# Felix Lucka

## Personal Information


Born in Hannover, Germany on May 23, 1985, nationality: German

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homepage *http://wwwmath.uni-muenster.de/num/burger/organization/lucka*


## Research Interests

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|---|---|
| Theoretical | inverse problems, Bayesian inference, variational regularization, compressed sensing, mathematical modeling |
| Methodical | MCMC, convex optimization, multimodal integration, finite element methods |
| Applications | Biomedical imaging and computing, brain research |

## PhD Thesis

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|---|---|
| Title | *Bayesian Inversion in Biomedical Imaging* |
| Supervisors | Prof. Dr. Martin Burger and PD Dr. Carsten H. Wolters |
| Reviewers | Prof. Dr. Martin Burger, Prof. Dr. Samuli Siltanen and PD Dr. Carsten H. Wolters |
| Sub./Defense | Dec. 2014 / 23.01.2015 |
| Degree | *summa cum laude* |
| Permalink | http://nbn-resolving.de/urn:nbn:de:hbz:6-80359613772 |

## Work Groups

since 2014 **Member of "The Center for Medical Image Computing"**, *Department of Computer Science, University College London*, Advisor: Prof. Dr. Simon Arridge.

2013 **Research Visit to UCLA**, *Department of Mathematics*, invited by Prof. Dr. Andrea Bertozzi and Prof. Dr. Stanley Osher.

2010-2014 **Member of "Workgroup Imaging"**, *Institute of Computational and Applied Mathematics, University of Münster*, headed by Prof. Dr. Martin Burger.

2008-2014 **Member of "Methods in bioelectromagnetism"**, *Institute for Biomagnetism and Biosignalanalysis, University of Münster*, headed by PD Dr. Carsten H. Wolters.

## Scientific Activities

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| Reviewer | Inverse Problems (4), Neurological Research (1), IEEE Transactions on Image Processing (1), Inverse Problems in Science and Engineering (1), Mathematical Problems in Engineering (1) |
| Referee | German National Academic Foundation (Studienstiftung des deutschen Volkes) (1) |

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## Awards and Scholarships

Apr. 2014 **Poster price**, *Workshop "Innovative Verarbeitung bioelektrischer und biomagnetischer Signale" - bbs2014, Berlin*.

Okt. 2012 **Poster price**, *NeuroVisionen 8, Aachen*.

Apr. 2012 **Best talk in "Biomagnetism and online signal processing"**, *Workshop "Innovative Verarbeitung bioelektrischer und biomagnetischer Signale" - bbs2012, Berlin*.

Sep. 2011 **Research visit funding**, *Funding for a two week research visit at the RTWH Aachen by the annual meeting of the DMV (German mathematical society)*.

since Jul. 2011 **PhD-Scholarship**, *German National Academic Foundation (Studienstiftung des deutschen Volkes)*.

2005-2011 **Scholarship**, *German National Academic Foundation (Studienstiftung des deutschen Volkes)*.

## Publications


[1] M. Burger and F.L. Maximum a posteriori estimates in linear inverse problems with log-concave priors are proper Bayes estimators. *Inverse Problems*, 30(11):114004, 2014.

[2] S.M. Rampersad, A.M. Janssen, F.L., U. Aydin, B. Lanfer, S. Lew, C.H. Wolters, D.F. Stegeman, and T.F. Oostendorp. Simulating Transcranial Direct Current Stimulation With a Detailed Anisotropic Human Head Model. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 22(3):441–452, May 2014.

[3] A.M. Janssen, S.M. Rampersad, F.L., B. Lanfer, S. Lew, Ü. Aydin, C.H. Wolters, D.F. Stegeman, and T.F. Oostendorp. The influence of sulcus width on simulated electric fields induced by transcranial magnetic stimulation. *Physics in Medicine and Biology*, 58(14):4881, 2013.

[4] F.L. Fast Markov chain Monte Carlo sampling for sparse Bayesian inference in high-dimensional inverse problems using L1-type priors. *Inverse Problems*, 28(12):125012, 2012.

[5] F.L., S. Pursiainen, M. Burger, and C.H. Wolters. Hierarchical Bayesian inference for the EEG inverse problem using realistic FE head models: Depth localization and source separation for focal primary currents. *NeuroImage*, 61(4):1364–1382, 2012.

[6] S. Wagner, F.L., M. Burger, L. Grasedyck, J. Haueisen, and C.H. Wolters. Comparison of direct and reciprocal forward modeling approaches in EEG source analysis. *Biomedical Engineering-Biomedizinische Technik*, 57(Suppl. 1):310, 2012.

[7] S. Pursiainen, F.L., and C.H. Wolters. Complete electrode model in EEG: relationship and differences to the point electrode model. *Physics in Medicine & Biology*, 57(4):999–1017, 2012.

[8] F.L., S. Pursiainen, M. Burger, and C.H. Wolters. Hierarchical Bayesian Models for EEG Inversion: Depth Localization and Source Separation for Focal Sources in Realistic FE Head Models. In *Biomedical Engineering*, volume 56. De Gruyter, 2011.

[9] F.L. Hierarchical Bayesian Approaches to the Inverse Problem of EEG/MEG Current Density Reconstruction. Diploma thesis, University of Münster., March 2011.

## Talks on Conferences

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| Dec. 8, 2014 | 20-th "Inverse Days" Conference, Tampere: *Sample-based Bayesian Inversion* |
| Sep. 28, 2013 | International Workshop on Inverse Problems and Regularization Theory, Fudan University, Shanghai: *Computational and Theoretical Aspects of L1-type Priors in Bayesian Inverse Problems* |
| Sep. 21, 2013 | Shanghai International Workshop on Recent Advances in Inverse Problems and Imaging Science, Shanghai Jiao Tong University: *Recent Results on L1-type Priors in Bayesian Inverse Problems* |
| Jul. 5, 2013 | Applied Inverse Problems Conference, Daejeon: *Computational and Theoretical Aspects of Sparsity-Constraints in Bayesian Inversion* |
| Jul. 2, 2013 | Applied Inverse Problems Conference, Daejeon: *Hierarchical Bayesian Modeling for EEG/MEG: From Simulated to Experimental Data* |
| Dec. 19, 2012 | 18-th "Inverse Days" Conference, Jyväskylä: *Sparsity Constraints in Bayesian Inversion* |
| Apr. 19, 2012 | Workshop "Innovative Verarbeitung bioelektrischer und biomagnetischer Signale" - bbs2012, Berlin: *Hierarchical Bayesian Models for Focal EEG/MEG Inversion* |
| Sep. 28, 2011 | Annual meeting of the DGBMT, Freiburg: *Hierarchical Bayesian Models for EEG Inversion: Depth Localization and Source Separation for Focal Sources in Realistic FE Head Models* |
| Sep. 20, 2011 | Annual meeting of the DMV, Köln.: *Hierarchical Bayesian Approaches to the Inverse Problem of EEG/MEG Current Density Reconstruction* |

## Invited Talks

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| Feb. 13, 2015 | Applied Maths Seminar, Warwick: *Sample-based Bayesian Inference in Inverse Problems* |
| Feb. 2, 2015 | Applied Math Colloquium, WWU: *Challenges of Dynamic High Resolution Photoacoustic Tomography* |
| May 29, 2013 | Applied Math Colloquium, UCLA: *Hierarchical Bayesian Modeling and Another Type of Sparsity* |
| Apr. 30, 2013<br>May 7, 2013 | Two introductory talks given at Stanley Osher's level set collective seminar, UCLA: *The Bayesian Approach to Inverse Problems and Imaging* |
| Nov. 13-15, 2012 | Three introductory talks given at the DAMTP, Centre for Mathematical Sciences, University of Cambridge: *The Bayesian Approach to Inverse Problems* |

## Own Posters

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| Sep. 4-5, 2014 | Lucka, F., Tellen, S., Wolters C.H. and Burger, M.: *Sparse Recovery Conditions and Realistic Forward Modeling in EEG/MEG Source Reconstruction*. UCL-Duke Workshop on Sensing and Analysis of High-Dimensional Data (SAHD 2014), London. |
| Aug. 26-28, 2014 | Lucka, F., Tellen, S., Wolters C.H. and Burger, M.: *Sparse Recovery Conditions and Realistic Forward Modeling in EEG/MEG Source Reconstruction*. "Inverse Problems - from Theory to Applications" (IPTA 2014) conference, Bristol. |
| Apr. 10-11, 2014 | Lucka, F., Tellen, S., Wolters C.H. and Burger, M.: *Sparse Recovery Conditions and Realistic Forward Modeling in EEG/MEG Source Reconstruction*. Workshop "Innovative Verarbeitung bioelektrischer und biomagnetischer Signale" - bbs2014, Berlin. |

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| Dez. 9-13, 2013 | Lucka, F., Tellen, S., Wolters C.H. and Burger, M.: *Sparse Recovery Conditions and Realistic Forward Modeling in EEG/MEG Source Reconstruction*. Matheon Workshop on Compressed Sensing and its Applications 2013, Berlin. |
| Nov. 29, 2013 | Lucka, F., Aydin, Ü., Vorwerk, J., Burger, M. and Wolters C.H.:*Hierarchical Fully-Bayesian Inference for Combined EEG/MEG Source Analysis of Evoked Responses: From Simulations to Real Data*. Neurovisionen 9, Cologne. |
| Sep. 5-8, 2013 | Lucka, F., Aydin, Ü., Vorwerk, J., Burger, M. and Wolters C.H.:*Hierarchical Fully-Bayesian Inference for Combined EEG/MEG Source Analysis of Evoked Responses: From Simulations to Real Data*. International Conference on Basic and Clinical Multimodal Imaging (BaCI), Geneva. |
| Okt. 26, 2012 | Lucka, F., Pursiainen, S., Burger, M. and Wolters C.H.:*Hierarchical Fully-Bayesian Inference for EEG/MEG combination: Examination of Depth Localization and Source Separation using Realistic FE Head Models*. NeuroVisionen 8, Aachen |
| Aug. 26-30, 2012 | Lucka, F., Pursiainen, S., Burger, M. and Wolters C.H.:*Hierarchical Fully-Bayesian Inference for EEG/MEG combination: Examination of Depth Localization and Source Separation using Realistic FE Head Models*. 18-th International Conference on Biomagnetism (Biomag 2012), Paris |
| Oct. 5-6, 2011 | Lucka, F., Pursiainen, S., Burger, M. and Wolters C.H.:*Hierarchical Bayesian Estimation for the EEG Inverse Problem using Realistic FE Head Models: Depth Localization and Source Separation for Focal Primary Currents*. Autumn School "The Multimodal Brain", Tübingen |

## Diploma Thesis

| | |
|---|---|
| Title | *Hierarchical Bayesian Approaches to the Inverse Problem of EEG/MEG Current Density Reconstruction* |
| Supervisors | Prof. Dr. Martin Burger and PD Dr. Carsten H. Wolters |
| Submission | Mar. 2011 |

## Teaching

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| 2013 | Introductory course to Matlab |
| since 2012 | Supervision of Bachelor and Masters theses. |
| 2009–2010 | Student tutor for an exercise for the course *Stochastics* |
| 2007–2008 | Student mentor for the courses *Theoretical Physics III and IV* |

## Summer Schools

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| Jun. 11-15, 2012 | "Summer School on Computational Methods for Inverse Problems in Imaging, Kuopio |
| Oct. 5-6, 2011 | Autumn School "The Multimodal Brain", Tübingen |
| Jul. 25-29, 2011 | Introductory Workshop on Inverse Problems, Cambridge |

## Education

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| 2005-2011 | **Studies in Mathematics with minor in Physics**, *University of Münster*, grade of diploma: 0.85 (with greatest distinction). |

2006-2011 **Studies in Physics with minor in Computer Science**, *University of Münster*, grade of intermediate diploma: 1.0.

Aug. 2007 **Summer Academy**, *Collective behavior in physical, biological and other many particle systems*.
by Prof. Dr. Erich Runge, Prof. Dr. Philipp Maass and PD Dr. Michael Bachmann

Aug. 2006 **Summer Academy**, *Pattern Formation: Phenomena and Modeling*.
by Prof. Dr. Andreas Mielke and Prof. Dr. Stefan Kehrein

1995–2004 **Secondary education (Abitur)**, *Gymnasium Mellendorf*, final grade: 1.0.

1991–1995 **Primary education**, *Grundschule Bissendorf*.

## Experience

since 2014 **Research associate**, *Department of Computer Science, University College London*.

2012-2014 **Research assistant**, *Institute of Computational and Applied Mathematics, University of Münster*.

2009–2010 **Student assistant**, *Institute of Mathematical Statistics*.

2008–2009 **Student research assistant**, *Institute for Biomagnetism and Biosignalanalysis*.

March 2008 **Internship**, *Max-Planck-Institute for Dynamics and Self-Organization*, Göttingen.
Laboratory for Fluid Dynamics, Pattern Formation and Nanobiocomplexity

2007–2008 **Student assistant**, *Institute for Theoretical Physics*.

2004–2005 **Alternative civilian service (Zivildienst)**, *gemeinnützige Gesellschaft für integrative Sozialdienste mbH (GIS), school escort for a disabled child*.

## Engagement

University Students' union (Fachschaft), faculty council (Fachbereichsrat), miscellaneous faculty committees, faculty task force *Public Relations*, faculty task force *Networking*, organizer of the *Lange Nacht der Mathematik* (*Long Night of the Sciences* for mathematics), co-organizer of the awarded project *Studies an die Schulen*

Gymnasium Student council (Schülervertretung), school president (Schülersprecher)

Miscellaneous Local youth council (Jugendparament der Gemeinde), miscellaneous political activities

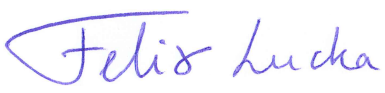
## References

**Prof. Dr. Martin Burger:** martin.burger@uni-muenster.de

**PD Dr. Carsten Hermann Wolters:** carsten.wolters@uni-muenster.de

**Prof. Dr. Samuli Siltanen:** samuli.siltanen@iki.fi

**Prof. Dr. Simon Arridge:** s.arridge@cs.ucl.ac.uk



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