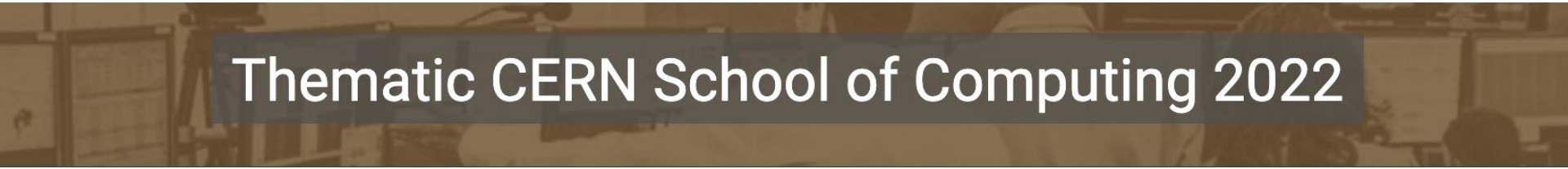
Welcome to

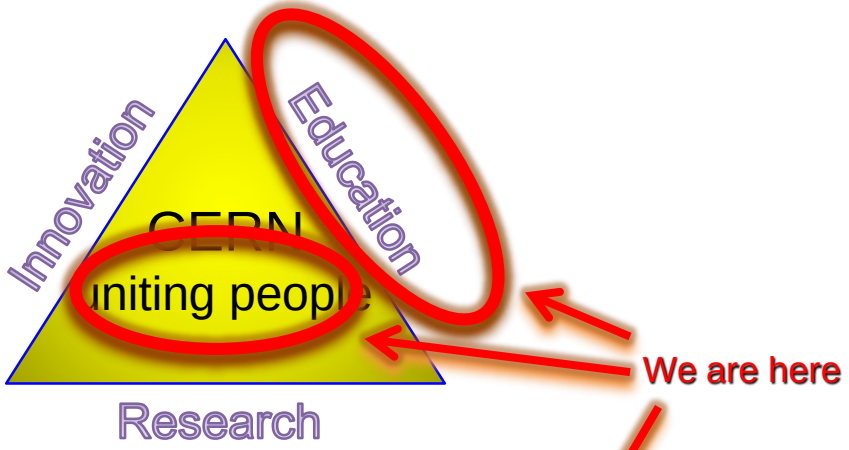


http://indico.cern.ch/e/tCSC-2022

Sebastian Lopienski
CERN School of Computing director

Introduction to CERN School of Computing

CERN's mission



Accelerating beams
(accelerators)

Detecting particles
(experiments)

Large-scale computing
(analysis)

Discovery

A school with a long history

- The school was created in 1970
  - 43nd edition in 2021

- 3000 students of ~80 different nationalities have followed the school
  - usually 80-100 per year
  - alumni web site: https://cern.ch/CSC/history/alumni/

- The school has visited 22 countries
  - https://cern.ch/CSC/history/past-schools/
  - recent: Romania, Croatia, Israel, Spain, Belgium, Greece, Portugal, Cyprus

Bridging science and computing

- Technological evolution in computing empowers science
  - especially in data-intensive domains such as High Energy Physics
  - computing is the main strategy for many scientific fields to do research efficiently on a large scale

- It is nowadays essential that:
  - scientists master computing technologies as a main tool for their research
  - computer engineers understand the scientific needs in order to deliver computing services to research projects

Academic dimension

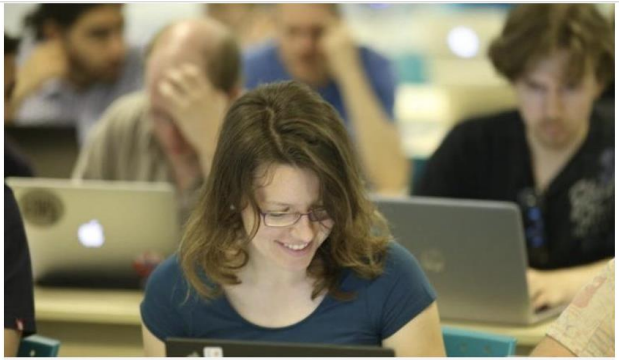
CERN School of Computing…

- is not a conference
  - lecturers do not present their work or promote their projects
- is not a training session
  - not a replication of training courses available at home institutes or online
  - focus on persistent knowledge, less on know-how

Three CERN Schools of Computing

tCSC 2022

Thematic School 10th edition, will take place at Cargèse, Corse-du-Sud (FR), from 1 to 7 May 2022 – Applications are now closed



tCSC security 2022

Thematic School on Security, will take place in Split, Croatia (HR), from 19 to 25 June 2022 – Applications are now closed

CSC 2022

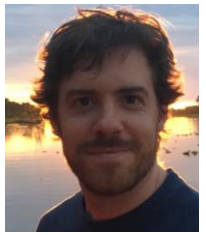
Main School 2022 43rd edition will take place in Krakow (PL), from 4 to 17 September 2022 – Apply!

Thematic CSC 2022

Academic programme

https://indico.cern.ch/event/1100351/program

CERN School of Computing



Theme: *"Scientific Software for Heterogeneous Architectures"*

- **Introduction lecture**
  "Preparing for the HL-LHC computational challenge"
  by Danilo Piparo (CERN)
- **Track 1:** *Technologies and Platforms*
  by Andrzej Nowak
- **Track 2:** *Parallel and Optimised Scientific Software*
  by Sebastien Ponce (CERN)
- **Track 3:** *Programming for Heterogeneous Architectures*
  by Dorothea vom Bruch (CPPM/CNRS)
  and Daniel Campora (University of Maastricht)

The local organizer

CSC Organizers

Joelma Tolomeo
Administrator

Jarek Polok
Technical Manager

Sebastian Lopienski
Director

But what gives the most value to the School?

Participants (**you!**)

38 students

https://indico.cern.ch/event/1100351/page/23768-participants

- 17 different nationalities
- 28 different institutes from 14 countries

- **Diverse, talented, passionate for science and technology**

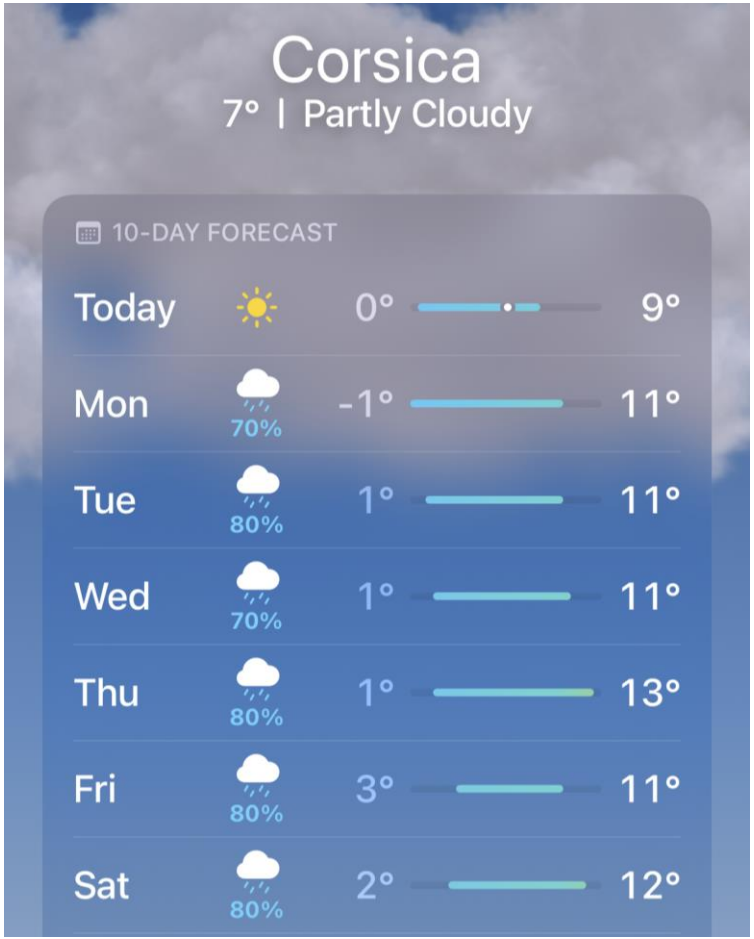
CERN School of Computing

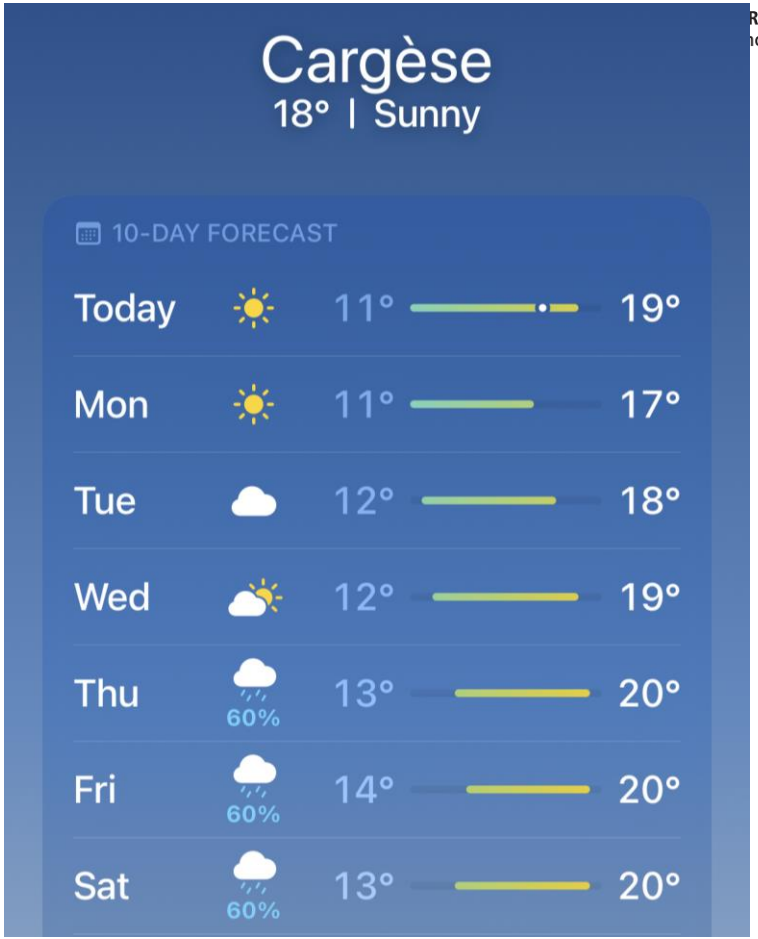
It’s a small world

All top scientists knows each other very well

One of the previous tCSC

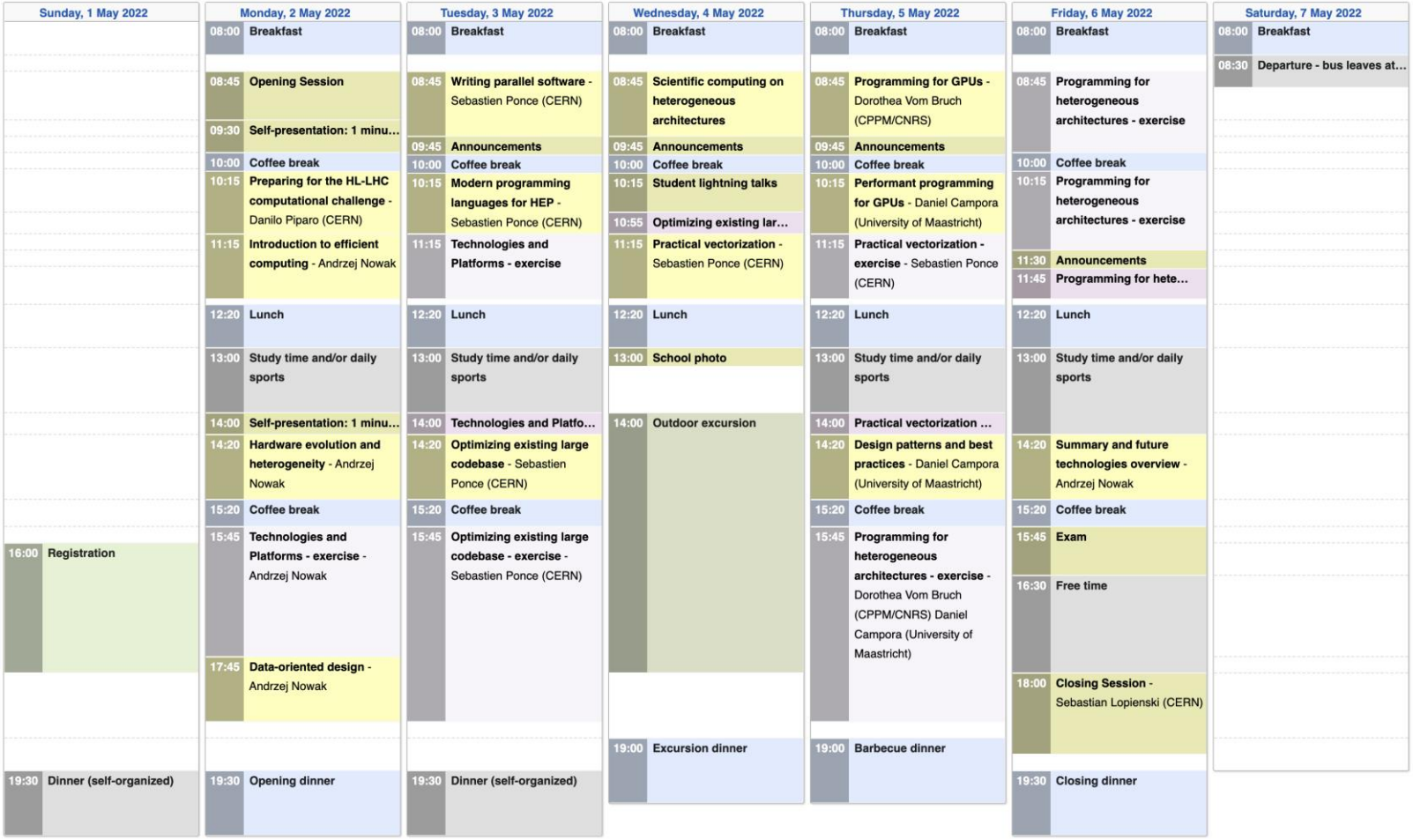
School organization and logistics


Corsica
7° | Partly Cloudy
10-DAY FORECAST
Today 0° 9°
Mon 70% -1° 11°
Tue 80% 1° 11°
Wed 70% 1° 11°
Thu 80% 1° 13°
Fri 80% 3° 11°
Sat 80% 2° 12°


Cargèse
18° | Sunny
10-DAY FORECAST
Today 11° 19°
Mon 11° 17°
Tue 12° 18°
Wed 12° 19°
Thu 60% 13° 20°
Fri 60% 14° 20°
Sat 60% 13° 20°

Timetable https://indico.cern.ch/event/1100351/timetable/

CERN School of Computing



Sunday, 1 May 2022

- 16:00 Registration
- 19:30 Dinner (self-organized)

Monday, 2 May 2022

- 08:00 Breakfast
- 08:45 Opening Session
- 09:30 Self-presentation: 1 minu…
- 10:00 Coffee break
- 10:15 Preparing for the HL-LHC computational challenge - Danilo Piparo (CERN)
- 11:15 Introduction to efficient computing - Andrzej Nowak
- 12:20 Lunch
- 13:00 Study time and/or daily sports
- 14:00 Self-presentation: 1 minu…
- 14:20 Hardware evolution and heterogeneity - Andrzej Nowak
- 15:20 Coffee break
- 15:45 Technologies and Platforms - exercise - Andrzej Nowak
- 17:45 Data-oriented design - Andrzej Nowak
- 19:30 Opening dinner

Tuesday, 3 May 2022

- 08:00 Breakfast
- 08:45 Writing parallel software - Sebastien Ponce (CERN)
- 09:45 Announcements
- 10:00 Coffee break
- 10:15 Modern programming languages for HEP - Sebastien Ponce (CERN)
- 11:15 Technologies and Platforms - exercise
- 12:20 Lunch
- 13:00 Study time and/or daily sports
- 14:00 Technologies and Platfo…
- 14:20 Optimizing existing large codebase - Sebastien Ponce (CERN)
- 15:20 Coffee break
- 15:45 Optimizing existing large codebase - exercise - Sebastien Ponce (CERN)
- 19:30 Dinner (self-organized)

Wednesday, 4 May 2022

- 08:00 Breakfast
- 08:45 Scientific computing on heterogeneous architectures
- 09:45 Announcements
- 10:00 Coffee break
- 10:15 Student lightning talks
- 10:55 Optimizing existing lar…
- 11:15 Practical vectorization - Sebastien Ponce (CERN)
- 12:20 Lunch
- 13:00 School photo
- 14:00 Outdoor excursion
- 19:00 Excursion dinner

Thursday, 5 May 2022

- 08:00 Breakfast
- 08:45 Programming for GPUs - Dorothea Vom Bruch (CPPM/CNRS)
- 09:45 Announcements
- 10:00 Coffee break
- 10:15 Performant programming for GPUs - Daniel Campora (University of Maastricht)
- 11:15 Practical vectorization - exercise - Sebastien Ponce (CERN)
- 12:20 Lunch
- 13:00 Study time and/or daily sports
- 14:00 Practical vectorization …
- 14:20 Design patterns and best practices - Daniel Campora (University of Maastricht)
- 15:20 Coffee break
- 15:45 Programming for heterogeneous architectures - exercise - Dorothea Vom Bruch (CPPM/CNRS) Daniel Campora (University of Maastricht)
- 19:00 Barbecue dinner

Friday, 6 May 2022

- 08:00 Breakfast
- 08:45 Programming for heterogeneous architectures - exercise
- 10:00 Coffee break
- 10:15 Programming for heterogeneous architectures - exercise
- 11:30 Announcements
- 11:45 Programming for hete…
- 12:20 Lunch
- 13:00 Study time and/or daily sports
- 14:20 Summary and future technologies overview - Andrzej Nowak
- 15:20 Coffee break
- 15:45 Exam
- 16:30 Free time
- 18:00 Closing Session - Sebastian Lopienski (CERN)
- 19:30 Closing dinner

Saturday, 7 May 2022

- 08:00 Breakfast
- 08:30 Departure - bus leaves at…

COVID-19 measures

https://indico.cern.ch/event/1100351/page/23761-covid-19-measures

Respect physical distancing

Wear a mask

- **exercise rooms**: during direct discussions with other
- **food area**: while queueing, and getting food and drinks
- **in buses, taxis or other shared transport**

Disinfect your hands

- **food area**: before getting the food
- **wash your hands often**

Indico is your friend

https://indico.cern.ch/e/tCSC-2022

CERN School of Computing

Thematic CERN School of Computing 2022

- Overview
- Academic programme
- Classes per lecturer
- Timetable (weekly)
- Timetable (daily)
- Practical information
  - Fees & payment
  - Terms & Conditions
  - Laptop configuration
- School guide
- COVID-19 measures
- Lecturers
- Participants
- Organisers
- tCSC 2022 Live!

The **10th *Thematic* CERN School of Computing (tCSC 2022)** will take place on **May 1-7, 2022**. The theme of the school is ***"Scientific Software for Heterogeneous Architectures"*** - see the academic programme for more details.

This School is organized by CERN. **Assuming a positive evolution of the pandemic, the school will take place in Cargèse, France**, and be hosted at the Institut d'Études Scientifiques de Cargèse (IESC). The Institute is located on the west coast of the French island of Corsica, 50 km north of Ajaccio city and its international airport. (However, if the pandemic situation doesn't allow traveling or physical presence, the school will be moved to online format.)

Please read the

School guide

https://indico.cern.ch/event/1100351/page/23760-school-guide

Check the CSC Live page regularly

https://indico.cern.ch/event/1100351/page/23770-tcsc-2022-live

CERN School of Computing

tCSC 2022 Live!

Welcome Thematic CSC 2022 to IESC!

Sunday, May 1st

Dear all **welcome to the Thematic CSC 2022**, focused on the topic of

"Scientific Software for Heterogeneous Architectures"

This year we have **38 participants** **of 17 different nationalities**:

Albania, Austria, Brazil, France, Germany, Greece, Hungary, India, Iran, Italy, Poland, Russia, Slovakia, South Korea, Spain, Ukraine, United Kingdom

… **representing 28 different institutes**:

CERN, DESY, EPFL, ETHZ, UFRJ, Goethe University, Humboldt University, INFN, University of Bologna, KIT, LPNHE-CNRS, NISER, Niels Bohr Institute, NIKHEF, Sapienza University, Scuola Normale Superiore, Seoul National University, Tata Institute, Universite Libre de Bruxelles, University of Edinburgh, University of Ferrara, University of Kansas, University of Manchester, University of Padua, University of Sofia, University of Turin, University of Warsaw, University of Wisconsin Madison

School booklet

- Printed version for those who asked for ot
- Electronic version (PDF) Linked from school main page on Indico (at the bottom)
- Contains **pictures and short biographies of all participants**

WhatsApp group

Unofficial communication channel

We recommend you to join the group

CSC Rule #1

Participate

- Attendance at all lectures and exercises is mandatory
- You should attend all meals and coffee breaks
- Taking part in social and sports events is optional
  - You must let us know whether you participate or not

CSC Rule #2

Be on time

Check what the schedule says:

- *"Lecture starts at 9:00"* => You must be in the room before 9:00
- *"The bus leaves at 18:00"* => It will leave at 18:00

If you're late, we won't wait

CERN School of Computing

CSC Rule #3

Wear your badge

CSC Rule #4

CERN School of Computing

ENJOY AND PROFIT FROM THE SCHOOL!

… and now …

the self-presentation session!