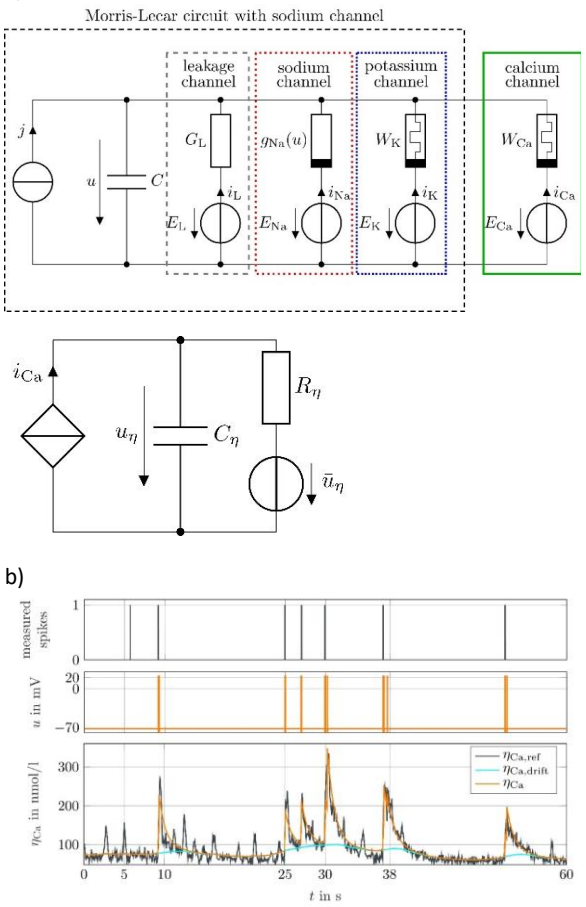
Dear members and friends of the CRC 1461,

we are looking back to some eventful weeks: From Aug 31 – Sep 2 the 2nd Summer School of the iRTG took place at the "NEZ Kollhorst" in Kiel (see p. 2 of this newsletter). Already the week after the CRC held its first International Workshop together with our partners from the University of Groningen, the Netherlands. The workshop took off with an icebreaker at Kiel University and continued with a conference on bio-inspired pathways on the Color Line (more on this in the next newsletter).

Science News

News from Sebastian and Karlheinz (RUB, A1):

Calcium imaging has become quite popular as a method for measuring neuronal activity, as it for instance allows to simultaneously track the neuronal activity of thousands of neurons without requiring the use of electrodes. While this is an important advantage over e.g. electrophysiology, a major drawback is that calcium imaging provides fluorescence traces instead of action potential measurements. Since there is no direct linking between fluorescence traces and electrical signals such as voltage or current, it is especially challenging to mimic the data obtained by calcium imaging by electrical circuits. Recently, we published an article proposing a circuit approach to deal with this issue based on a relationship between fluorescence traces and calcium concentrations. In particular, we modified the Morris-Lecar model and utilized its equivalent electrical circuit, since it provides a calcium current in addition to action potentials. We integrated this calcium current with an RC circuit to calculate a calcium concentration. The latter can then be compared to the calcium concentrations obtained from the converted, measured fluorescence traces. A wave digital emulation has been used for verification purposes by mimicking several calcium imaging measurements of mouse neurons.



a) Morris-Lecar circuit for providing action potentials and calcium current (left) and RC circuit for calculating the calcium concentration (right).
b) Timing of measured action potentials (top), emulated action potentials (center) and comparison of emulated and measured calcium concentration (bottom).

Reference: Jenderny, S, Ochs, K. Wave digital model of calcium-imaging-based neuronal activity of mice. Int J Numer Model. 2022; e3053. doi:10.1002/jnm.3053

More CRC-News...

Niko Carstens (C2) successfully defended his dissertation entitled „Memristive Dynamics of Ag-based Nanostructures for Neuromorphic Systems" on Aug 22, 2022 at CAU Kiel. The CRC 1461 wishes him all the best for the future!

Two more **ATMs** took place at CAU Kiel in August: B3/B4 offered the so far largest ATM "Introduction to dynamical systems on networks" with participants from all project groups. Bharat with the support of Kamran (B2) performed the ATM "Circuit Design".

CoffeeBreakDown is a podcast-style YouTube channel hosted by two budding scientists, Luca Vialetto (Kiel University, Kiel, Germany) and Aaron Ho (Dutch Institute for Fundamental Energy Research, Eindhoven, the Netherlands). The objective is to strengthen connections between the scientific world and the general public, by involving young researchers, professors, and PhD students to share their thoughts about science and applications. In one of the episodes, Rouven Lamprecht from the CRC 1461 joined to discuss about his work on "neuromorphic computing: materials and fabrication". You can watch this video (and some other episodes) at this link. Another aim of the channel is to improve communication skills and to show the more human part of science, a crucial aspect that is often neglected in the community, as opposed to the technical and factual

one. Please, keep in mind that this is still a learning process that involves the guests and the hosts of this channel. Hence, if you have any suggestions and / or topics you would like to share, feel free to contact Luca.
(Text by Luca Vialetto.)

Summer School 2022

This year's Summer School took place at the NEZ Kollhorst, a beautiful location in Kiel, from Aug 31 to Sep 2. The organizing team, Roshani, Rafael and Folke compiled an agenda that provided a good balance of work and fun. The first day started with a talk by Sonja on the current developments in the iRTG followed by a round of "research karaoke" to break the ice. In the evening the participants had the opportunity to exchange their experiences with different iRTG-measures while enjoying some pizza. The second day started with a workshop on the "Principles of Scientific Communication" (ProScience) which received very good feedback. The afternoon was dedicated to the team-building measure "Summer Olympics" and ended with a talk entitled "Our Brain and Baron Munchhausen" by Hermann. The third day's main event was "Ask a Dr. part II", a panel discussion with the guests Iris Hayes (Phi-Sone AG), Sören Kaps (CAU Kiel), Alexander Schaum (CAU Kiel). In the end the participants were ask to evaluate the Summer School. The final grade for the event is 1,8.

CRC 1461 - Publication Performance	
Journal papers (peer-reviewed)	26
Conference papers (peer-reviewed)	10
Conference contributions	40
Total	**76**

Participants of the Summer School 2022 (© Julia Siekmann)

Upcoming Events

Oct. 11 - 13, 2022 Online-course "Scientific Coding and Computing with MATLAB" for iRTG-members

Oct 13, 2022 3rd Meeting of the CRC-board

Oct. 17 - 20, 2022 ATM A2/A3 (CAU Kiel): *"Quanolis"*

Oct. 27, 2022, 16:00 h CRC 1461 Colloquium: *Title to be announced* – Katharina Krischer (TU Munich)

Nov. 09 - 10, 2022 **CRC Fall Retreat (Online)** – more information will follow soon!

Nov. 15 - 17, 2022 ATM B3/C1/C7 (Ilmenau)

The Summer School organizing team: Rafael Ashkrizzadeh,Roshani Madurawala and Folke Rolf (© Julia Siekmann)

Cheers, Sonja, Leonie and Hermann