

Dear Reader,

You scientists shape this newsletter.

This newsletter is intended for all SPS members, researchers, industries, students, interested specialists and physics friends. Feel free to share this Newsletter within your community. If you would like to share some news with us, please contact [Celine.Lichtensteiger@UniGe.ch](mailto:Celine.Lichtensteiger@UniGe.ch).

## Swiss Physical Society during Corona breakout

These times are special and unprecedented for all of us. The virulence of the Corona outbreak is becoming clearer and clearer by the day and governments world-wide are acting. Drastic measures are imposed involving social distancing and turning down whole industries, affecting all aspects of our social lives. How to balance the right level of measures to 'flatten the curve' as much as possible or as much as needed, demands proper understanding and analysis of available data, as well as properly tuned epidemic models that also take deeper understanding of societal behaviour into account.

Physics and the skills physicists bring along in data analysis and model building, plays an important role here. Especially when physicists join interdisciplinary teams that bring in all the required skills in one place. Such teams have the power to develop reliable descriptions and predictions that are necessary for the right political decisions to be taken - even if these are hard. The same is true for decisions to be taken to curb the global impact man-made climate change is causing.

The Swiss Physical Society is continuing its work. The initial deadline for submitting abstracts to the SPS annual meeting has ended, with far less abstracts collected than in other years - another collateral damage of the Corona outbreak. We have thus decided to extend the abstract submission deadline to 31 March 2020 ([here](#)). With many conferences being cancelled world-wide, you may ask yourselves whether a meeting taking place 29 June to 3 July 2020 will be possible or not. Fact is, there is not enough understanding today to make a firm decision now. We will keep you informed, in the hope of the annual meeting to be conducted as planned.

Meanwhile, we invite you to enjoy a new edition of our monthly newsletter, with topics brought together and edited - this time from our home-office exile.

*Hans-Peter Beck, President*

## WHAT'S UP IN SWITZERLAND?

### Computation on a magnetic track

Finding strategies to merge computational and data storage functionalities in integrated circuits is essential for developing more efficient electronic devices and work to go beyond the end of Moore's Law. Researchers from ETH Zurich and the Paul Scherrer Institute (PSI) have shown how magnetic



domain walls can be manipulated by electric currents in order to perform Boolean logic

operations by exploiting the “lateral chiral coupling” mediated by the interfacial Dzyaloshinskii-Moriya interaction, which they first demonstrated in **2019**. This research, published in the journal Nature, marks an important step towards the development of *logic-in-memory* architectures that overcome the so-called von Neumann bottleneck and reduce the energy used and time needed for the transfer of data between computation and storage units. Read the original article [here](#).

*Image: Author Zhaochu Luo in the Paul Scherrer Institute cleanroom. © Paul Scherrer Institute, Markus Fischer*

## Jost Bürgi Symposium 2020 is cancelled

The upcoming Jost Bürgi Symposium - initially scheduled **1-2 May 2020** in Lichtensteig in Toggenburg, Canton St. Gallen, Bürgi's birthplace - is cancelled due to the actual situation. This Symposium was organized to remind us of the person and work of this Renaissance genius (1552-1632), whose collaboration with Johannes Kepler and Tycho Brahe revolutionised astronomy around 1600 in Prague. In his person, the watchmaker and craftsman merged with the inventor, mathematician, astronomer and artist. You can nevertheless have a nostalgic look on the very attractive programme to be postponed. [\[More\]](#)



## Physics at the Large Hadron Collider turns 10

To mark the upcoming anniversary of 10 years of LHC physics, experiments foremost detector experts reflect on what it took to develop, install and commission the detector and the excitement over first physics results. [\[More\]](#)



*Image: LHCb experiment - dipole magnet and beam pipe. © M Brice & J Ordan/CERN-PHOTO-201812-329-18*

## Tracking down the mystery of matter at the PSI

Researchers at the Paul Scherrer Institute PSI have measured a property of the neutron more precisely than ever before. In the process they could improve significantly the limit on the electric dipole moment of the neutron as compared to previous measurements. With that, it has also become less likely that this dipole moment can



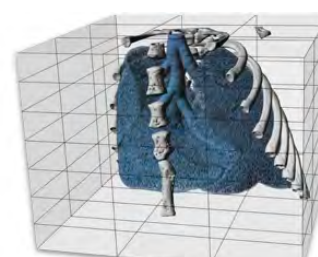
help to explain the origin of all matter in the universe. The researchers achieved this result using the ultracold neutron source at PSI. The announcement by PSI can be found [here](#) and an interview with a former SPS executive board member and co-author [here](#).

*Image: Physicists Philipp Schmidt-Wellenburg (left) and Georg Bison, scientists at the Laboratory for Particle Physics at PSI, in front of the experiment to measure a fundamental property of the neutron: its electric dipole moment. Visible are primarily the round, concentric shields made of sheet metal, which serve to shield external magnetic fields. © Paul Scherrer Institute/Mahir Dzambegovic*

# WHAT'S UP IN EUROPE

## LEAPS engages in COVID-19 research

In **January 2020**, the WHO declared the recent outbreak of coronavirus disease a public health emergency of international concern. The “League of European Accelerator based-Photon Sources” (LEAPS) facilities with their dedicated and



specialised biochemical characterisation techniques support the needs to improve our understanding of the newly identified virus and its possible future evolution as well as to contain the spread, and to develop precise diagnostics and treatment to improve the public health response and patient care. **Several LEAPS facilities have opened priority COVID-19 calls to give rapid access to beamtime for scientists studying the virus.** [\[More\]](#)

First results have been achieved: the SARS-CoV-2 viral main protease structure has been determined at BESSY II. [\[More\]](#) The protease represents a critical target for therapy, and the results of the measurement can offer a new basis for further development of specific antiviral treatments.

In Switzerland, the Swiss Light Source, SLS, at PSI opened a "PRIORITY COVID-19 Call" for short proposals and quick peer review to enable rapid access to beamtime. [\[More\]](#)

*Image: Micrometer-resolution X-ray tomographic full-volume reconstruction of a juvenile rat lung, demonstrating the capability of today's imaging tools to study how the virus attacks the lungs.* [\[More\]](#)

## Treating ventricular tachycardia using 150 MeV protons

Charged particle beams have a long history in treating cancerous diseases. Now, new fields of medical treatment are added. In a clinical world-first, a proton beam has been used to treat a patient with a ventricular tachycardia, which causes unsynchronised electrical impulses that prevent the heart from pumping blood. A 150 MeV beam of protons was directed at a portion of tissue in the heart of a 73-year-old male patient at the National Center of Oncological Hadrontherapy (CNAO) in Italy. The successful procedure had a minimal impact on the delicate surrounding tissues, and marks a new path in the rapidly evolving field of hadron therapy. [\[More\]](#)



*Image: The 80 m-circumference synchrotron at CNAO, which is isolated from the treatment rooms by reinforced concrete shielding.* © CNAO

## WHAT'S UP IN THE WORLD?

### New results from Axion dark matter search

Axions, first introduced as a solution to the strong CP problem in QCD, are viable cold dark matter candidates, as they would be produced non-thermally in the early Universe. Their masses are restricted to a narrower range, from about  $1\mu\text{eV}$  to  $3\text{ meV}$  by laboratory searches and from various astrophysical observations. Searches for axions take advantage of the predicted minuscule coupling of this particle to photons, electrons, as well as to protons or neutrons. The Axion Dark Matter eXperiment (ADMX) searches for dark-matter axion conversion into photons with a microwave-resonant cavity inside a magnetic field. It started to take data in 2016 and it will test a sizeable fraction of the predicted parameter space. In a new [Physical Review Letter](#), the ADMX collaboration reports the search for axions in the mass range between  $2.66$  and  $3.31\ \mu\text{eV}$ , and excludes axions in a benchmark, Dine-Fischler-Srednicki-Zhitnitsky (DFSZ), model in this range. [\[More\]](#)

### The Axion Dark Matter eXperiment



*Image: The ADMX detector taken out from its magnet.* © Rakshya Khatiwada

The Swiss Physical Society (SPS) unites persons interested in physics from university, schools, research, development and industry. The SPS promotes the scientific exchange of ideas in Switzerland and with its international environment.

[Unsubscribe](#) | [Manage profile](#) | [About](#)

[Subscribe as new user](#)