

Dear members and friends of the CRC 1461,

We are happy to provide some science news again!

Science News

News from Petro, Alexander and Thomas (CAU, B4):

We recently addressed a problem of the unknown temperature reconstruction from the neuronal signal generated by networks of thermosensitive neurons modeled by the Hodgkin-Huxley formalism (to be presented at MATHMOD 2022). We have shown that the instantaneous firing frequencies of the neurons do not provide

sufficient information for the precise temperature reconstruction and that the temporal patterns of the instantaneous frequencies should be taken into account. The reconstruction was made using the reservoir computing approach with the readout formed out of the discretized (in time) trajectories of the instantaneous frequencies of neurons. Interestingly, more rich information containing the time evolution of membrane potentials in the readout does not lead to any improvement of the unknown input reconstruction. This observation supports one of the fundamental principles of neuroscience stating that, except for a few highly specific contexts, information in neural systems is encoded in the temporal rather than voltage characteristics of action potentials.

Thank you for your contributions!

Please send your Science News (highlights of your research) to Sonja any time!

ATMs in February postponed

Unfortunately, six ATMs planned in February at CAU and TUIL had to be cancelled due to covid-restrictions that prohibited travel as well as the organization of out of turn-courses in general. The ATMs that should have taken place in Ilmenau will be postponed to summer.

Lecture by Philip Hövel at TUIL

Philipp Hövel (University College Cork, Ireland), who is a Mercator-fellow in the CRC, is visiting Ilmenau this February. He gave a two-part lecture entitled “Nonlinear Dynamics, networks, and machine learning” on Feb. 9 and 10, one a basic (1st day) and an advanced level (2nd day). Originally the lecture was planned as an in-person event. However, due to travel restrictions prohibiting participants to attend, the event was offered as

a hybrid-lecture enabling everyone to join in online. This offered a great opportunity also for people who couldn't make it to Ilmenau in the first place. More than 10 doctoral candidates and postdocs from the CRC took part in the lecture. Thanks to Philipp, Claudia and Martin for making this possible!

First CRC Expert Meeting in March 2022

Project C 3 organized a first CRC Expert Meeting on March 10, 2022 entitled *2D implementations of neural networks* (also see Upcoming Events below). C3 aims to develop a two-dimensional (2D) technical implementation of a neural network. This year they plan to realize a 2D master structure, which determines the geometry of the components and connections. But what should such a 2D structure look like to be interesting for a comparison with the hydra in biology? Is it possible to mimic the connectivity and maybe the geometry of a 3D biological system with a 2D network? Please join in via Zoom and discuss 2D network design approaches with the C3-group! The link is available in the OLAT calendar and will be sent out via email.

Info from the Office

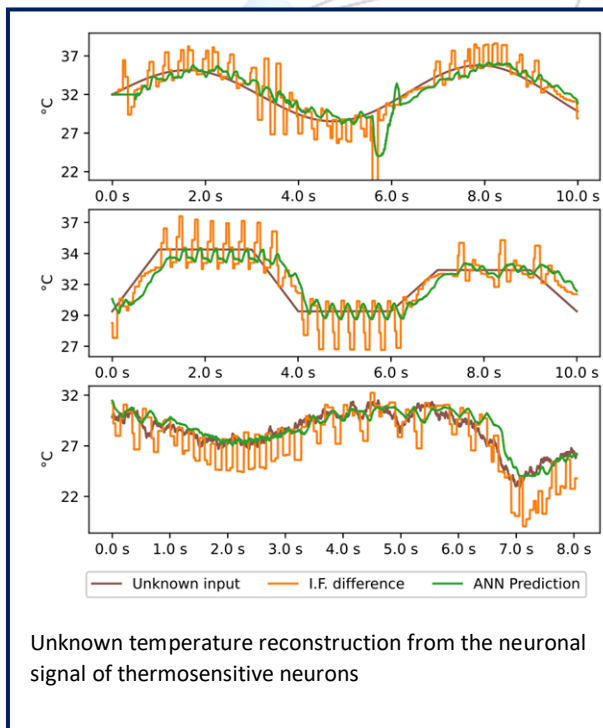
Starting in March, Sonja reduced her working hours to 80 % and will usually take Wednesdays off. She is very much looking forward to her 4-day week :-)

Here is a reminder of the upcoming admin-deadlines in March 2022:

Mar. 1 - 11, 2022 Submission of grant request (Q 2, 2022) by external partners

Mar. 15, 2022 Deadline annual status report for external partners

Mar. 31, 2022 Final deadline annual status report (submission to DFG)



Upcoming Events

Feb. 24, 2022, 16:00 h CRC 1461 Colloquium: *Homeostatic self-organization in neural networks* – Johannes Zierenberg (MPI Göttingen)

Feb. 28, 2022, 14:00 h CRC-Board meeting

Please check OLAT for ATMs planned in March 2022!

Mar. 10, 2022, 09:00 – 11:00 Expert Meeting C3: *2D implementations of neural networks*

Apr. 27 - 28, 2022 **CRC Spring Retreat** (Kiel)

Jun. 29 – Jul. 01, 2022 Intelligent Materials Conference (CAU Kiel)

Sep. 05 – 08, 2022 **CRC International Workshop** (CAU and Color Line)

Members of the CRC

Welcome to Kiel, Jan and Luca!

Jan Trieschmann together with Thomas Mussenbrock is the PI of CRC-project C5 - Multiscale Transport Modeling: From Process Plasmas to Resistive Switching Devices. Until recently, Jan was affiliated to the BTU in Cottbus. However, since Feb. 1 he is officially a junior professor for Theoretical Electrical Engineering at the institute of Electrical Engineering and Information Technology, CAU Kiel. Based on his previous expertise on modeling and simulation of transport phenomena in technological plasmas and nanoelectronic devices, in Kiel he together with his co-workers will continue to establish a multi-scale model, bridging the gap between processing of memristive devices and their nonlinear electrical characteristics. Part of this ambition will involve data-driven modeling and machine learning methods. CRC-postdoc Luca Vialetto joined Jan in Kiel. After obtaining his position in the CRC in October, Luca re-

ceived his doctorate from Eindhoven University of Technology, the Netherlands in November 2021. During his PhD, Luca worked on plasma modelling for CO₂ conversion, electron kinetics, chemistry and transport. His research interests and expertise include plasma modelling, kinetic theory, and computer science. During his project in Kiel, he aims at expanding his knowledge on multi-scale modelling of plasma deposition and machine learning, and, ultimately, at collaborating with researchers in Kiel and outside.



Luca Vialetto (left) and Jan Trieschmann (right) at the Faculty of Engineering in Kiel

Welcome to the CRC, Fatemeh!

Fatemeh Abshari received her Master's degree in Electronics Engineering from Tarbiat Modares University in Iran. In her master thesis "Luminophore layers for optical oxygen sensing", Fatemeh fabricated a novel porous luminophore layer for oxygen gas sensing with high sensitivity. She joined the Chair for Integrated Systems and

Photonics in Feb 2022 as a doctoral researcher in project C3 of the CRC. In her PhD research project, she aims to mimic axon growth on a nanoscale using nano optical templates. She is excited about contributing to future neuromorphic computing systems.



Fatemeh Abshari – new doctoral researcher in project C3

Cheers,

Sonja, Leonie and Hermann

CRC 1461 - Publication Performance	
Journal papers (peer-reviewed)	16
Conference papers (peer-reviewed)	6
Conference contributions	16
Total	38