CSCS
Centro Svizzero di Calcolo Scientifico
Swiss National Supercomputing Centre

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The Swiss National Supercomputing Centre becomes Swiss provider of the data infrastructure for the Square Kilometre Array Observatory

CSCS will support scientists of the Square Kilometre Array Observatory (SKAO) consortium all over the world to shed light on the first billion years of the Universe. Together with other centers around the world it will host part of the expected annual amount of 700 petabytes of data generated by SKAO – data waiting to be processed and analyzed by the scientists.

Under a new agreement the Swiss National Supercomputing Center (CSCS) will manage and store enormous amounts of data for an international observatory that is searching for open questions in astronomy. The Swiss State Secretary for Education, Research, and Innovation (SERI) gave the mandate to CSCS in Lugano to provide the data infrastructure for the Square Kilometre Array Observatory (SKAO). CSCS has the long-term expertise in data management to fulfill the Swiss commitment in this international effort. At the same time, EPFL has been appointed to be the Swiss scientific coordinator of the observatory.

SKAO is the next generation world's largest radio astronomy facility. Scientists and engineers from all over the world, including Switzerland, have joined forces to build and deliver a unique instrument that will enable physics discoveries in the 21st century. The Observatory aims at gaining insight on the first billion years of the Universe. Scientists will attempt to understand astrophysical phenomena like planet formation, galaxy evolution and science of the early Universe. At the forefront of Big Data Astronomy, SKAO will be one of the largest data challenges of the future.

CSCS looks forward to collaborating with the SKAO science community and contribute a shared and distributed data, computing, and networking infrastructure. Decade-long experience in providing services to the Swiss Institute of Particle (CHIPP) community will be of great advantage when preparing similar services for SKAO. The CSCS Alps infrastructure will allow traditional runs at scale, but more importantly it enables scientists to manage and store big data and to apply AI to find answers to many open questions in astronomy.

In December 2021, the Federal Council has approved funding for membership and participation of Switzerland in the construction and operation of SKA telescopes until 2030. As of January 2022, Switzerland is a full member of the SKAO consortium. Fifteen countries all over the world are

participating in this effort. South Africa and Australia will host the telescope infrastructure, the Global Headquarters are located at Jodrell Bank in the UK.

“The accession of Switzerland to SKAO was an important milestone for Switzerland, as well as for SKAO.” says Martina Hirayama, State Secretary for Education, Research and Innovation “As Switzerland was the first non-signatory country of the Convention establishing SKAO to become member. Great challenges lie ahead of us, but I trust we will be able to overcome them.” SKAO is of particular interest for Switzerland also because three Commonwealth states, including the UK, Australia and South Africa, are funding and managing it. This will help to diversify Swiss participation in international research infrastructures, which so far is dominated by collaborations with European core groups.

South Africa will install 197 satellite dishes, distributed over 33’000 m^2, an area comparable to 126 tennis courts. Each dish could be as far from the next as 150 km. Australia will start with of 130’000 antennas of 2 meters of height to cover low frequency radio waves. But the final goal will be to install up to a million antennas.

Data produced by the Australian and the South African telescope infrastructure is expected to be enormous. The SKAO will archive about 700 petabytes per year. This is equivalent of filling the data storage capacity of about 1.5 million typical laptops every year by today’s standard.

“CSCS is ready to take on the data challenges of SKAO worldwide. To provide the HPC platform, data and cloud-like services with the new Alps infrastructure” Thomas Schulthess, Director of the CSCS, says. “We are living an exciting moment in the history of science. And CSCS is building the new research infrastructure in a timely manner that once more will put Switzerland at the forefront of science and technology”.