Dr. Samuel Bieri

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CONTACT INFORMATION

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RESEARCH INTERESTS

Low-dimensional quantum many-body theory, magnetism, spin liquids, superconductivity, Gutzwiller approach, strong correlation, topological phases, quantum Hall effects, mathematical physics

EMPLOYMENT HISTORY

Swiss Federal Institute of Technology (ETHZ), Zürich, Switzerland **April 2015 - present**

ITP Visitor

University Pierre and Marie Curie (UPMC), Paris, France **Sept. 2013 - March 2015**

Postdoctoral Fellow, Profs. C. Lhuillier, B. Bernu, L. Messio
Research: Proj. symmetry group, gauge theory, chiral spin liquids, kagome Heisenberg models.

Massachusetts Institute of Technology (MIT), Cambridge MA, USA **July 2011 - Aug. 2013**

Postdoctoral Fellow, Condensed Matter Theory Group, Prof. P. A. Lee.
Research: Quantum spin liquids, Gutzwiller wave functions, variational Monte Carlo methods.
Teaching: Development of MOOC "Classical Physics" with Prof. Walter Lewin.

Swiss Federal Institute of Technology (ETHZ), Zürich, Switzerland **May 2009 - June 2011**

Postdoctoral Associate in Mathematical Physics, Prof. J. Fröhlich.
Research: Chern-Simons theory, edge states, and quantum Hall interferometry.

École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland **Oct. 2004 - April 2009**

Research and Teaching Assistant, strongly correlated and mesoscopic physics, Prof. D. A. Ivanov.
Research: High-temperature superconductivity, RVB spin liquids

EDUCATION

École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

Doctor of Science (PhD) in Physics **Dec. 2008**

- Title of the thesis:
  Resonating-valence-bond approaches to high-temperature superconductivity
- Thesis advisor: Prof. Dr. Dmitri A. Ivanov
- Area of study: strongly correlated electrons and doped Mott insulators, high-temperature superconductivity; *t-J* model in 2d, Gutzwiller wave functions, spin liquids, quantum dimer model, topological order, field-theory, Monte Carlo methods, random matrices.

Physicien Diplomé EPFL (Dipl. Ing. Phys.) **March 2004**

- Title of the thesis:
  Stability of the soliton in the broken O(3) nonlinear sigma-model in 2+1 dimensions
- Advisor: Prof. Dr. Mikhail Shaposhnikov
- Area of study: high-energy and particle physics; quantum field theory, topological and non-topological solitons, integrable models.

Collège Sainte-Croix, Fribourg, Switzerland – State Matura **July 1999**

CITIZENSHIP

Swiss

LANGUAGES

German (native), French (professional), English (professional)

TEACHING EXPERIENCE

Teaching Fellow, MIT **2013**
Development of 8.01x, Classical Physics (massive open online course on MITx/edx platform).

Teaching Assistant, ETHZ **2009 - 2011**
Supervision of graduate and undergraduate research seminars (Proseminar).

Teaching Assistant, EPFL **2004 - 2009**
Tutor for lectures in quantum mechanics, classical electrodynamics, quantum field theory, classical mechanics. Supervision of undergraduate seminars and MSc research projects.

Student TA, EPFL, Tutor in general physics and classical mechanics. **2000 - 2003**

REFERENCES

Prof. Dr. Claire Lhuillier	claire.lhuillier@upmc.fr
Prof. Dr. Patrick A. Lee	palee@mit.edu
Prof. Dr. Senthil Todadri	senthil@mit.edu
Prof. Dr. Jürg Fröhlich	juerg@phys.ethz.ch
Dr. Dmitri A. Ivanov	ivanov@itp.phys.ethz.ch

PUBLICATION LIST

- ❑ **S. Bieri**, L. Messio, B. Bernu, and C. Lhuillier, *Gapless chiral spin liquid in a kagome Heisenberg model*, arXiv:1411.1622 (submitted to PRL).
- ❑ D. Boldrin, B. Fåk, M. Enderle, **S. Bieri**, J. Ollivier, S. Rols, P. Manuel, and A. S. Wills, *Haydeeite: A spin-1/2 kagome ferromagnet*, Phys. Rev. B **91**, 220408(R) (2015).
- ❑ R. V. Mishmash, J. R. Garrison, **S. Bieri**, and C. Xu, *Theory of a Competitive Spin Liquid State for Weak Mott Insulators on the Triangular Lattice*, Phys. Rev. Lett. **111**, 157203 (2013).
- ❑ **S. Bieri**, M. Serbyn, T. Senthil, and P. A. Lee, *Paired chiral spin liquid with a Fermi surface in $S = 1$ model on the triangular lattice*, Phys. Rev. B **86**, 224409 (2012).
- ❑ **S. Bieri** and J. Fröhlich, *Effective field theory and tunneling currents in the fractional quantum Hall effect*, Annals of Physics (NY) **327**, 959 (2012).
- ❑ **S. Bieri** and J. Fröhlich, *Physical principles underlying the quantum Hall effect*, C. R. Phys. **12**, 332 (2011); arXiv:1006.0457 (2010).
- ❑ **S. Bieri** and D. A. Ivanov, *SU(2) approach to the pseudogap phase of high-temperature superconductors: electronic spectral function*, Phys. Rev. B **79**, 174518 (2009).
- ❑ H. Ribeiro, **S. Bieri**, and D. A. Ivanov, *Single hole and vortex excitations in the triangular-lattice quantum dimer model*, Phys. Rev. B **76**, 172301 (2007).
- ❑ **S. Bieri** and D. A. Ivanov, *Quasiparticle spectral weights of Gutzwiller-projected high-T_c superconductors*, Phys. Rev. B **75**, 035104 (2007).
- ❑ **S. Bieri** and D. A. Ivanov, *Coherent spectral weights of Gutzwiller-projected superconductors*, AIP Conf. Proc. **918**, 277 (2007).

- ❑ PhD Thesis, Thèse EPFL, no 4242 (2008), http://library.epfl.ch/en/theses/?nr=4242
- ❑ Master Thesis, EPFL (2004), http://www.huebeli.net/samuel/files/dwork.pdf

CURRENT COLLABORATIONS

LPTMC, Paris VI: Classification of chiral spin liquids on frustrated lattices.

ILL, Grenoble: Possible explanations of neutron scattering data for triangular spin-1 QSL candidate.

AWARDS & FELLOWSHIPS

SNSF Fellowship for Prospective Researchers, 12 month research grant, MIT (2011).

EPFL Student Mobility Grant, 2001, Université de Montreal.

QUALIFICATIONS

Maître de Conférence (Assist. Professor) in France, Sect. 28 (Condensed Matter) **2015**

REFEREE FOR

Physical Review (American Physical Society)

Physical Review Letters (American Physical Society)

Communications in Mathematical Physics (Springer)

Journal of Physics and Chemistry of Solids (Elsevier)

Talks and Conferences

Invited talk, Institute for Theoretical Physics, University of Fribourg, July 2015.
Invited talk, Institute for Theoretical Physics, ETH Zürich, June 2015.
Invited talk Conference on Frustrated Magnetism, LPTM, Cergy-Pontoise, Nov. 2014.
Invited talk LPTHE-LPTMC, UPMC: Quantum Spin Liquids in Frustrated Magnets, Jan. 2014.
Gr. de Recherche Matériaux et Interactions en Comp. CNRS, Gif/Yvette, Nov. 2013 (poster).
Frustrated Magnetism and Quantum Spin Liquids, Santa Barbara, Sept.-Oct. 2012 (talk).
Majorana Fermions, nab Statistics, Topol Quantum Info Processing, Trieste, August 2012 (participant).
APS March Meeting, Boston MA, February 2012 (talk).
Quantum theory from small to large scales, Les Houches, August 2010 (participant).
Emergent quantum phenomena from the nano to the macro world, Cargèse, July 2009 (talk).
Strong correlations in materials and atom traps, Trieste, August 2008 (talk).
Highly frustrated magnets and strongly correlated systems, Trieste, August 2007 (poster).
Meeting on strongly correlated systems, Geneva, December 2006 (talk).
11th training course in the physics of strongly correlated systems, Vietri (Salerno), Oct. 2006 (talk).
Materials with novel electronic properties, Les Diablerets, September 2005 (poster).
10th training course in the physics of str correlated systems, Vietri (Salerno), Oct. 2005 (participant).
Random matrices, random processed and integrable systems, CRM Montreal, June 2005 (participant).

Other experience

Military service, Swiss Air Force, basic training and repetition courses **1999 - 2010**
Consultant, e-globe technologies AG, Bern, Switzerland **2004**
Research internship, Notre-Dame hospital, Center for Biomedical Research, UdeM **2002**
EPFL exchange program, Master studies at the Université de Montreal (UdeM), Canada **2001 - 2002**