

# Eike Middell

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**Email** eike@middell.net

**Year of Birth** 1982  
**Nationality** German



## Education

**Feb 2015 - Nov 2008** Ph.D. in Physics - Humboldt Universität zu Berlin / DESY Zeuthen  
**Thesis:** "Search for neutrino-induced particle showers with IceCube-40"

**Oct 2008 - Sep 2002** Diploma in Physics - Humboldt Universität zu Berlin / DESY Zeuthen  
**Thesis:** "Reconstruction of Cascade-like Events in Icecube"

## Work History

**Present - Apr 2023** Intelligent Biomedical Sensing (IBS) Lab, TU Berlin - BIFOLD, Berlin  
*PostDoc and Lead Software Engineer*

**Present - Jan 2019** Self-employed  
*Freelance Scientific Software Developer*

**Present - Jan 2021** Grandperspective GmbH, Kleinmachnow  
Development of algorithms for the 3D reconstruction of gas clouds for a remote sensing solution to detect gas leaks in industrial sites.  
**Technologies:** Python's Scientific Stack, PyTorch, C++, pybind11, Eigen, VTK, Qt, PostGIS, geoserver, fastapi, docker

**Mar 2022 - Jul 2020** Flowpilot GmbH, Berlin  
Contributed to several data science tasks in the context of cashflow analysis and forecasting for small and medium enterprises. Adapted an attention-based deep neural network to the task of interpretable cashflow forecasting based on accounting data. Classification of bank transactions.  
**Technologies:** Tensorflow, Pandas, scikit-learn, Dask, flask, Elasticsearch, Kibana, AWS, docker

**Dec 2021 - Jul 2020** Fünfundvierzigste Babelsberg Film GmbH, Potsdam  
Design, installation and maintenance of a director's studio computer network.

**Sep 2020** inHouse VFX, Berlin  
Consulting on network security and remote work during the pandemic.

- May 2022 - Aug 2019** Charité, Institut für Biometrie und Klinische Epidemiologie, Berlin
- Development and maintenance of an online learning tool for students and researchers to deal with frequently held statistical misconceptions. The tool comprises a multiple choice test with optional aids. A study was conducted to prove the tool's efficacy. To this end, the application offered data protection compliant ways of handling the admission of study participants and the monitoring of user interactions.
- Technologies:** Django, JQuery, Bootstrap, docker
- Aug 2019 - Jun 2019** Trade Machines FI GmbH, Berlin
- Development of a pattern matching algorithm to detect watermarks in user uploaded product photos.
- Technologies:** OpenCV, CMake, Tensorflow
- Nov 2019 - Apr 2019** Max-Planck-Institut für Bildungsforschung, Berlin
- Development of a customized data analysis pipeline for a fNIRS experiment.
- Technologies:** Python's Scientific Stack, LabVIEW
- Nov 2018 - Jun 2015** NIRx Medizintechnik GmbH, Berlin  
*Team Lead Software Development (team: 3-6)*
- Software development for the acquisition and analysis of functional near-infrared spectroscopy (fNIRS) data. Supervised the software development for the "NIRSport 2" wireless fNIRS imager from conception to market release. Worked on time-series analysis of fNIRS data, noise model estimation, assessment of functional activation by describing the data with a general linear model and machine learning methods. 3D visualization of NIRS data using standard fMRI atlases. System administration.
- Technologies:** C++,Python and its Scientific Stack, pybind11, Qt5, CMake, conda, Git, YouTrack, LabVIEW, Matlab, VTK, Statistical Parametric Mapping, Lab Streaming Layer, Intel Edison
- May 2015 - Apr 2014** Universitätsklinikum Freiburg, Research Group "Experimental Neuropsychology", Freiburg and NIRx Medizintechnik GmbH, Berlin  
*PostDoc*
- Joint research project with NIRx Medizintechnik GmbH aimed at using functional near-infrared spectroscopy (fNIRS) to assess side-effects and possible improvements of deep brain stimulation in the therapy of Parkinson's disease. Improved the real-time digital signal processing and instrument control software of a fNIRS imager prototype.
- Technologies:** C#/WPF, C, Python
- Sep 2013 - Dec 2008** Deutsches Elektronensynchrotron (DESY), Zeuthen and Universität Bonn  
*Ph.D. Student*
- Developed multivariate data analyses to search for rare neutrino interactions in data taken with the half-completed IceCube neutrino telescope. Development of analysis tools. Optimized the batch production of Monte Carlo simulations.
- Technologies:** C++, Boost, Boost.Python, Python, numpy, scipy, HDF5, ROOT, TMVA, Sun Grid Engine, LaTeX

- Jun 2008 - Jul 2007** - Deutsches Elektronensynchrotron (DESY), Zeuthen  
*Diploma Student*
- Developed a maximum-likelihood estimator to solve the inverse problem of inferring the direction and deposited energy of neutrino-induced particle showers.
- Technologies:** C++, Python, numpy, scipy, HDF5, ROOT, Sun Grid Engine, LaTeX
- Jun 2008 - Feb 2006** - Deutsches Elektronensynchrotron (DESY), Zeuthen  
*Research Assistant*
- Worked on instrument-control software for the Baikal Neutrino telescope: fault tolerant time-synchronization at a remote site, monitoring and redundancy of critical network components deployed under water.
- Technologies:** GPS, NTP, SNMP, RSTP, Python, ROOT, Qt4
- Sep 2005 - May 2005** - Humboldt Universität zu Berlin, Department of Chemistry, Berlin  
*Research Assistant*
- Developed software for data analysis and hardware control of a spectrograph.
- Technologies:** Java/Swing, LabVIEW
- Jul 2007 - Nov 2004** - Amelia-Earhart-Oberschule, Berlin  
*System Administrator*
- Maintenance of a school network of ca. 40 computers. Setup and maintenance of a thin-client server to increase the use of the available, aged computer workstations.
- Technologies:** Edubuntu, LTSP, Win 98/XP, Samba
- Jun 2002 - Aug 2001** - Sozialstation "Die Brücke" ISB, Berlin  
*Civilian Service - personal assistant for people with severe disabilities*

## Research Visits

- 2011** - Amundsen-Scott South Pole Station, Antarctica  
 Construction work and calibration measurements at the surface air shower array of IceCube (IceTop).
- 2009-2006** - Lake Baikal, Siberia  
 Regular participation in the annular winter expeditions to the Lake Baikal Neutrino telescope. Maintenance work and development on the data acquisition system.

## Teaching

- 2017-2015** - supervised a Ph.D. student, introductory lessons on workshops, technical customer support
- 2009-2007** - 2x teaching assistant for nuclear and particle physics courses

## Publications

J. Gemignani *et al.*, "Improving the analysis of near-spectroscopy data with multivariate classification of hemodynamic patterns: A theoretical formulation and validation", *J. Neural Eng.* **15** 4 (2018)

M. G. Aartsen *et al.*, "Search for neutrino-induced particle showers with IceCube-40", *Phys. Rev. D* **89** 102001 (2014)

E. Middell, "Search for atmospheric neutrino-induced particle showers with IceCube-40", *Proc. of the 32nd ICRC, Beijing, China*, #1097 (2011)

E. Middell, J. McCartin and M. D'Agostino for the IceCube Collaboration, "Improved Reconstruction of Cascade-like Events in IceCube", *Proc. of the 31st ICRC, Łódź, Poland*, #0708 (2009)

V. Aynutdinov *et al.*, "The Baikal neutrino experiment: Status, selected physics results, and perspectives", *Nucl.Instrum.Meth.* **A588** 99-106 (2008)

(past member of the IceCube and Baikal author lists)

## Selected Talks and Posters

F. K. Schumacher *et al.*, "Network effects of subthalamic nucleus deep brain stimulation on the prefrontal cortex", OHBM, Vancouver (2017) (*Poster*)

E. Middell, "Fundamentals of NIRS data analysis & nirsLAB introduction", Getting started with fNIRS and NIRx - 2 day workshop, Berlin (2017) (*talk*)

E. Middell, C. P. Kaller, F. K. Schumacher, C. H. Schmitz, "Continuous multi-channel NIRS measurements of the prefrontal cortex with high spatial and high temporal resolution", BrainLinks-BrainTools Annual Meeting, Freiburg (2014) (*Poster*)

E. Middell, "Search for diffuse neutrino fluxes with IceCube", Jahrestagung der Astronomischen Gesellschaft, Hamburg (2012) (*Talk*)

E. Middell, "Dark Matter: Kleine Teilchen, dunkle Massen.", Science Slam, Berlin (2011), (*Popular Scientific Talk*)

E. Middell, "Reconstruction and Identification of Neutrino-Induced Particle Showers in IceCube", Very Large Volume Neutrino Telescope Workshop, Erlangen (2011) (*Talk*)

E. Middell, "Cascade and  $\nu_\tau$  Reconstruction in IceCube", Mediterranean Antarctic Neutrino Telescope Symposium, Berlin (2009) (*Talk*)

## Languages

<b>English</b>	fluent
<b>French</b>	basic
<b>German</b>	mother tongue