# Dominik Dold, M.Sc.

born in Titisee-Neustadt, Germany
dominik.dold@kip.uni-heidelberg.de
https://dodo47.github.io/
computational neuroscience, machine & deep learning, AI, statistics


## Work experience

2016 – ···· **Research Assistent.** Petrovici group for brain-inspired computing, U. Heidelberg.
2017 – 2018 **Guest Researcher.** Senn group for comp. neuroscience, U. Bern.
2014 – 2015 **Research Assistent.** Evers group for theo. quantum dynamics, MPIK Heidelberg.

## Summer schools

June 2019 **DS$^3$ Data Science Summer School.**
Five-day school co-organised by the École polytechnique & the DATAIA Institute.

March 2019 **IRCN Course in Neuro-Inspired Computation.**
Invited after application. Four-day course offered by the U. Tokyo.

## Training

August 2019 **Team Communication - Key Roles and Intercultural Contexts Workshop.**
March 2019 **University Leadership and Management (Epigeum).**
**Courses: Leadership and management, Managing people, Strategic planning.**
February 2019 **Business management course "Grundlagenwissen BWL".**
October 2018 **Computational Physics with GPUs.**
April 2017 **Machine learning in science and industry.**
Courses offered by the Heidelberg Graduate School for Physics.

## Skills

Languages very good writing, reading and communication skills in english
Coding Python & tensorflow, Matlab, Mathematica, C(++), HTML
Software familiar with Linux bash shell and Windows systems, version control (git), integrated testing (jenkins), job scheduler (slurm, moab)
Design LaTeX, Microsoft Office, Microsoft Powerpoint, Inkscape, Gimp
Teaching co-supervised one master's thesis and supervised lecture tutorials, physics experiments for students and soft skill courses for first-year students
Social organised the Journal Club of my research group during my Ph.D.

## Communication & presentation skills

### Selected talks

2019 **Selected talk at Cosyne 2019**
Cosyne Conference 2019, Lisbon, Portugal.
Selected from submitted abstracts.

## Communication & presentation skills (continued)

2018
- **Invited talk at INI (ETH)**
  ETH Institute of Neuroinformatics, Zurich, Switzerland.
  Invited by Dr. João Sacramento.
- **Intel Neuromorphic Research Community (INRC) Workshop**
  Workshop, hosted by Intel, Reykjavik, Iceland.
  Invited as INRC Project Representative.
- **Neuroplasticity: From Bench to Machine Learning**
  Workshop, Institute of Advanced Studies, U. Surrey, England.
  Selected from submitted abstracts.
- **From Neuroscience to Machine Learning**
  Workshop, European Institute for Theoretical Neuroscience, France.
  Invited as a replacement for Prof. Dr. Walter Senn.

### Poster presentations

2019
- **Bernstein Conference 2019** in Berlin, Germany.
- **CNS Conference 2019** in Barcelona, Spain.
- **DS$^3$ Data Science Summer School** in Paris, France.
- **IRCN Course in Neuro-Inspired Computation** in Tokyo, Japan.

2018
- **Bernstein Conference 2018** in Berlin, Germany.
- **EMBO Dendrites Workshop 2018** in Heraklion, Greece.

2017
- **Bernstein Conference 2017** in Göttingen, Germany.
- **CNS Conference 2017** in Antwerp, Belgium.

## Awards

2019
- First prize in the finals of the 2019 International Collegiate Competition for Brain-Inspired Computing (ICCBC 2019) at Tsinghua University in Beijing, China.

## Education

2016 – · · · ·
- **Dr. rer. nat., Heidelberg Graduate School for Physics, Germany.**

2014 – 2016
- **M.Sc. in Physics, Heidelberg University, Germany.**
  Thesis title: *Stochastic Computation in Spiking Neural Networks Without Noise.*

2010 – 2014
- **B.Sc. in Physics, Heidelberg University, Germany.**
  Thesis title: *Energy Conservation in Fano Spectral Line Shape Control.*

2001 – 2010
- **Abitur, Gymnasium am Romäusring, Villingen-Schwenningen.**

## Research publications, theses & proposals

### Journal articles and preprints

1. Senn*, W., **Dold*, D.**, Binas, J., Schindler, K., Bengio, Y., Sacramento, J. & Petrovici, M. A. (2019). Lagrangian dynamics of dendritic microcircuits enables real-time error backpropagation across cortical areas. *in prep.*
2. **Dold*, D.**, Bytschok*, I., Kungl, A. F., Baumbach, A., Breitwieser, O., Senn, W., … Petrovici*, M. A. (2019). Stochasticity from function – why the bayesian brain may need no noise. *Neural Networks*, *119*, 200–213. doi:https://doi.org/10.1016/j.neunet.2019.08.002
3. Kungl, A. F., Schmitt, S., Klähn, J., Müller, P., Baumbach, A., **Dold, D.**, … Koke, C. et al. (2019). Accelerated physical emulation of bayesian inference in spiking neural networks. *arXiv preprint arXiv:1807.02389 (submitted, currently in review)*.
4. Bytschok*, I., **Dold*, D.**, Schemmel, J., Meier, K. & Petrovici*, M. A. (2017). Spike-based probabilistic inference with correlated noise. *arXiv:1707.01746 preprint*.

### Theses

1. Zenk, M. (2018). *Spatio-temporal predictions with spiking neural networks*. Master's thesis, co-supervised by **Dold, D.** Heidelberg University.
2. **Dold, D.** (2016). *Stochastic computation in spiking neural networks without noise*. Master's thesis. Heidelberg University.
3. **Dold, D.** (2014). *Energy conservation in fano spectral line shape control*. Bachelor thesis. Heidelberg University.

### Proposals

1. Jordan, J., **Dold, D.**, Petrovici, M. A. & Senn, W. (2018). Real-time error-backpropagation for deep cortical microcircuits in spiking neuromorphic systems. Intel INRC grant.

## References


**Prof. Dr. Walter Senn**
Department of Physiology, University of Bern
Bühlplatz 5, CH-3012 Bern
+41 31 631 8721
senn@pyl.unibe.ch

**Prof. Dr. Andreas Mielke**
Institute for Theoretical Physics
Philosophenweg 19, D-69120 Heidelberg
+49 6221 549431
mielke@tphys.uni-heidelberg.de

**apl. Prof. Dr. Jörg Evers**
Max Planck Institute for Nuclear Physics
Saupfercheckweg 1, D-69117 Heidelberg
+49 6221 516 177
joerg.evers@mpi-hd.mpg.de

**Dr. Mihai A. Petrovici**
Department of Physiology, University of Bern
Bühlplatz 5, CH-3012 Bern
+41 31 631 8718
petrovici@pyl.unibe.ch