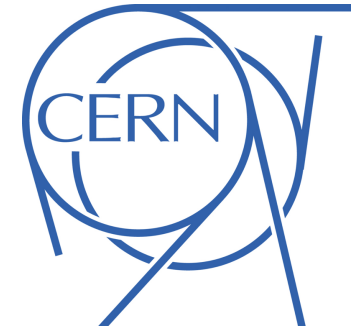


# Welcome from CERN

6th CERN–UNESCO–NRF Open Science School  
Pretoria, South Africa, 17–21 February 2025

Jens Vigen



# CERN— UNESCO— NRF School on Open Science

- Sponsors
  - [UNESCO International Basic Science Programme](#)
  - [CERN & Society Foundation](#)
- Events
  - Rwanda (2009)
  - Morocco (2010)
  - Senegal (2011)
  - Ghana (2016)
  - Kenya (2018)
  - South Africa (2025)
- Evolution over time
  - School → Workshop
  - Digital libraries → open science



# What is CERN?

- International initiative to bring Europe together again after World War II
- History
  - European Conference on Culture, Lausanne 1949 (Broglie)
  - UNESCO, Florence 1950 (Rabi)
  - Pre-CERN 1952 (Amaldi)
  - CERN established 1954
  - CERN70 last year
- Successful initiative with ambitious future plans
  - Physics plans for the next 70 years

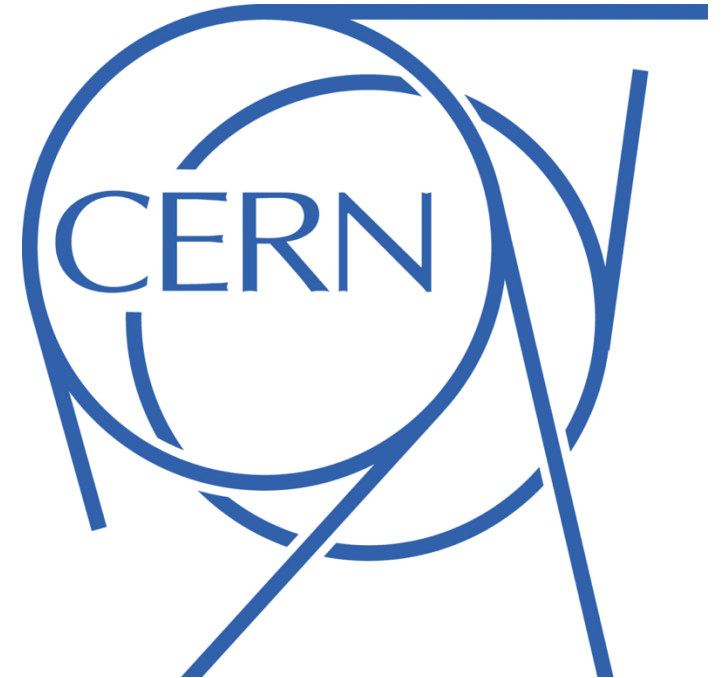


# European Organization for Nuclear Research

C

Centre ...

Hefty discussion in Copenhagen  
back in 1952 ...



# European Organization for Nuclear Research

C

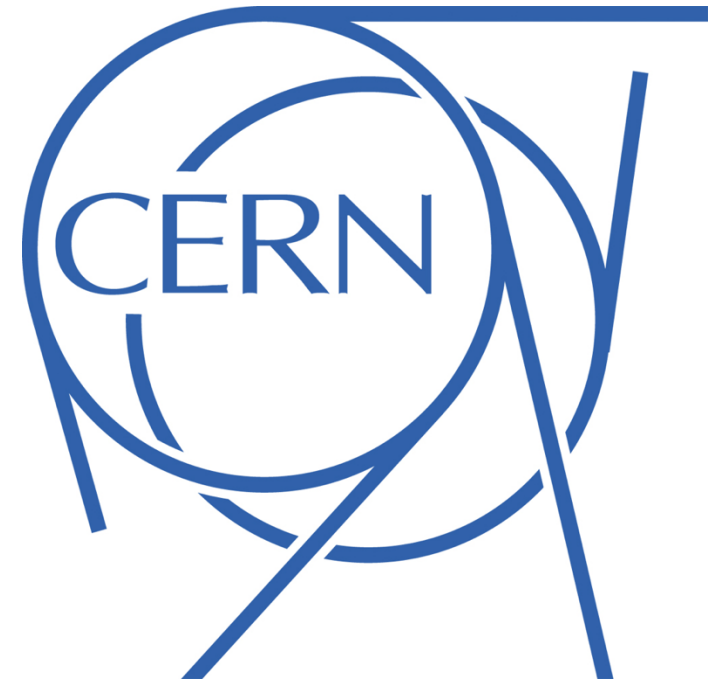
Centre ...

Cabale

Casino

Concubinage

Cirque



# As simple as possible ...

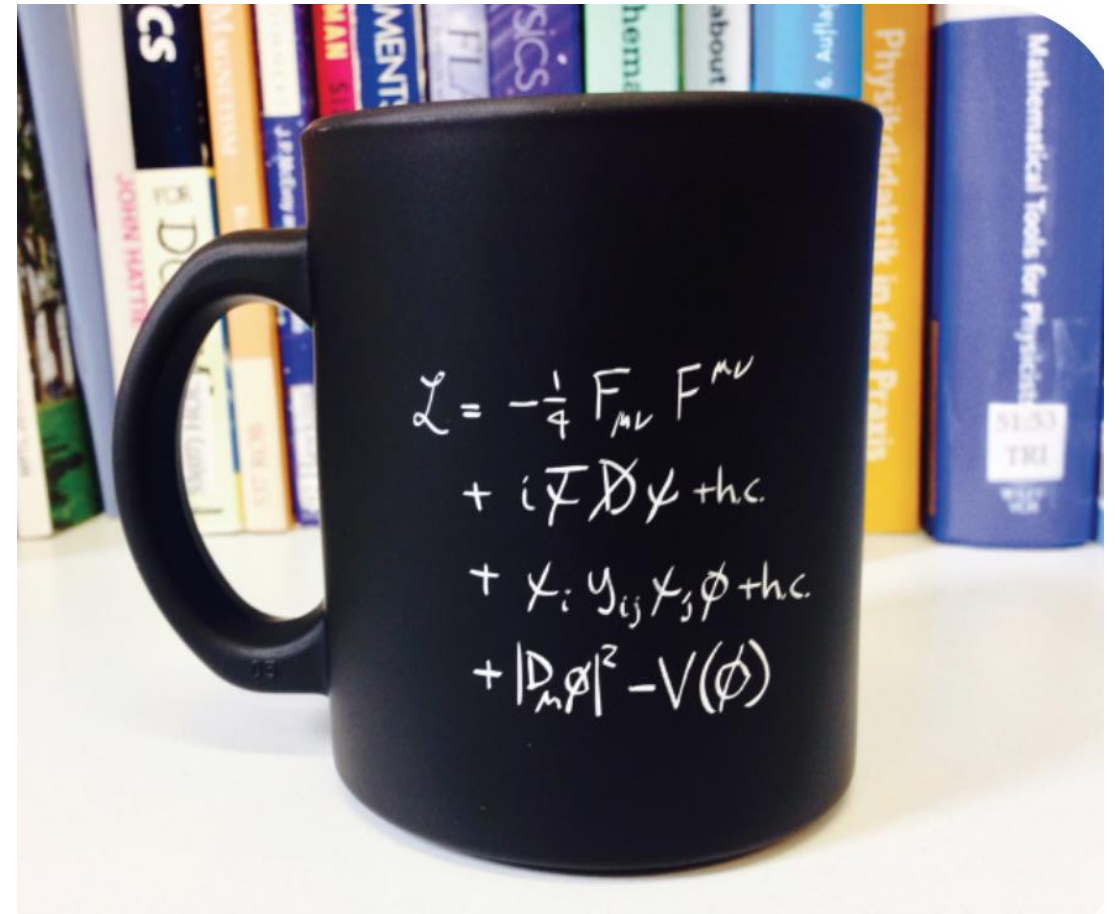
*Everything should be made as simple as possible, but not simpler.*

Albert Einstein

Is this simple?

Let's have a coffee with the Standard Model of particle physics!

[Julia Woithe et al. Phys. Educ. 52 \(2017\) 034001](#)

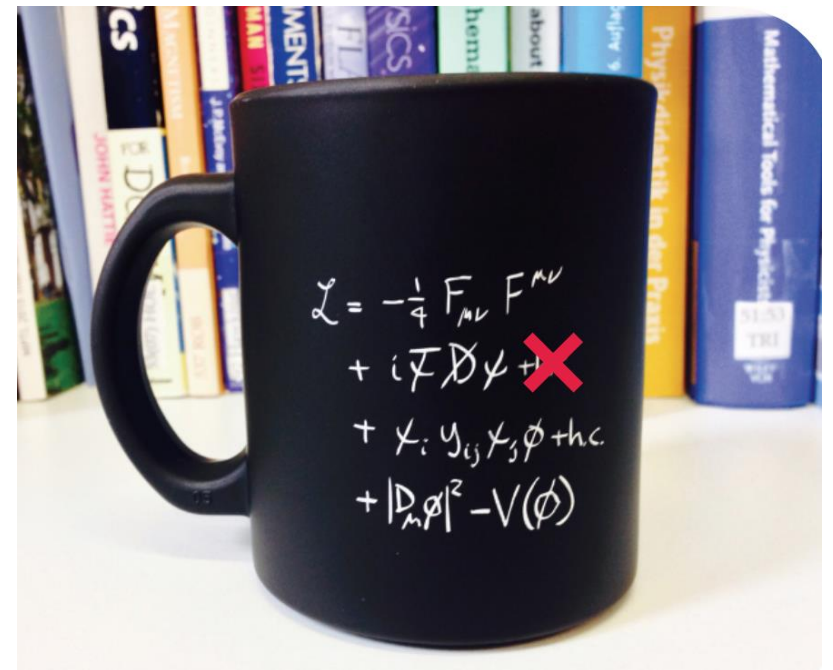
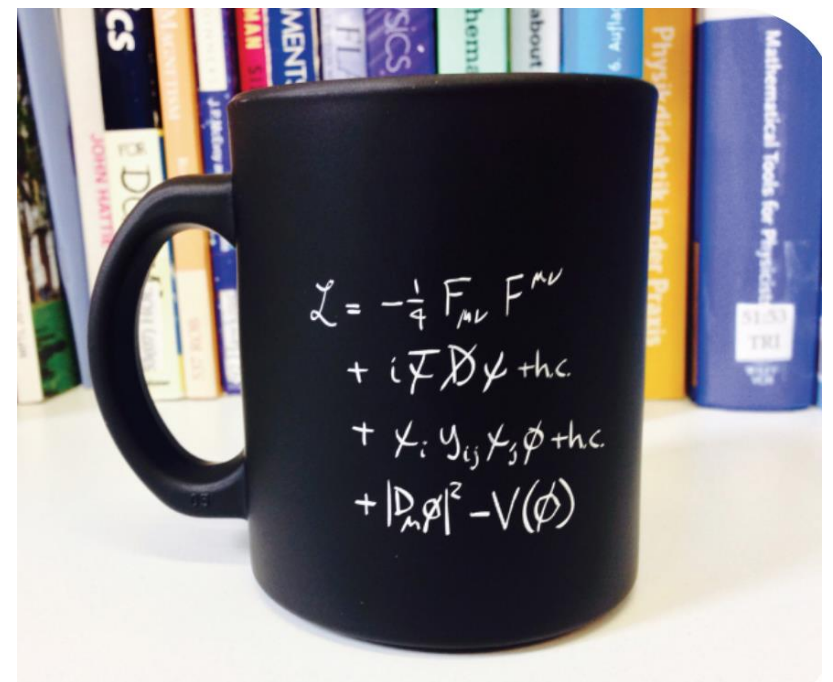


# As simple as possible ...

Maybe not simple, but at least compact—[but even physicists do not agree, so do not worry!](#)

Jokes apart, plenty of good physics and R&D

- Particle physics, i.e. observation of the Higgs boson
- Word Wide Web
- Medical physics applications







# How do we do it?

- We build the largest machines to study the smallest particles in the universe
- We develop technology to advance the limits of what is possible
- We perform world-class research in theoretical and experimental particle physics



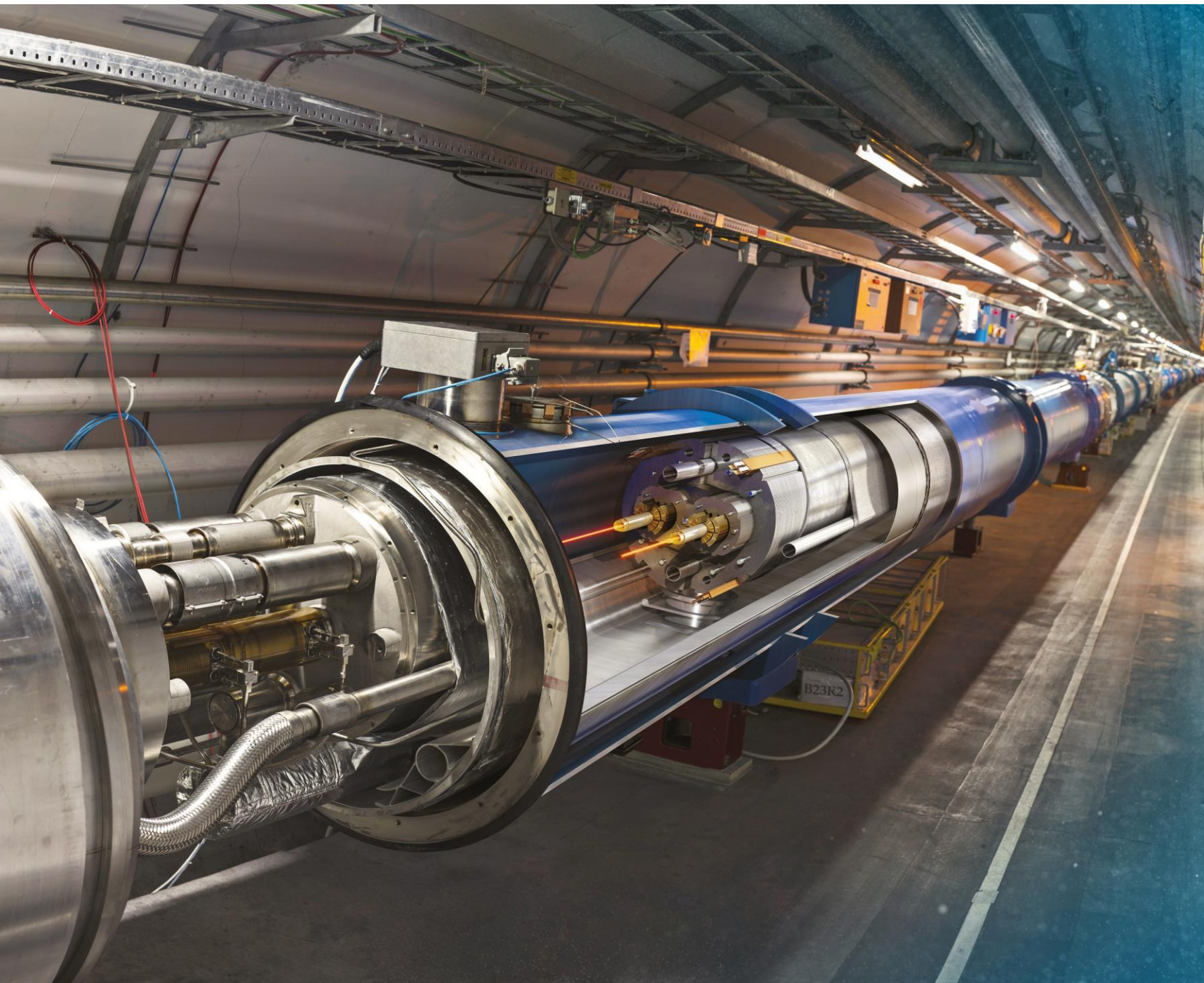
ACCELERATORS



DETECTORS



COMPUTING



# Large Hadron Collider (LHC)

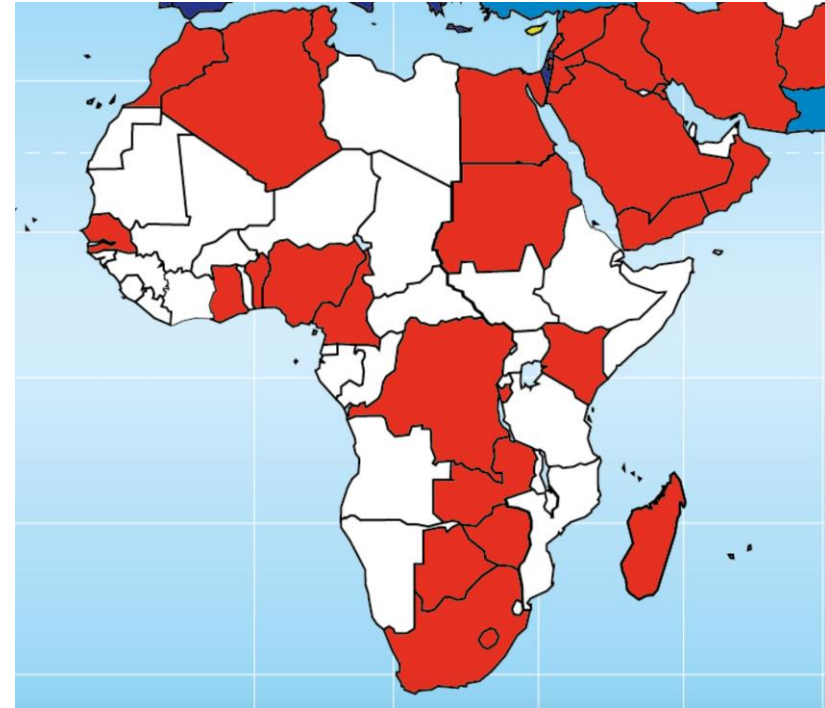
- 27 km in circumference
- About 100 m underground
- Superconducting magnets steer the particles around the ring
- Particles are accelerated to close to the speed of light

# Collaboration with Africa

Location of institutes



Researchers by nationality



[SA-CERN](#)

South African scientific collaboration with CERN

# Library@CERN

- CERN Scientific Information Service
  - The only group at CERN that has kept the same name since the beginning back in 1954
- Open around the clock through the year
- Facilitated “open access” before the Internet existed
- Did not see the potential of the WWW ...
  - Though deeply involved today in Inspire HEP (previously known as SLAC SPIRES), which was the first web server in the Americas and the WWW killer-application in 1991
  - First CERN library home page in 1994



# CERN and open science

- CERN convention

- AI Overview [provided by Google 16 February 2025]

According to the CERN Convention, the results of all experimental and theoretical work conducted at CERN "shall be published or otherwise made generally available," meaning that all research findings from CERN must be publicly accessible through publication or other means, reflecting a strong commitment to open science

- Communication Patterns in High-Energy Physics (Written in 1965, published in 2002), Luisella Goldschmidt-Clermont, [High Energy Phys. Libr. Webzine 6 \(2002\) pp.1](#)

# How did open science get started?



CERN Relay Race 2005

- Direct exchange of letters between scholars  $\neq$  open science
- First journals  $\neq$  open science
- Circulation of preprints per post  $\approx$  open access
- arXiv and OA journals 😊
- Library repositories  $\rightarrow$  Open access to the literature 😊 😊
- Data repositories  $\rightarrow$  Open access to the data 😊 😊 😊

# Reflections around open science

- Nobody will carry out a research project without writing up the results
  - Private world: Patents
  - Academic world: Scientific journals—slowly moving towards open
- General trend in the academic world to also strive for preservation of the data, software and hardware (—at least emulations)
  - Comes with a non-negligible cost and a lack of incentives for scientists
- New knowledge can trigger desires to analyze historical datasets in a new perspective
  - Could in general not be done for large physics experiments prior to LHC
- Transdisciplinary research cannot function without open science

# Who are the actors in (open) science?

- Producer of research artifacts
  - Academics
  - Industry
  - Citizens
- Curators of research artifacts
  - Academics
  - Industry
  - Citizens
  - Librarians and information technology specialists
- Consumers of research artifacts
  - Academics
  - Industry
  - Citizens



# What about politics and open science?

- The situation can quickly change
  - Following national elections
  - Following unwanted events
    - Example of declassified reports generally available being taken off
      - "Many copies keep copies safe"
- International tensions put open research at risk
  - Researchers operating globally risk to lose access to their own data
- We must design and maintain our shared information infrastructures in such a way that future use cannot be prevented by any “single entity”