

# CURRICULUM VITAE

CHRISTOPH BRUNE

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## CONTACT INFORMATION

Address: Theodor-Fontane-Str. 19  
48712 Gescher, Germany

Phone: +49(0)251-918903

Cell phone: +49(0)172-2603539

Email: mail@christoph-brune.de

Homepage: <http://www.christoph-brune.de>

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## PERSONAL DETAILS

Date of Birth: June 6, 1982

Place of birth: Kevelaer, Germany

Citizenship: German

Marital Status: Married

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## EDUCATION

08/2010- Temporary postdoctoral position at the European Institute for Molecular Imaging and the University of Münster

07/2010 **Ph.D.** in Mathematics, University of Münster (summa cum laude)  
Date of the Dissertation: July 15, 2010  
Advisors / Referees: Prof. Martin Burger, Prof. Stanley Osher  
*Title of Thesis: 4D Imaging in Tomography and Optical Nanoscopy*

12/2008-07/2010 Doctoral research scholarship by the German Telekom Foundation

09/2007-11/2008 Joint project of the German Federal Ministry of Education and Research (BMBF) *INVERS: Deconvolution problems with sparsity constraints in optical nanoscopy and mass spectroscopy*

09/2007-07/2010 PhD student in the Workgroup Imaging of the Institute for Computational and Applied Mathematics, University of Münster

- 08/2007      **Diploma thesis** in applied mathematics and computer science, University of Münster (double degree, distinction: very good)  
*Title of Thesis: Optical flow computation and edge detection using optimization methods*
- 10/2002-08/2007    **Undergraduate studies** at University of Münster, diploma in Mathematics and diploma in Computer Science
- 2001            Higher education entrance qualification obtained at Gymnasium Remigianum Borken, Germany
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## INTERNSHIPS & COMMUNITY SERVICE

- 08/2006-10/2006    IT-Consulting zeb/ in Münster *Topic: Web applications with Java Server Faces and AJAX*
- 2001-2002        Community service in the nursing home in Raesfeld
- 1998            Industrial internship at the thrift institution Westmünsterland
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## RESEARCH INTERESTS

4D image processing and image reconstruction

Inverse problems with sparsity constraints in biomedicine and physics

Regularization with singular energies

Bregman distances and inverse multiscale methods

Analysis of variational methods, convergence rates

Models for motion estimation and optimal transport

Optimization and optimal control of partial differential equations

Convex splitting methods for large scale optimization problems

Computational science and parallelization

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## GRANTS & RESEARCH PROJECTS

*Research fellowship by the German Telekom Foundation*  
Own application and presentation in front of foundation committee  
Double-stage procedure, success rate: 9 out of 48 candidates

BMBF joint research project *INVERS: Deconvolution problems with sparsity constraints in optical nanoscopy and mass spectroscopy*

Member of the Collaborative Research Centre 656, *Molecular Cardiovascular Imaging*, German Research Foundation

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## INTERNATIONAL RESEARCH STAYS

- 03/2010            Research visits at the workgroups of Prof. Hintermüller and Prof. Kunisch, University of Graz, Austria.
- 11/2009            Research visit at Prof. Stanley Osher and the Institute for Pure and Applied Mathematics (IPAM), University of California, Los Angeles, USA.
- 09/2009-11/2009    Research stay at Prof. Eldad Haber, Mathematics and Computer Science, University of British Columbia, Vancouver, Canada.  
*Topic: Numerical methods for time dependent image reconstruction based on optimal transport.*  
Further collaboration: Prof. Uri Ascher, Computer Science and Prof. Doug Oldenburg, Geophysical Inversion Facility, UBC Vancouver.
- 07/2009            Research stay at the workgroup mathematical image processing of Prof. Scherzer, Johann Radon Institute for Computational and Applied Mathematics (RICAM), University of Linz, Austria.
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## TEACHING EXPERIENCE

- 04/2011-07/2011    Planned *lecture "Numerics of Partial Differential Equations"*, together with Prof. Burger, summer semester 2011, University of Münster.
- 04/2011-07/2011    Planned *seminar "Modeling in Biomedical Imaging"*, together with Prof. Burger, summer semester 2011, University of Münster.
- 10/2010-03/2011    *Lecture and tutorial "Variational Methods in Biomedical Imaging"*, winter semester 2010/2011, University of Münster.  
The lecture has been designed together with Prof. Burger. I give more than half of the lectures on my own.  
→ [Link to the course](#)
- 2009                Participation in the *ProMath mentor program* for elementary students
- 01/2009            Participation in the student project: *Mathe für kleine Asse*, together with the didactics of mathematics and the university clinics in Münster

- 11/2008 Participation in the University Day 2008 for pupils and students, University of Münster
- 05/2008 Participation in the *Long Night of Mathematics*, in the course of the year of science Mathematics, University of Münster
- 10/2006-03/2007 Student assistant as an exercise instructor for the course *numerical mathematics* by Prof. Maurer
- 10/2004-03/2005 Student assistant as an exercise instructor for the course *linear algebra* by Prof. Schneider
- 09/2004-10/2004 Student assistant as a group leader of the preliminary course for mathematics by Prof. Ischebeck

### **Co-supervision of diploma students**

- 2010 Nina Schumacher, Topic: 3D Image Rekonstruktion in Microscopy
- 2010 Angel Angelov, Topic: Multimodal Registration
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### **FURTHER ACTIVITIES**

*Member of the taskforce "Public Relations"*, objective: external presentation of the department mathematics and computer science, including conception and content management system TYPO3 for the web presentation of the department

*Conception and realization of the web presentation* of the working group and the institute for computational and applied mathematics

Installation, design and maintenance of the *publication system Basilic*

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### **PARTICIPATION IN CONFERENCES AND WORKSHOPS**

#### **2011**

*Invitation to ICIAM 2011*, Vancouver, Canada, Jul 18-22, 2011

*Invitation to SIAM Conference on Optimization*, Darmstadt, Germany, May 16-19, 2011

*Invitation to GAMM 82th Annual Meeting of the International Association of Applied Mathematics and Mechanics*, Graz, Austria, April 18-22, 2011

#### **2010**

*SIAM Conference on Imaging Science*, Chicago, Illinois, USA, April 12-14, 2010

*GAMM 81st Annual Meeting of the International Association of Applied Mathematics and Mechanics, Karlsruhe, March 22-26, 2010*

*Workshops SciencePlus: Doctoral viva & disputation: Well prepare for the home stretch and job- & career management for doctoral candidates, German Telekom Foundation, Bonn, Feb 1-2, 2010*

## **2009**

*Monge-Kantorovich Optimal Transport - Theory and Applications, Santa Fe, New Mexico, USA, Oct 19-21, 2009*

*Pacific Northwest Numerical Analysis Seminar, University of British Columbia, Vancouver, Canada, Sep 26, 2009*

*AIP Conference on Applied and Inverse Problems, Vienna, Austria, Jul 20-24, 2009*

*CUDA-Workshop, Parallel programming on graphics processing units (GPUs) with Matlab and C++, University of Muenster, Germany, Jul 3, 2009*

*Workshop on scientific soft skills: content, presentation and body language, German Telekom Foundation, Cologne, Germany, Jun 22-23, 2009*

*SSVM 2nd International Conference on Scale Space and Variational Methods in Computer Vision, Voss, Norway, Jun 1-5, 2009*

*Annual Scholarship Meeting of German Telekom Foundation, Cologne-Bonn, Germany, Mar 25-27, 2009*

## **2008**

*Mentoring workshop and 5th anniversary celebration of German Telekom Foundation, Cologne-Bonn, Germany, Dec 16-17, 2008*

*The MathWorks Workshop, Matlab for C/C++ Programmers, Cologne, Germany, Dec 10, 2008*

*Annual meeting of the joint research project INVERSE of German Federal Ministry of Education and Research (BMBF), Bremen, Germany, Dec 4, 2008*

*MIID08 Meeting of German Federal Ministry of Education and Research (BMBF) projects with public relations activities, Mathematics for innovation in industry and services, Duisburg, Germany, Oct 26-28, 2008*

*CIME Summer School 2008 - Level Set and PDE based Reconstruction Methods: Applications to Inverse Problems and Image Processing (Organizers: Osher, Burger, Mennucci, Rumpf, Dorn), Cetraro, Italy, Sep 8-13, 2008*

*SIAM Conference on Imaging Science jointly with SIAM Annual Meeting, San Diego, California, USA, Jul 7-9, 2008*

*GAMM 79th Annual Meeting of the International Association of Applied Mathematics and Mechanics, Bremen, Germany, Mar 31 - Apr 4, 2008*

COMSOL Multiphysics Workshop, Finite Element Software, Dortmund, Germany,  
Mar 5, 2008

## **2007**

CeNoS Workshop, Center of Nonlinear Science, Windows to Complexity, Münster,  
Germany, Nov 27, 2007

Opening Workshop of joint research project INVERS of German Federal Ministry  
of Education and Research (BMBF), University of Göttingen, Germany, Dec 7,  
2007

CFG 13th Czech-French-German International Conference on Optimization, Heidel-  
berg, Germany, Sep 17-21, 2007

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## ORAL PRESENTATIONS

### **Talks at Conferences & Workshops**

*Invited talk at the ICIAM 2011, Vancouver, Canada, Jul 18-22, 2011*

*Invited talk at the SIAM Conference on Optimization, Darmstadt, Germany, May 16-  
19, 2011*

*Invited talk at the GAMM 82th Annual Meeting of the International Association of  
Applied Mathematics and Mechanics, Graz, Austria, April 18-22, 2011*

*SIAM Conference on Imaging Science, Chicago, Illinois, USA, Apr 12-14, 2010*

*GAMM 81th Annual Meeting of the International Association of Applied Mathematics  
and Mechanics, Karlsruhe, Mar 22-24, 2010*

*AIP Conference on Applied and Inverse Problems, Vienna, Austria, Jul 20-24, 2009*

*SSVM 2nd International Conference on Scale Space and Variational Methods in  
Computer Vision, Voss, Norway, Jun 1-5, 2009*

*Annual Scholarship Meeting of German Telekom Foundation, Cologne-Bonn, Ger-  
many, Mar 25-27, 2009*

*Annual Meeting of joint research project INVERSE of German Federal Ministry of  
Education and Research (BMBF), Bremen, Germany, Dec 4, 2008*

*CIME Summer School 08 - Level Set and PDE based Reconstruction Methods:  
Applications to Inverse Problems and Image Processing (Organizers: Osher,  
Burger, Mennucci, Rumpf, Dorn), Cetraro, Italy, Sep 8-13, 2008*

*Two talks at SIAM Conference on Imaging Science jointly with SIAM Annual Meeting,  
San Diego, California, USA, Jul 7-9, 2008*

GAMM 79th Annual Meeting of the International Association of Applied Mathematics and Mechanics, Bremen, Germany, Mar 31 - Apr 4, 2008

Opening Workshop of joint research project INVERSE of German Federal Ministry of Education and Research (BMBF), University of Göttingen, Germany, Dec 7, 2007

CFG 13th Czech-French-German International Conference on Optimization, Heidelberg, Germany, Sep 17-21, 2007

### **Talks in Seminars & Colloquia**

*Invited talk in the colloquium of mathematics*, University of Lübeck, Germany, Dec 1, 2010

*Research seminar of the workgroup imaging*, University of Münster, Nov 3, 2010

*Talk for the disputation within the Ph.D. defense process*, University of Münster, Jul 15, 2010

*Research seminar of Prof. Kunisch and the collaborative research centre MOBIS*, University of Graz, Austria, Mar 10, 2010

*Primal and Dual Bregman-TV Methods for Image Reconstruction*, UCLA IPAM Level Set Collective, Los Angeles, USA, Nov 17, 2009

*GIF Research Meeting, Geophysical inversion facility*, University of British Columbia, Vancouver, Canada, Oct 29, 2009

*SCAIM Seminar, Scientific Computing and Applied and Industrial Mathematics*, University of British Columbia, Vancouver, Canada, Oct 6, 2009

*Meeting of Geophysical inversion facility*, University of British Columbia, Vancouver, Canada, Sep 25, 2009, Short research talk

*Student project: "Mathe für kleine Asse"*, jointly held with B. Schlake and Prof. Burger, University Clinics Münster, Jan 20, 2009

*Talk at the university day*, jointly held with M. Franek and A. Sawatzky, University of Münster, Nov 6, 2008

*Talk within the evaluation of the department of mathematics and computer science*, jointly held with Prof. Burger and Prof. Ohlberger, University of Münster, Jun 9, 2008

*What do a game console and heart diagnostic have in common?, Long Night of Mathematics in course of the year of science math*, jointly held with M. Franek and A. Sawatzky, University of Münster, Mai 30, 2008

*EM-TV Methods in Image Reconstruction, Research Seminar*, Institute for Computational and Applied Mathematics, Kleinwalsertal, Austria, Jan 23, 2008

*Optical Flow, Colloquium of applied mathematics*, University of Münster, 2007

*Online Media Processor system for the processing of multimedia web contents*, talk in the student project seminar, 2006

*SQP Methods, research seminar optimization*, University of Münster, 2006

*Reconstructing Depth Information from Surface Normal Vectors*, Research Seminar Computer Vision and Pattern Recognition, University of Münster, 2005

### **Poster Presentations**

*Total Variation Processing of Images with Poisson Statistics*, CAIP 2009 - 13th International Conference on Computer Analysis of Images and Patterns, Münster, Germany, Sep 2-4, 2009

*Mathematics provides a deep insight - inverse Problems in tomography, microscopy and spectroscopy*, MIID08 Meeting of German Federal Ministry of Education and Research (BMBF) projects with public communication activities, Mathematics for innovation in industry and services, Duisburg, Germany, Oct 26-28, 2008

*Accurate EM-TV Algorithm in PET with Low SNR*, IEEE NSS/MIC/RTSD 2008 - Nuclear Science Symposium & Medical Imaging Conference, Dresden, Germany, Oct 19-25, 2008

*Deconvolution problems in optical nanoscopy*, Evaluation of the department of mathematics and computer science, University of Münster, Jun 9, 2008

### **Organization of Events**

Minisymposium *Optimization in Biomedical Applications* (double-session) at the SIAM Conference on Optimization, Darmstadt, Mai 16-19, 2011

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## REVIEW FOR INTERNATIONAL JOURNALS

CMS, Communications in Mathematical Sciences (2x)

IJCV, International Journal of Computer Vision (3x)

SISC, SIAM Journal on Scientific Computing (1x)

JVCI, Journal of Visual Communication and Image Representation (4x)

IEEE, International Parallel and Distributed Processing (2x)

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## COMPUTER SKILLS

### Programming languages

C++, Java, PHP, Prolog

Matlab, LaTeX, Mathematica, Maple

### Further knowledge in computer science

Administration of computer systems (software and hardware)

Implementation with parallelization software (CUDA/OpenCL on GPUs and MPI/OpenMP for clusters)

Webapplications (JavaServerFaces)

Content-Management System Typo3

Publication System Basilic

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## LANGUAGES

**German** Mother tongue

**English** Advanced courses

**Spanish** Intermediate and reading courses

**Latin**

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## REFERENCES

Persons, who are familiar with my professional qualifications and my character:

### **Professor Stanley Osher**

Director of Applied Mathematics  
University of California, Los Angeles

Email: [sjo@math.ucla.edu](mailto:sjo@math.ucla.edu)  
Homepage: <http://www.math.ucla.edu/~sjo/>

### **Professor Martin Burger**

Institute for Computational and Applied Mathematics  
University of Münster, Germany

Phone: +49 251 83-33793  
Email: [martin.burger@uni-muenster.de](mailto:martin.burger@uni-muenster.de)  
Homepage: <http://wwwmath.uni-muenster.de/u/burger>

### **Professor Eldad Haber**

Department of Mathematics and Earth and Ocean Science  
University of British Columbia, Vancouver

Phone: +1 604 822 9068  
Email: [haber@math.ubc.ca](mailto:haber@math.ubc.ca)  
Homepage: <http://www.math.ubc.ca/~haber>

### **Professor Thorsten Hohage**

Institute for Computational and Applied Mathematics  
Georg-August-University of Göttingen, Germany

Phone: +49 551 39-4509  
Email: [hohage@math.uni-muenster.de](mailto:hohage@math.uni-muenster.de)  
Homepage: <http://num.math.uni-goettingen.de/hohage>

### **Dr. Andreas Schönle**

Department of NanoBiophotonics  
Max-Planck-Institute for Biophysical Chemistry  
Göttingen, Germany

Phone: +49 551 201-2611  
Email: [aschoen@gwdg.de](mailto:aschoen@gwdg.de)  
Homepage: <http://www.mpibpc.mpg.de/groups/hell/>