SWITZERLAND AND THE SKA

UNIVERSITÉ DE GENÈVE

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Universität Zürich

ETH zürich

CSCS
Centro Svizzero di Calcolo Scientifico
Swiss National Supercomputing Centre

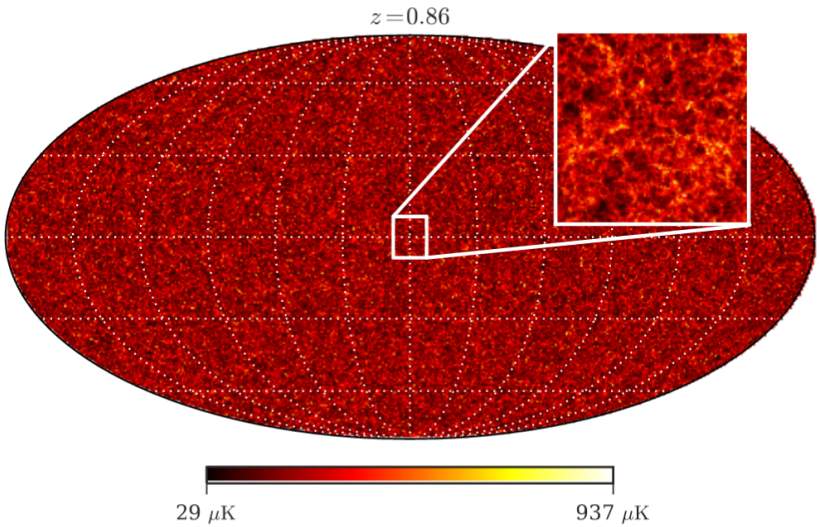
Fachhochschule Nordwestschweiz

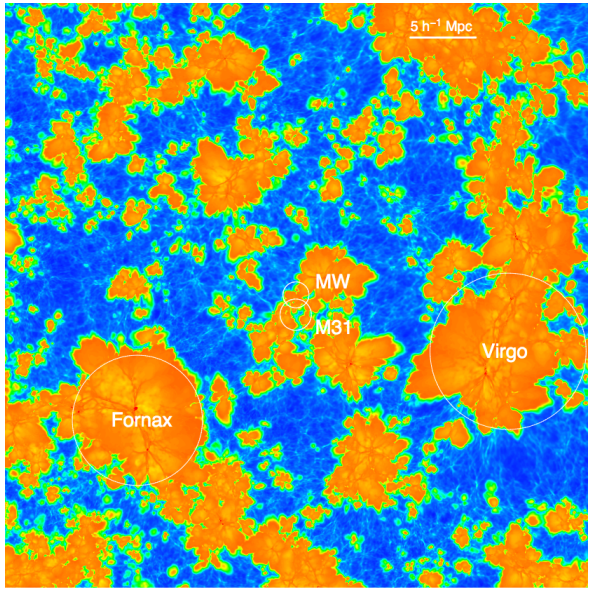
Daniel Schaerer (UniGE), Swiss SKA board

SWITZERLAND AND THE SKA

SCIENCE

- Astrophysics, Theoretical Physics
- Cosmology
- Cosmic reionisation
- Cosmic magnetic fields
- Galaxy evolution
- Extrasolar planets, astrobiology
- …





Ocvirk et al. 2015, Cosmic Dawn collaboration

UNIVERSITÉ DE GENÈVE

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Universität Zürich

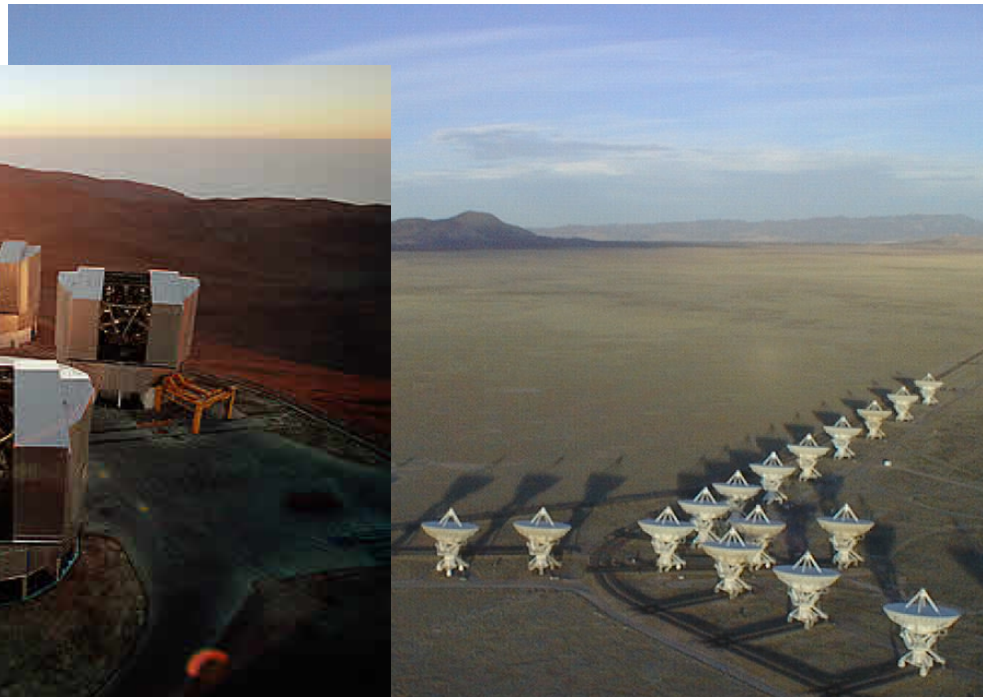
ETH zürich

CSCS
Centro Svizzero di Calcolo Scientifico
Swiss National Supercomputing Centre

Fachhochschule Nordwestschweiz

HST (UV-IR)

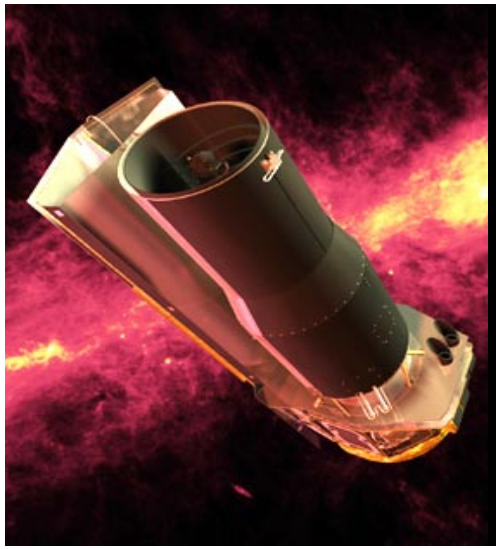
VLT (visible-near-IR)



VLA (radio)

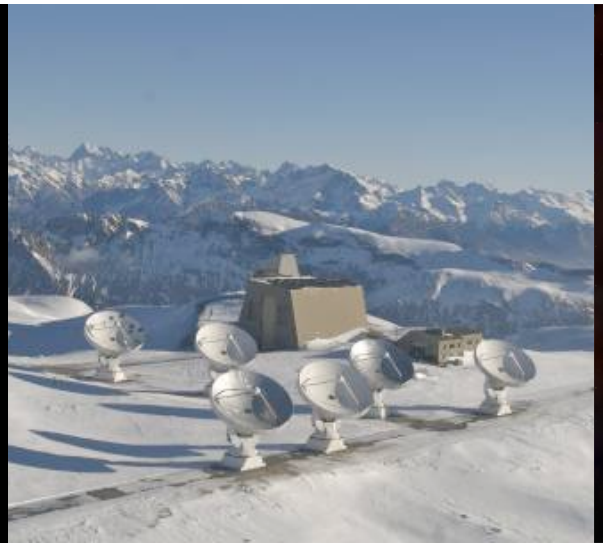
Multi-wavelength observations

Spitzer (near / mid-IR)

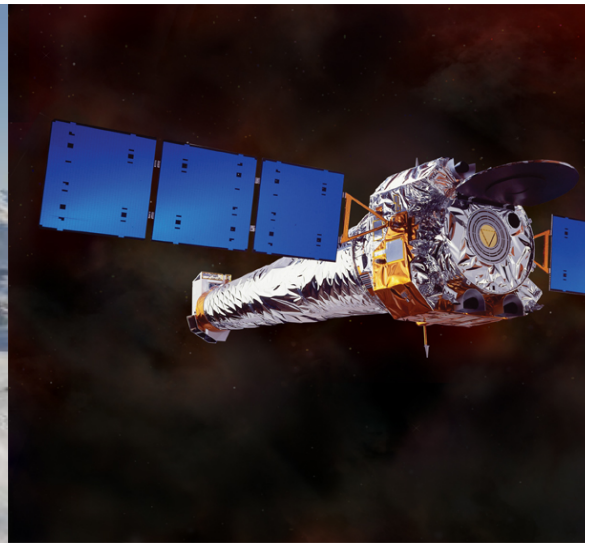


Herschel (IR)

IRAM, ALMA (mm)

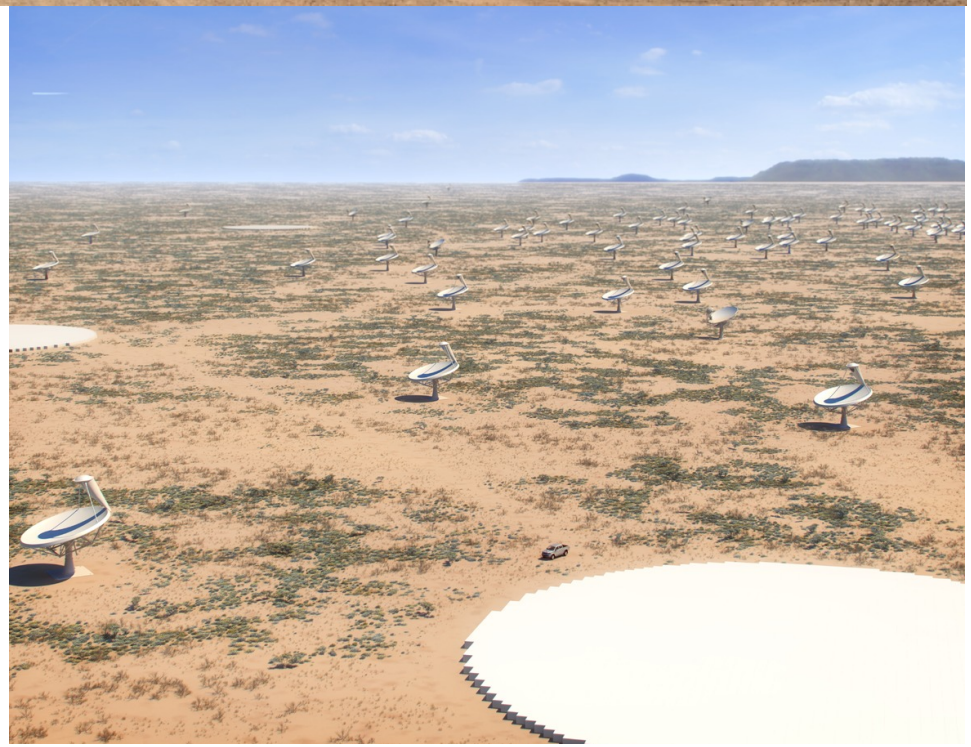


Chandra (X)



SWITZERLAND AND THE SKA

SCIENCE **Multi-wavelength observations**



SKA
SQUARE KILOMETRE ARRAY

The next step!

UNIVERSITÉ DE GENÈVE

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Universität Zürich

ETH zürich

CSCS
Centro Svizzero di Calcolo Scientifico
Swiss National Supercomputing Centre

Fachhochschule Nordwestschweiz

SWITZERLAND AND THE SKA

SCIENCE

Simulations

CoDa from Teyssier …

UNIVERSITÉ DE GENÈVE

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Universität Zürich

ETH zürich

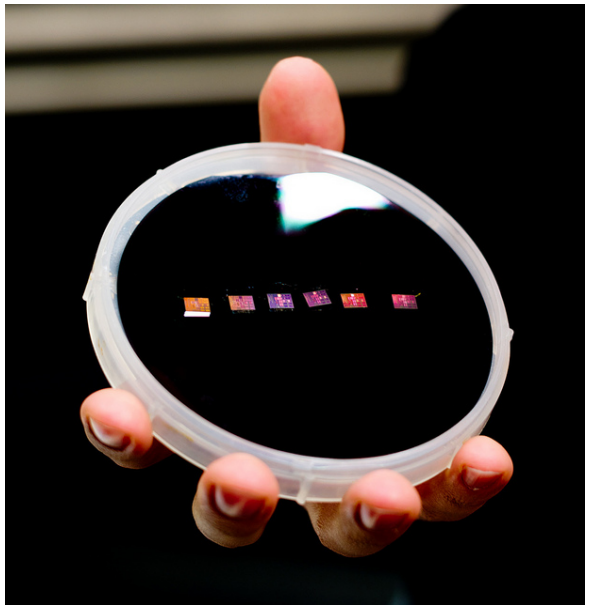
CSCS
Centro Svizzero di Calcolo Scientifico
Swiss National Supercomputing Centre

Fachhochschule Nordwestschweiz

SWITZERLAND AND THE SKA

TECHNOLOGY

- Hardware:
  - Large capacity memories
  - Fast analog-digital converters
  - …
- Data compression and extraction
- Signal and image processing
- Machine learning
- Big Data developments
- …



DOME project
Credit: IBM Research, Zurich

UNIVERSITÉ DE GENÈVE

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Universität Zürich

ETH zürich

CSCS
Centro Svizzero di Calcolo Scientifico
Swiss National Supercomputing Centre

Fachhochschule Nordwestschweiz

SWITZERLAND AND THE SKA

The current Swiss landscape

Interest groups, competences :

- Astrophysics, Cosmology
- Theoretical Physics
- High Performance Computing, Signal processing
- Big data, data mining, …
- Hardware (electronics, antennae…)

Active Universities/institutions:

- Geneva (UniGE)
- Lausanne (EPFL)
- Zurich (UniZH + ETH)
- National Supercomputing Centre (CSCS)
- University of Applied Sciences (FHNW)

Industry:

- IBM research

UNIVERSITÉ DE GENÈVE

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Universität Zürich

ETH zürich

CSCS
Centro Svizzero di Calcolo Scientifico
Swiss National Supercomputing Centre

Fachhochschule Nordwestschweiz

SWITZERLAND AND THE SKA

The current Swiss landscape

Involvement in SKA precursors, radio astronomy, interferometry:

- Users of IRAM, ALMA, SMA
- Users of (e)VLA, GMRT, ATCA
- Participation in ASKAP, MeerKat
- Involvement in BINGO
- Antenna in Bleien
- …

Involvement in SKA Science Working Groups:

- *Participants* in Cosmology, Astrobiology/Cradle of Life, Continuum Surveys, Extragalactic Spectral Line, Our Galaxy, Solar & Heliospheric Physics
- *Candidates* for H I and Galaxy Evolution, Epoch of Reionization & the Dark Ages, Cosmic Magnetism

UNIVERSITÉ DE GENÈVE

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

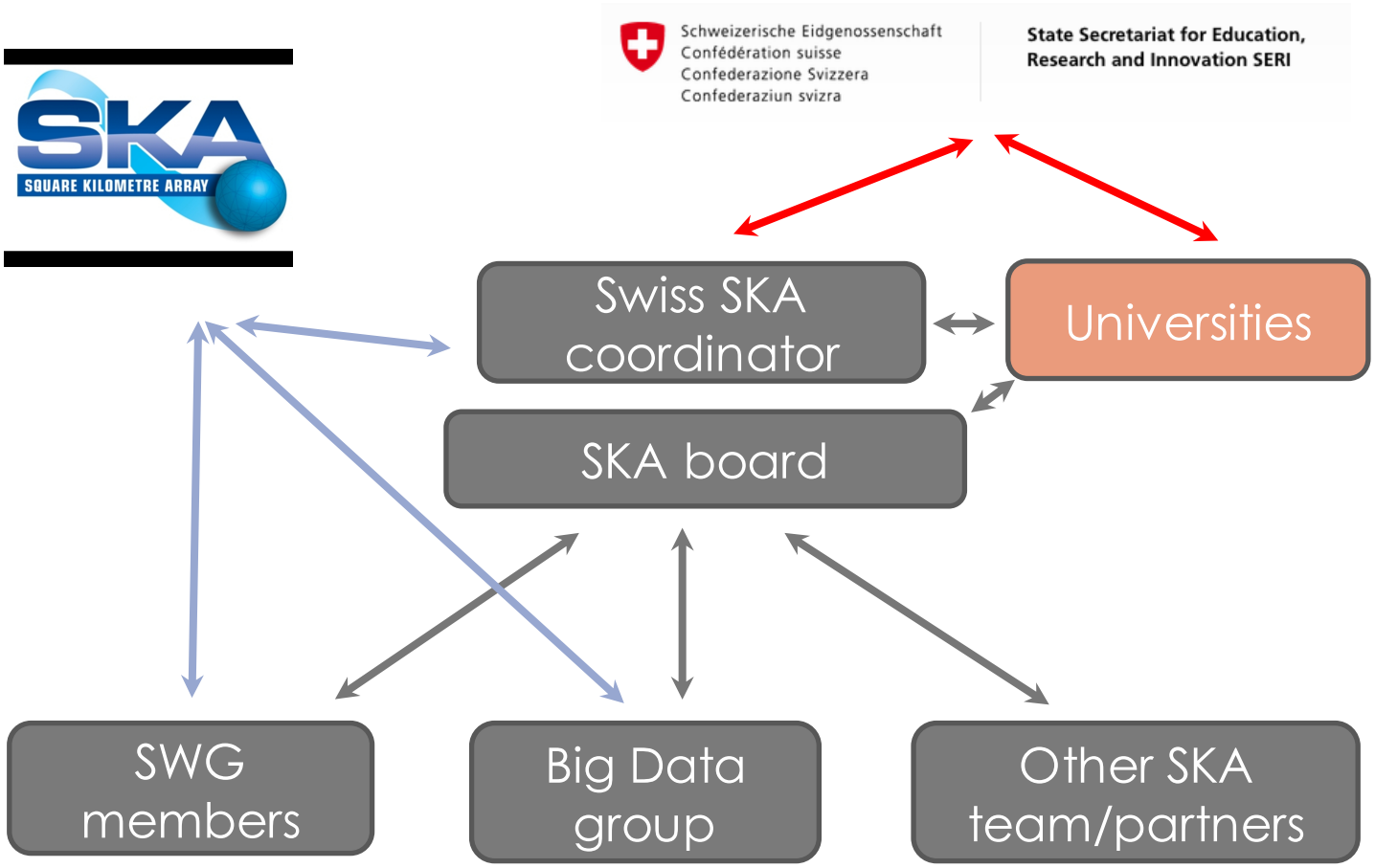
Universität Zürich

ETH zürich

CSCS
Centro Svizzero di Calcolo Scientifico
Swiss National Supercomputing Centre

Fachhochschule Nordwestschweiz

SWITZERLAND AND THE SKA



UNIVERSITÉ DE GENÈVE

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Universität Zürich

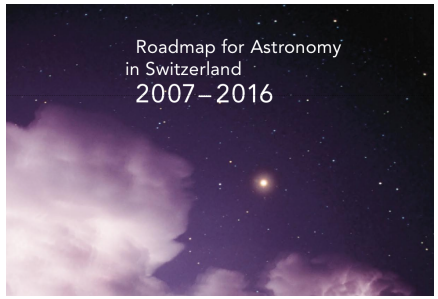
ETH zürich

CSCS
Centro Svizzero di Calcolo Scientifico
Swiss National Supercomputing Centre

Fachhochschule Nordwestschweiz

SWITZERLAND AND THE SKA

2014: update of Swiss Roadmap for Astronomy 2007-2016 published by CHAPS committee
→ Recommends participation in future large projects
→ ***SKA and LSST considered « scientifically most attractive at present »***



2014: Swiss Research Infrastructures Roadmap:
Federal Council Dispatch on the promotion of Education, Research and Innovation (ERI) for 2017-2020.

→ **Proposal to join the SKA submitted**:
Schaerer (UniGE, Leading House), Meylan (EPFL), Teyssier (UniZH)

SWISS RESEARCH INFRASTRUCTURES ROADMAP

CALL FOR APPLICATIONS FOR NEW RESEARCH INFRASTRUCTURES OF NATIONAL RELEVANCE

UNIVERSITÉ DE GENÈVE

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Universität Zürich

ETH zürich

CSCS
Centro Svizzero di Calcolo Scientifico
Swiss National Supercomputing Centre

Fachhochschule Nordwestschweiz

SWITZERLAND AND THE SKA

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

State Secretariat for Education, Research and Innovation SERI

→ **Late 2015: 4 new research organisations indentified by SERI**

UNIVERSITÉ DE GENÈVE

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Universität Zürich

ETH zürich

CSCS Centro Svizzero di Calcolo Scientifico Swiss National Supercomputing Centre

Fachhochschule Nordwestschweiz

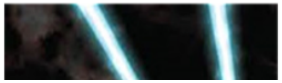
New research organisations

As part of the 2015 Swiss Research Infrastructure Roadmap, four international research organisations in the process of getting established have been identified, for which the question of Swiss participation merits serious consideration. The possibility of Swiss participation in these organisations will be decided by 2020. SERI is tasked with preparing the participations, establishing the financial framework up until the time when Switzerland signs an international agreement and, of course, ensuring an evaluation is made of the advantages of these participations for Switzerland. Representatives of the Swiss scientific communities concerned are in close contact with these efforts.

CTA, Cherenkov Telescope Array (astronomy)

CTA is an international scientific cooperation project that aims to build a world leading research facility in the field of astroparticle physics. The infrastructure will involve a network of more than 100 Cherenkov-type telescopes, located in the southern hemisphere on a site in Chile (Paranal) and in the northern hemisphere on the island of Palma (Canary Islands, Spain). Fundamental breakthroughs are expected in the field of high-energy astroparticle physics and more generally in cosmology and fundamental physics. Construction of CTA is expected to start in 2017 or 2018 on the basis of an international agreement. In Switzerland, the universities of Zurich and Geneva and the ETH Zurich are actively involved in this project.

ELI, Extreme Light Infrastructure (laser physics)



ELI is a research facility under construction located on three sites in the Czech Republic, Romania and Hungary. Currently, it is the only leading-edge research facility entirely based in the enlarged

SKA, Square Kilometer Array (astronomy)

The Square Kilometre Array is a radio telescope under construction that will have a collection surface of approximately one square kilometre. The SKA is planned for work in the range of 0.10-25 GHz, eventually with the aim of reaching the 0.06-35 GHz frequency range. Its size will make it 50 times more sensitive than the instruments currently in use and provide the possibility to monitor several independent fields of vision, thus allowing different radio astronomers to observe at the same time or to observe different parts of the sky at the same time. The SKA radio telescope will make it possible to obtain distant radio images by using the interferometry technique.

The SKA will be the most sensitive instrument of observation in radio astronomy ever designed, capable of detecting all the active galactic nuclei up to a redshift of 6, when the universe was not more than a billion years old. It will have the power to detect the signature of planets similar to Earth at distances of several hundreds of thousands of light years away. The SKA network is expected to have up to 3,000 dish antennas installed in South Africa and Australia. The SKA headquarters will be based in the United Kingdom. To date, 15 Asian, European and African states have joined SKA. The scope of SKA makes it a major long-term project for astrophysics at the global level, and Switzerland is closely monitoring its development, in particular in the universities of Geneva and Zurich, as well as the Federal Institutes of Technology in Zurich and Lausanne.

LBNF, Long-Baseline Neutrino Facility and DUNE, Deep Underground Neutrino Experiment (particle physics)

The world scientific community in the field of neutrino physics is currently developing a project of unprecedented scope to carry out research in this field: DUNE, which is expected to be conducted in the purpose-built facility. LBNF. An international collaboration will be

SWITZERLAND AND THE SKA

UNIVERSITÉ DE GENÈVE

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

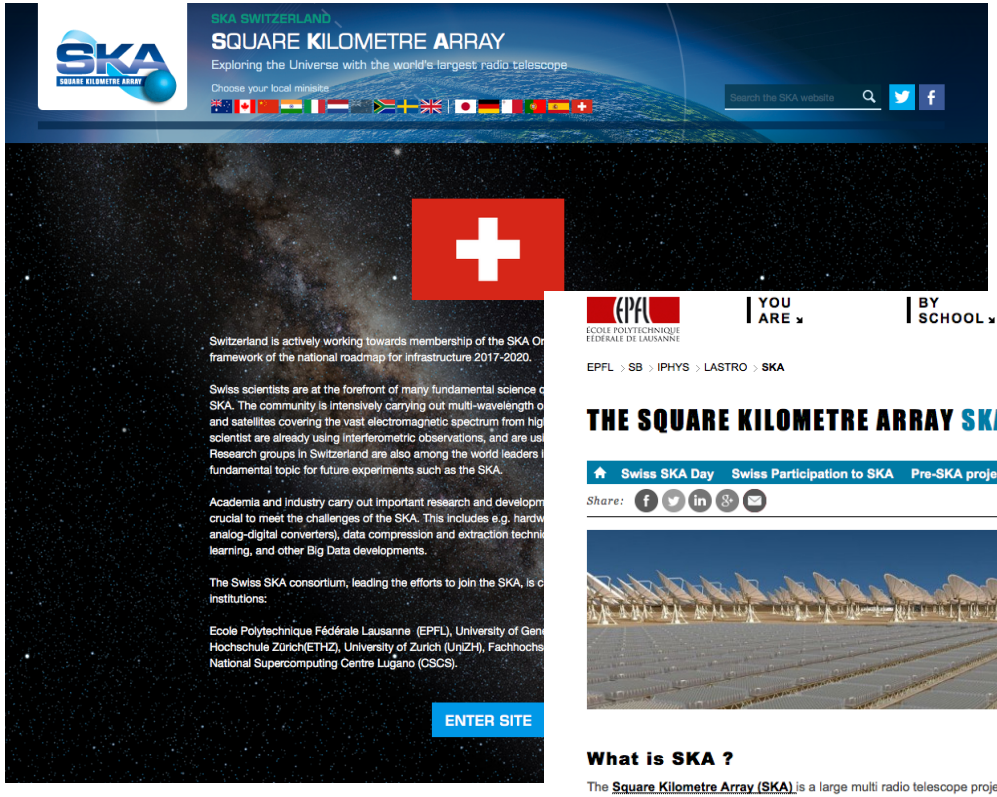
Universität Zürich

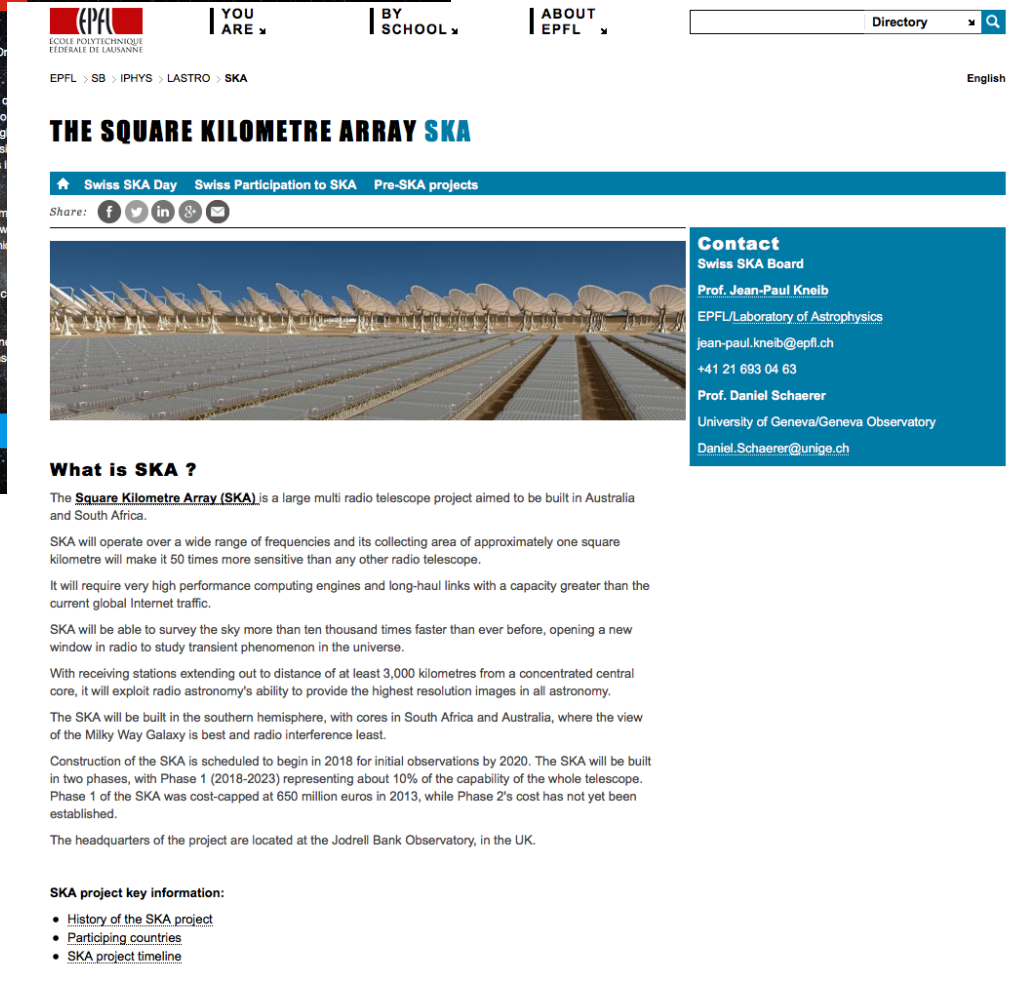
ETH zürich

CSCS
Centro Svizzero di Calcolo Scientifico
Swiss National Supercomputing Centre

Fachhochschule Nordwestschweiz

SWITZERLAND AND THE SKA





UNIVERSITÉ DE GENÈVE

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

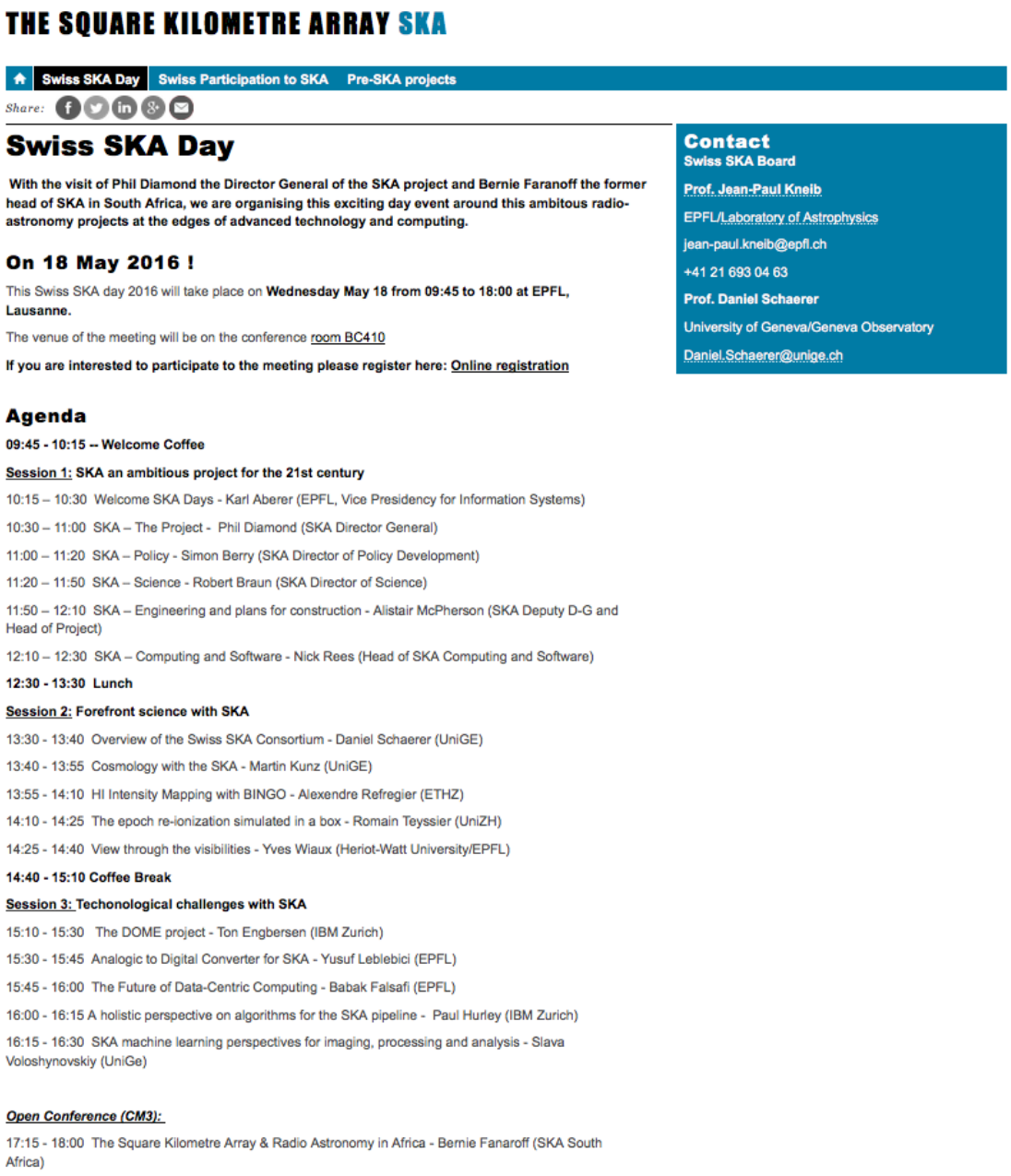
Universität Zürich

ETH zürich

CSCS
Centro Svizzero di Calcolo Scientifico
Swiss National Supercomputing Centre

Fachhochschule Nordwestschweiz

SWITZERLAND AND THE SKA



THE SQUARE KILOMETRE ARRAY SKA

Swiss SKA Day | Swiss Participation to SKA | Pre-SKA projects

Share:

Swiss SKA Day

With the visit of Phil Diamond the Director General of the SKA project and Bernie Faranoff the former head of SKA in South Africa, we are organising this exciting day event around this ambitous radio-astronomy projects at the edges of advanced technology and computing.

On 18 May 2016 !

This Swiss SKA day 2016 will take place on **Wednesday May 18 from 09:45 to 18:00 at EPFL, Lausanne.**

The venue of the meeting will be on the conference room BC410

If you are interested to participate to the meeting please register here: Online registration

Contact
Swiss SKA Board
Prof. Jean-Paul Kneib
EPFL/Laboratory of Astrophysics
jean-paul.kneib@epfl.ch
+41 21 693 04 63
Prof. Daniel Schaerer
University of Geneva/Geneva Observatory
Daniel.Schaerer@unige.ch

Agenda

09:45 - 10:15 -- Welcome Coffee

Session 1: SKA an ambitious project for the 21st century

10:15 – 10:30 Welcome SKA Days - Karl Aberer (EPFL, Vice Presidency for Information Systems)

10:30 – 11:00 SKA – The Project - Phil Diamond (SKA Director General)

11:00 – 11:20 SKA – Policy - Simon Berry (SKA Director of Policy Development)

11:20 – 11:50 SKA – Science - Robert Braun (SKA Director of Science)

11:50 – 12:10 SKA – Engineering and plans for construction - Alistair McPherson (SKA Deputy D-G and Head of Project)

12:10 – 12:30 SKA – Computing and Software - Nick Rees (Head of SKA Computing and Software)

12:30 - 13:30 Lunch

Session 2: Forefront science with SKA

13:30 - 13:40 Overview of the Swiss SKA Consortium - Daniel Schaerer (UniGE)

13:40 - 13:55 Cosmology with the SKA - Martin Kunz (UniGE)

13:55 - 14:10 HI Intensity Mapping with BINGO - Alexendre Refregier (ETHZ)

14:10 - 14:25 The epoch re-ionization simulated in a box - Romain Teyssier (UniZH)

14:25 - 14:40 View through the visibilities - Yves Wiaux (Heriot-Watt University/EPFL)

14:40 - 15:10 Coffee Break

Session 3: Techonological challenges with SKA

15:10 - 15:30 The DOME project - Ton Engbersen (IBM Zurich)

15:30 - 15:45 Analogic to Digital Converter for SKA - Yusuf Leblebici (EPFL)

15:45 - 16:00 The Future of Data-Centric Computing - Babak Falsafi (EPFL)

16:00 - 16:15 A holistic perspective on algorithms for the SKA pipeline - Paul Hurley (IBM Zurich)

16:15 - 16:30 SKA machine learning perspectives for imaging, processing and analysis - Slava Voloshynovskiy (UniGe)

Open Conference (CM3):

17:15 - 18:00 The Square Kilometre Array & Radio Astronomy in Africa - Bernie Fanaroff (SKA South Africa)

UNIVERSITÉ DE GENÈVE

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Universität Zürich

ETH zürich

CSCS
Centro Svizzero di Calcolo Scientifico
Swiss National Supercomputing Centre

Fachhochschule Nordwestschweiz