014, Washington DC,
C. Chwiesko, B. Boulat, D. Wiederman, M. Hoehn and M. Sauvage, *A new fMRI compatible set-up for perception and memory of odors in anesthetized and awake rats.*

Society for Neuroscience, Annual meeting, October 17-21 2015, Chicago Il,
C. Chwiesko, B. Boulat, D. Wiederman, M. Hoehn and M. Sauvage, *Hippocampal and Perirhinal cortex BOLD Responses to Familiar and Novel Odors in Awake Rats: Just a Start*