

Complete List of Publications, Talks & Posters

Holger Bartolf

Zürich, 2010

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Curriculum Vitae

Personal Dates

Name: Holger Bartolf
Day of birth: 15.05.1978
Birthplace: Karansebesch, Romania
Regional provenance: Pforzheim, Germany
Adress: Lägernstrasse 2
8953 Dietikon ZH, Switzerland



Education

1984 - 1988 Primary School "Südstadtschule"
75175 Pforzheim, Germany
1988 - 1997 A-levels "Hilda-Gymnasium"
75172 Pforzheim, Germany

Diploma Studies (Master Equivalent)

1998 - 2003 [University Fridericiana](#)
Part of the [Karlsruhe Institute of Technology \(KIT\)](#)
[76131 Karlsruhe](#), Germany
Interests: Solid-State Physics and Information Technology
2003 - 2004 [Physics Institute](#) of the [Faculty of Physics](#) of the [KIT](#)
Experimental Diploma Thesis (corresponds to a Master Degree):
Title: *"Galvanomagnetische Effekte von $CeCu_{6-x}Au_x$ bei tiefen Temperaturen".*
Objective: *Observation of the onset of antiferromagnetic ordering near a quantum-critical point ($T = 0$ K) within a Heavy-Fermion solid-state system utilizing standard Hall-effect measurements.*

Internship (Industrial Placement)

2004 - 2005 [TRUMPF Laser GmbH + Co. KG](#)
[78713 Schramberg](#), Germany
Objective: *Investigation of the focal properties of single Laser-pulses (at different repetition rates) in a Nd: YLF and a Nd: YAG, diode-pumped, Q-switched solid-state Laser-system; Applicationtests.*

Ph. D. Research

2005 - 2009

Physics Institute of the Faculty of Science of the
University of Zürich
8057 Zürich, Switzerland

26.11.2009

Successful Defense of the Ph. D. Thesis

Thesis Title: *“Fabrication and Characterization of Superconducting Nanowire Highspeed Single-Photon Detectors”.*

Objective: *Development of nanoscaled devices with narrowest lateral dimensions on the 50 nm scale, which are sensitive to electromagnetic radiation with an energy-quantum detection-rapidity in the GHz-frequency-range. The detector’s nanoscale fabrication process was developed at the FIRST Center for Micro- and Nanoscience of the ETH Zürich, 8093 Zürich, Switzerland. In the academic part of the thesis, the behavior of the observed detector’s energy-sensitivity was investigated by varying the nanowire’s width.*

Visiting Research

2008 Nov & Dec

German Aerospace Center (DLR)
12489 Berlin, Germany

Objective: *Detection of electromagnetic quanta and thermal vortex-excitations within a superconducting nanowire highspeed single-photon detector at cryogenic temperatures (data gathering).*

Postdoctoral Research

2009 - 2010

Physics Institute of the Faculty of Science of the
University of Zürich
8057 Zürich, Switzerland

Research Funding 2010 from the University of Zürich:

In 2010: 97 Grants out of 282 Proposals

Project Title: *“Fluctuation-Mechanisms in NbN-Based Superconducting Photon Detectors”.*

Objective: *Investigation of the origin of the detectors’s dark-count events in a time-resolved experiment and description of the data in terms of a Boltzmann-model, based on established thermal fluctuation-mechanisms in superconductors such as the Berezinskii-Kosterlitz-Thouless vortex-transition, the entry-barrier for vortex-penetration and phase-slip phenomena.*

Experiences & Skills

Technology	Level
Cleanroom Process Technology	3 years; daily
• Micro- & Nanolithographic Process Developments	proficient
• Mask Design for Photolithography (GDSII) Feature Sizes down to $\approx 1 \mu\text{m}$	proficient
• Nanoscale Fabrication Experience down to $\approx 10 \text{ nm}$	expert
• Contact Photolithographic Mask Aligner: UV-Light Exposure, Spin-Coating, Wet Bench, Chemical Development	proficient
• Dry Etching: Low Power and Low Pressure	expert
• Thin-Film Generation: Electron-Beam Evaporation & Cathode-Sputtering	medium
• Microscopy & Nanoscopy: SEM, AFM, Surface Profiler, opt. Microscope	expert
• Wafersaw & Wedge Microwire-Bonder	proficient
Electronic & Photonic Device Characterization	3 years
• Resistivity	expert
• IV-Response Curves: Sourcemeter & Nanovoltmeter	proficient
• Time-Resolved Experiments (Picosecond Accurate Single-Shot Digital Oscilloscope)	proficient
• Photon Efficiency Measurements	expert
• Gated Voltage-Level Threshold Counting Experiments	proficient
Laser Material Machining	6 months
• 20 W Pulsed Nd:YAG Laser $\lambda = 1064 \text{ nm}$ Laser Cutting, Laser Marking, Laser Engraving	proficient
Cryogenic & Vacuum Technology	5 years
• Helium & Nitrogen Based (down into the Sub-K Regime)	proficient

Languages

German
English
French

Level

native written and spoken
proficient written and spoken
basics written and spoken

Driving Licenses

A1, B, C1, BE, C1E

European Classification Scheme

Software

MS-Windows
MS-Office
LaTeX (WinEdt)
JabRef
C++
LabView
Origin
MathCAD
HTML
Corel (Draw & Photo)
POV-Ray
Raith-Software Suite
GDSII
L-Edit
Casino

Level

expert
expert
expert
expert
medium
proficient
expert
expert
proficient
expert
expert
expert
expert
medium
proficient

Description

PC Operating System
Office Software Suite
Document Preparation System
Reference Management Software
Programming Language
Visual Programming Language
Scientific Graphing and Data Analysis
Computer Algebra System
Markup Language for Web Pages
(Vector) Graphics Editor
Ray Tracing Program
Electron-Beam Lithography Software
Structure Library for IC-Production
Chip Design Editor for IC-Production
Monte-Carlo Simulation of the
Electron-Matter Interaction
Proximity Effect Correction Software
for Electron-Beam Nanolithography
CAD Editor for Laser Machining

NanoPECSTM

proficient

TruMark

proficient

Publication List

I. During Doctoral Thesis

Doctoral Thesis

- *Fabrication and Characterization of Superconducting Nanowire Highspeed Single-Photon Detectors*
H. Bartolf
Ph. D. Thesis (2010), MNF faculty, University of Zürich, Switzerland

Papers about the Physics in Nanowire Detectors

- *Lithographic Tuning of the Spectral Sensitivity of a Superconducting Nanowire Quantum Detector*
H. Bartolf, K. Inderbitzin, A. Engel, A. Schilling, K. Il'in, M. Siegel, H.-W. Hübers, A. Semenov
in preparation for submission to: **Nanotechnology**
- *Current-Assisted Thermally Activated Flux Liberation in Ultrathin Nanopatterned NbN Superconducting Meander Structures*
12 pages, 5 chapters, 7 figures, 2 tables, 30 equations and 68 references
H. Bartolf, A. Engel, A. Schilling, K. Il'in, M. Siegel, H.-W. Hübers, A. Semenov
Physical Review B **80** (2010) 024502
Selected for the [January 15, 2010](#) issue of the
Virtual Journal of Applications of Superconductivity

Popular Writing

- *Der Photonenzähler*
F. Würsten
unireport 2008: wissen teilen, section *Physik* on page 30,
University of Zürich, Switzerland

General Papers about the Fabrication on the Nanoscale

- *Symbiotic Optimization of the Nanolithography and RF-Plasma Etching for Fabricating High-Quality Light Sensitive Superconductors on the 50 nm Scale*
H. Bartolf, K. Inderbitzin, L. B. Gómez, A. Engel, A. Schilling, H.-W. Hübers, A. Semenov, K. Il'in, M. Siegel
submitted to: ([preprint available @arXiv: 1011.4676](#))
Nanotechnology
- *Nanoscale Fabrication by Intrinsic Suppression of Proximity-Electron Exposures and General Considerations for Easy & Effective Top-Down Fabrication*
14 pages, 5 chapters, 10 figures, 3 equations and 52 references
H. Bartolf, K. Inderbitzin, L. B. Gómez, A. Engel, A. Schilling
Journal of Micromechanics and Microengineering **20** (2010) 125015
- *Fabrication of Metallic Structures with Lateral Dimensions less than 15 nm and $j_c(T)$ -Measurements in NbN Micro- and Nanobridges*
H. Bartolf, A. Engel, A. Schilling, K. Il'in, M. Siegel
Physica C **468** (2008) 793-796
- *Multi-Project Wafer Scale Process for Productive Research and Development*
H. Bartolf, A. Engel, L. Gómez, A. Schilling
Raith Application Note (2008), Raith GmbH, 44227 Dortmund, Germany
- *Superconducting Single Photon Detectors*
H. Bartolf, A. Engel, A. Schilling
in: *Electron-beam applications at ETH Zurich*, F. Robin,
Raith Application Note (2006), Raith GmbH, 44227 Dortmund, Germany

Contributed Papers

- *Optical and Transport Properties of Ultrathin NbN Films and Nanostructures*
10 pages, 5 chapters, 9 figures, 3 tables, 2 equations and 31 references
A. Semenov, B. Günther, U. Böttger, H.-W. Hübers, **H. Bartolf**, A. Engel,
A. Schilling, K. Il'in, M. Siegel, R. Schneider, D. Gerthsen, N. A. Gippius
Physical Review B **80** (2009) 054510
- *NbN Superconducting Nanowire Photon Counters:
Magnetoconductivity and Other Detector Properties*
A. Engel, **H. Bartolf**, A. Semenov, K. Il'in, A. Schilling, H.-W. Hübers, M. Siegel
AIP Conference Proceedings **1185** (2009) 76 - 79
- *Critical Current and Dark Counts in Superconducting Nanowire
Single-Photon Detectors*
A. Semenov, M. Hofherr, A. Engel, K. Il'in, **H. Bartolf**, A. Schilling, H.-W. Hübers,
M. Siegel
submitted to: **Superconductor Science and Technology**
- *Magnetic Vortices in Superconducting Photon Detectors*
A. Engel, **H. Bartolf**, A. Schilling, A. Semenov, H.-W. Hübers, K. Il'in, M. Siegel
Journal of Modern Optics **56** (2009) 352 - 357
- *Temperature- and Field-Dependence of Critical Currents in NbN Microbridges*
A. Engel, **H. Bartolf**, A. Schilling, K. Il'in, M. Siegel, A. Semenov, H.-W. Hübers
Journal of Physics: Conference Series **97** (2008) 012152
- *Ultra-Thin NbN Films on Si: Crystalline and Superconducting Properties*
K. Il'in, R. Schneider, D. Gerthsen, A. Engel, **H. Bartolf**, A. Schilling, A. Semenov,
H.-W. Hübers, B. Freitag M. Siegel
Journal of Physics: Conference Series **97** (2008) 012045
- *Current-Induced Critical State in NbN Thin-Film Structures*
K. Il'in, M. Siegel, A. Engel, **H. Bartolf**, A. Schilling, A. Semenov, H.-W. Hübers
Journal of Low Temperature Physics **151** (2008) 585 - 590

II. During Diploma Student Research

- *Hall Effect across the Quantum Phase Transition of $CeCu_{6-x}Au_x$*
H. Bartolf, C. Pfeiderer, O. Stockert, M. Vojta, H. v. Löhneysen
Physica B 359 - 361 (2005) 86 - 88
- *Rare-Earth Intermetallic Compounds at a Magnetic Instability*
H. v. Löhneysen, H. Bartolf, S. Drotzinger, C. Pfeiderer, O. Stockert, D. Souptel,
W. Löser, G. Behr
Journal of Alloys and Compounds 408 - 412 (2006) 9 - 15
- *Magnetotransport in $CeCu_{6-x}Au_x$*
H. v. Löhneysen, H. Bartolf, C. Pfeiderer, F. Obermair, M. Vojta, P. Wölfle
Physica B 378 - 380 (2006) 44 - 45

Talks, Posters and Further Education

Recent Research Talks

- *Dissipative Fluctuation Mechanisms in BCS-Superconductors*
H. Bartolf
Congress on Cryoelectronic Devices
October 03 - October 05, 2010
15738 Zeuthen (Berlin), Germany
- *Research on Nanoscaled Superconducting Highspeed Single-Photon Detectors
Enabled by Easy & Effective Top-Down Fabrication*
H. Bartolf
Seminar Talk at ABB Switzerland
September 09, 2010
ABB Switzerland Ltd, Corporate Research Center, 5405 Baden-Dättwil, Switzerland
- *Detection of Electromagnetic Quanta and Thermal Vortex-Excitations
within a Superconducting Nanowire Highspeed Single-Photon Detector*
H. Bartolf
Seminar Talk at IBM Rüschlikon
January 19, 2010
IBM Research GmbH, Zürich Research Laboratory, 8803 Rüschlikon, Switzerland

Talks about Doctoral Thesis

- *Fabrication and Characterization of Superconducting Nanowire Highspeed Single-Photon Detectors*
H. Bartolf
Seminar in Experimental Physics (Doctoral Examination)
November 26, 2009
Physics Institute, University of Zürich, 8057 Zürich, Switzerland
- *Spectral Sensitivity of Superconducting Single-Photon Detectors*
H. Bartolf, A. Engel, L. Gómez, A. Schilling, K. Il'in, M. Siegel, A. Semenov, H.-W. Hübers
Seminar in Solid-State Physics
June 25, 2008
Physics Institute, University of Zürich, 8057 Zürich, Switzerland
- *Fabrication of Superconducting Nanowire-Meander Single-Photon Detectors*
H. Bartolf, A. Engel, L. Gómez, A. Schilling, K. Il'in, M. Siegel, A. Semenov, H.-W. Hübers
9th International Conference on Nanostructured Materials
June 01 - June 06, 2008
2630 Barra da Tijuca, Rio de Janeiro, Brazil
- *Lift-Off Technique for the Fabrication of Nanostructures*
H. Bartolf, A. Engel, A. Schilling
Annual Conference of the Swiss Physical Society
February 20 - February 21, 2007
University of Zürich, 8057 Zürich, Switzerland
- *Galvanomagnetische Effekte an $CeCu_{6-x}Au_x$ bei tiefen Temperaturen*
H. Bartolf, C. Pfeleiderer, O. Stockert, M. Vojta, H. v. Löhneysen
Seminar in Solid-State Physics
November 17, 2004
Physics Institute, University of Zürich, 8057 Zürich, Switzerland

Posters about Doctoral Thesis

- *Fabrication Process of Superconducting Nanostructures and $R(T, B)$ Measurements of their Electronic Phase Transition*
H. Bartolf, A. Engel, L. Gómez, A. Schilling, K. Il'in, M. Siegel
Annual Conference of the Swiss Physical Society
March 26 - March 27, 2008
Université de Genève, 1205 Genève, Switzerland
- *Process Development for the Fabrication of Metallic Structures with Lateral Dimensions of about 10 nm and Superconducting nm-sized Meander Structures*
H. Bartolf, A. Engel, A. Schilling, K. Il'in, M. Siegel
2007 Swiss Workshop on Materials with Novel Electronic Properties
September 28 - September 30, 2007
1865 Les Diablerets, Switzerland
- *Fabrication of Metallic Structures with Spatial Dimensions of about 10 nm and $j_c(T)$ -Measurements in NbN Micro- and Nanobridges*
H. Bartolf, A. Engel, A. Schilling, K. Il'in, M. Siegel
5th International Conference on Vortex Matter in Nanostructured Superconductors
September 8 - September 14, 2007
85100 Kalithea, Rhodes
- *Exploration of New Materials for Superconducting Single-Photon Detectors*
A. Engel, **H. Bartolf**, A. Schilling, B. J. Ruck, C. Portesi
Annual Conference of the Swiss Physical Society
February 20 - February 21, 2007
University of Zürich, 8057 Zürich, Switzerland
- *Lift-Off Technique for the Fabrication of Conducting Nanostructures*
H. Bartolf, A. Engel, A. Schilling
Congress on Cryoelectronic Devices
October 03 - October 05, 2006
98693 Ilmenau (Thuringian Forest), Germany
- *Superconducting Nanostructures and Single-Photon Detectors*
A. Engel, **H. Bartolf**, A. Schilling, A. Semenov, H.-W. Hübers, K. Il'in, M. Siegel
Annual Conference of the Swiss Physical Society
February 13 - February 14, 2006
Ecole Polytechnique Fédérale de Lausanne, 1015 Lausanne, Switzerland

- *Superconducting Nanostructures: Fluctuations and Photon Detectors*
A. Engel, **H. Bartolf**, A. Schilling, A. Semenov, H.-W. Hübers, K. Il'in, M. Siegel
2005 Swiss Workshop on Materials with Novel Electronic Properties
September 26 - September 28, 2005
1865 Les Diablerets, Switzerland

Summer Schools and Further Education

- *2nd MaNEP Summer School 2006: Probing the Physics of Low Dimensional Systems*
September 11 - September 16, 2006
3906 Saas-Fee, Switzerland
- *10th Lithography Training Course on Lithography Systems*
June 07 - June 09, 2005
Raith Headquarter, 44227 Dortmund, Germany

Talks & Posters During Diploma Student Research

- *Hall Effect at the Quantum Phase Transition of $CeCu_{6-x}Au_x$ (Poster RES2-153)*
H. Bartolf, C. Pfeiderer, O. Stockert, H. v. Löhneysen
International Conference on Strongly Correlated Electron Systems
July 26 - July 30, 2004
University of Karlsruhe, 76128 Karlsruhe, Germany
- *Hall-Konstante am Quantenphasenübergang von $CeCu_{6-x}Au_x$*
H. Bartolf
Seminar in Experimental Physics (Diploma Examination)
May 13, 2004
Physics Institute, University of Karlsruhe, 76128 Karlsruhe, Germany
- *Hall-Konstante von $CeCu_{6-x}Au_x$ am Quantenphasenübergang (Talk TT 21.1 Mi 16:45 H18)*
H. Bartolf, C. Pfeiderer, O. Stockert, H. v. Löhneysen
DPG-Spring Meeting (Deutsche Physikalische Gesellschaft)
March 08 - March 12, 2004
University of Regensburg, 93040 Regensburg, Germany