## Federal Environment Minister Svenja Schulze Visits JSC

Svenja Schulze, Federal Minister for the Environment, Nature Conservation and Nuclear Safety (BMU), visited Forschungszentrum Jülich on 28 June 2021 as part of her summer tour. At the Jülich Supercomputing Centre (JSC), she learned about energy-efficient supercomputing and the use of artificial intelligence (AI) for climate and environmental protection. The minister was welcomed by Jülich's new members of the Board of Directors, Dr. Astrid Lambrecht and Prof. Frauke Melchior. Afterwards, Dr. Scarlet Stadtler from JSC and her colleagues provided insights into the KI:STE project (AI Strategy for Earth System Data), which is funded by the BMU. The aim of the project is to use deep learning methods for the in-depth analysis of environmental data, for example to assess risks from natural hazards that are becoming increasingly frequent as a result of climate change. This should enable preventive measures to be initiated at an early stage in the event of extreme meteorological events. Together with the project partners, the technical prerequisites are also to be created to ensure that powerful AI applications for environmental data are made available in a portable way. Prof. Thomas Lippert, head of JSC, concluded by speaking about the ongoing activities on energy-efficient supercomputing at JSC, especially with regard to the development of future exascale systems. Environment minister Schulze was impressed by Jülich's research activities.

**Contact: Dr. Scarlet Stadtler, s.stadtler@fz-juelich.de**

## JSC Involved in Three New NFDI Consortia

The Joint Science Conference in Bonn (GWK) has announced that 10 National Research Data Infrastructure (NFDI) consortia have been newly selected for funding in the second round of calls for proposals. The NFDI was established in 2020 to ensure that the large amount of data from publicly funded science is available to all scientists in Germany. Through the NFDI, the data holdings of science and research are to be systematically made accessible and sustainably secured while maintaining any need for protection as well as being networked on a national and international level. This is outlined in the FAIR (Findable, Accessible, Interoperable, and Reusable) principles. The NFDI is thus intended as a repository of knowledge for the entire research landscape and as a driver for Open Science. It is being funded by the German Federal Ministry of Education and Research.

JSC is involved in three of the new consortia: PUNCH4NFDI (where Forschungszentrum Jülich acted as a co-applicant), FAIRmat, and Text+.

The consortium **PUNCH4NFDI** (Particles, Universe, NuClei, and Hadrons for the NFDI) will develop a new, common science platform for the areas of particle physics, astroparticle physics, astrophysics, and hadron and nuclear physics (https://www.punch4nfdi.de/). "Big Data" and "Open Data" already form part of the day-to-day routines of researchers in these areas. However, the new large-scale science facilities produce exponentially growing volumes of data that pose new challenges for the researchers. For example, the new Square Kilometre Array (SKA) telescope expects that data volume will surpass that of the entire internet as things stand. The PUNCH4NFDI platform will provide central access to the research data, offer modern tools for knowledge extraction, and allow the automatic publication of new research data. JSC will provide crucial support access to the research portal in the different research fields. For example, JSC hosts the German data archive of the international LOFAR telescope and will now develop new data storage concepts for SKA. As an HPC centre, JSC will offer optimized software tools, making data production, management, and analysis more efficient and, therefore, more and more climate compatible. Modern AI methods for analysing large quantities of complex data on supercomputers will play a significant role in achieving this goal. In addition, JSC will provide resources to the consortium such as computing time and storage space.

The **FAIRmat** consortium (https://www.fair-di.eu/fairmat) will create a data infrastructure in the field of condensed matter physics, the chemical physics of solids and materials science. JSC will provide support to this NFDI with infrastructure for prototype workflow implementations.

Furthermore, JSC is a participant in the **Text+** consortium (https://www.text-plus.org/) and supports research on Digital Collections, Lexical Resources, and Editions with its expertise in operating and integrating data and compute services in the Text+ workspace concept.

**Contact: jsc@fz-juelich.de**

## Joint Virtual Lab AIDAS Implemented by CEA and FZJ

Forschungszentrum Jülich (FZJ) and CEA Paris are joining forces and will enhance their cooperation in the field of artificial intelligence, data analytics, and scalable simulation (AIDAS). To this end, François Jacq, General Administrator for the French Alternative Energies and Atomic Energy Commission (CEA), and Prof. Wolfgang Marquardt, Chairman of the Board of Directors at FZJ, signed an Implementing Agreement on the Joint Virtual Lab AIDAS that runs until the end of 2024.

AIDAS aims at advancing simulation in Europe by bringing together the partners' expertise in numerics with respect to AI, quantum computing, and high-performance computing (HPC). So far, around 70 scientists are represented in AIDAS. The lab is led by Christophe Calvin and France Boillod-Cerneux from CEA and Prof. Thomas Lippert and Prof. Kristel Michielsen from the Jülich Supercomputing Centre at FZJ.

CEA and FZJ have a long-standing cooperation in the field of HPC, both in HPC-based application fields and in the development of cutting-edge HPC technologies in Europe. Within AIDAS they will develop scalable and optimized application codes in selected scientific fields, explore the potential benefits of new and future computer architectures, and promote the synergetic interdisciplinary development and use of generic methods and algorithms for exascale computing. In addition, attractive programming and user environments will be developed.

AIDAS is also intended to become a blueprint for further cooperation within the EU and to strengthen the potential and synergies of intra-European strategic partnerships. An important perspective is the preparation of major EU initiatives.

**Contact: Prof. Kristel Michielsen, k.michielsen@fz-juelich.de**

## NIC Excellence Project April 2021

The NIC Peer Review Board regularly awards the title "NIC Excellence Project" to outstanding simulation projects. At its April meeting, the board decided to honour Prof. Szabolcs Borsanyi (University of Wuppertal) for his work on the determination of the strong interaction from the Standard Model of particle physics and his special focus on the determination of the magnetic moment of the muon.

The Standard Model of particle physics describes all known elementary particles and their interaction. For example, the existence of the Higgs boson was successfully predicted with this model – an achievement that was honoured with the Nobel Prize in Physics in 2013. However, discrepancies between theory and experiment continue to arise, for example in the determination of the magnetic moment of the muon. The work of Prof. Borsanyi et al. (DOI: 10.1038/s41586-021-03418-1) was able to resolve this discrepancy by calculating the interaction of the particles involved with the exclusive help of the Standard Model and without the use of experimental data. A large fraction of the computations was carried out on the supercomputers at FZJ.

Furthermore, the NIC acknowledges the work on the calculation of heavy ion experiments using the Standard Model. Here, extreme physical conditions have to be taken into account as well as the high demands placed on the theory and the experiment. For more details, see http://www.john-von-neumann-institut.de/nic/borsanyi (in German).

**Contact: Dr. Alexander Trautmann, coordination-office@fz-juelich.de**

## EBRAINS on the ESFRI Roadmap 2021

EBRAINS, the research infrastructure being developed by the EU-funded Human Brain Project (HBP) since 2013, has been included in the ESFRI Roadmap 2021. EBRAINS thus now ranks among the list of the best European research infrastructures.

EBRAINS is a new digital research infrastructure gathering an extensive range of data and tools for brain-related research. It aims to capitalize on the work performed by the HBP teams in digital neuroscience, brain medicine, and brain-inspired technology, and will take it to the next level. ESFRI is the European Strategy Forum on Research Infrastructures, which aims to promote scientific integration at a European level, strengthen its international outreach, and provide scientists with access to Europe's most up-to-date research infrastructures. Research infrastructures included in the ESFRI Roadmap are subject to a thorough evaluation and selection procedure, taking both scientific excellence and implementation rigour into account.

Forschungszentrum Jülich has been a member of the HBP since the beginning and contributes to EBRAINS by developing and operating key tools and services. JSC leads the HBP's "EBRAINS Computing Services" work package and is one of the five European supercomputing centres building and operating the Fenix e-infrastructure, providing HPC, cloud, and data services as a basis of EBRAINS. In addition to these and many other activities, it has also been involved in the design of the EBRAINS architecture and is active in the development of brain simulation tools such as Arbor, NEST, and TVB.

**Contact: hpcns-coord@fz-juelich.de**