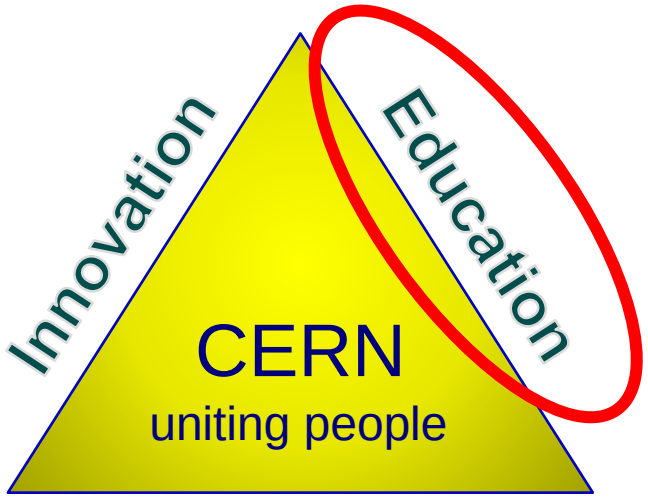
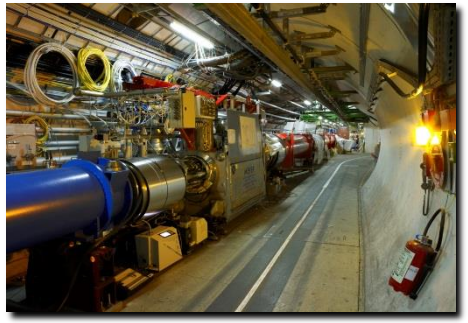
Welcome to the thematic CERN School of Computing

Alberto Pace, school director

CERN's mission



The CERN School of Computing is here …



Accelerating beams (accelerators)

Detecting particles (experiments)

Large-scale computing (Analysis)

Discovery

A school with a long history

- The school was created in 1970, 2023 has been the 44th edition
- This is the 13th edition of the Thematic School
- The school has visited 23 countries
  - all member states (except Bulgaria, Slovak Republic) + Croatia, Cyprus, India
- 84 different nationalities
- 3145 students have followed the school

Mandate and mission

- Create a *common culture* in *scientific computing* among young scientists and engineers involved *in particle physics or other sciences*, as a strategic direction to *promote mobility* and to facilitate the development of large computing-oriented *transnational projects*.
  - http://cern.ch/csc
- Participants come from worldwide laboratories and universities with typically 20 to 30 different nationalities (61 different nationalities in the past 10 years).
  - http://cern.ch/csc/alumni

Bridging science and computing

- The unprecedented technological evolution in computing has profited directly to several scientific research projects, in particular in high energy physics
  - Computing is today the main strategy for many sciences to boost their research productivity
- It is nowadays essential that:
  - Scientists master computing technologies as the main tool for their research
  - Computer scientists understand the scientific domain of the investigation to deliver computing services that meet the needs of the research project

An additional side effect …

- … knowledge transfer of (CERN) skills and (CERN) know-how in computing to academic, national laboratories, research institutes, institutional and industrial circles in Member States and other countries
  - With direct or potential applications up to all spheres of the society (as exemplified with the Web, and the Grid).

The CERN Schools of computing

- The Main School
  - Two weeks, ~ 60 participants *(82 last year)*
  - Multiple topics on scientific computing
- The Thematic schools
  - Goes more in depth on a particular topic
  - Smaller participation, shorter duration (one week), clear goals
  - Last year, two schools 35 + 38 participants
  - This school: 23 participants
- The Inverted school
  - It is frequent to find among students real experts on specific topics, and the cumulated knowledge of the students exceeds the one of lecturers.
  - At the end of each school, we invite students to propose some lectures, and we organize an “inverted” school. *“Where students turn into teachers”*
  - In 2023, the 14th edition had 14 lecturers and more than hundred participants

The School Academic Dimension

- The school …
  - … is not a conference
  - … is not a place for lecturers to present their work, promote their projects
  - Does not replicate of common training available at home institutes, or in member state's universities
  - Does not delivering "technical training" courses

- Focus on **persistent knowledge**, less notions and knowhow

Focus on Knowledge

- Knowledge versus Knowhow

Knowledge	Knowhow
Articulated to other knowledge of the learner	Generally stand-alone information
By nature, when taken by the learner, different between learners	Initially, the same for every learner
Transferable, adaptable to other environments	Transfer requires effort
When taken by the learner, persistent	Will be forgotten if not practiced
Requires related knowledge pre-exist	Limited pre-requirements

A statement from Ivica …

- https://www.facebook.com/1334424117/posts/10232249117833997/?mibextid=rS40aB7S9Ucbxw6v

- "Another reason for your optimism is the fact that you go to school every day to learn something new. I know you are usually not exactly thrilled about going and being in school, but consider the following arguments. For thousands of years, millions of people have tried to understand various things about nature and society. Some of them spent their entire lives trying to understand the basic laws of nature, what our planet looks like, how the universe looks like, how stars, planets, people etc were created. You learn most of these things in a few hours of teaching and working at school or at home. From that perspective you know more after a few years of school than some of the greatest scientists in human history. And you find out more and more every day."

An outreach opportunity

- For the local organizers

ΚΑΘΗΜΕΡΙΝΗ **ΚΑΒΑΛΑ**

ΚΑΘΗΜΕΡΙΝΗ ΕΦΗΜΕΡΙΔΑ ΤΗΣ ΚΑΒΑΛΑΣ

Χρόνος 41ος · Αριθμός Φύλλου 11097 Παρασκευή 11 Σεπτεμβρίου 2015 Τιμή φύλλου 0,50 EURO

Θερινό Σχολείο Ηλεκτρονικής με 75 μεταπτυχιακούς φοιτητές θα διοργανώσει το ΤΕΙ Καβάλας

Μεγάλη διοργάνωση, πολλαπλά τα κέρδη

SLOBODNA DALMACIJA

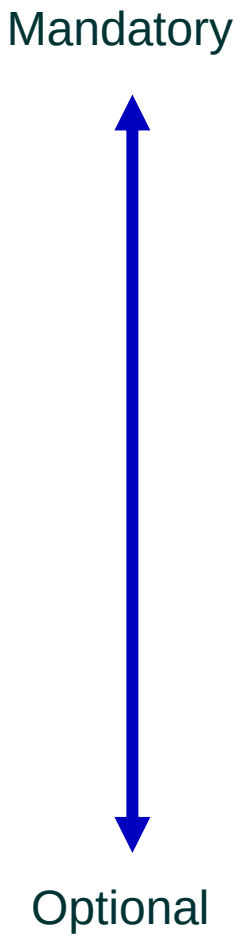
An outreach opportunity

- For CERN

Thematic CSC 2023 on
“Security of research computing infrastructures”

The school learning process

- Learning process
  - Lectures
  - Exercises
  - Exam
- Meet special persons,
  Build trusts with colleagues across the world
  - Lunches, dinners, coffee breaks, evenings
  - Excursions
  - Music events
  - Sport programme



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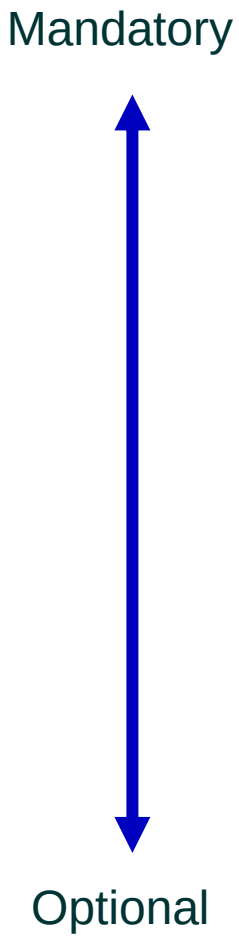

Your lecturers

- Theme: “Security of research computing infrastructures”
  - Introduction
  - Track 1: Protection and prevention
  - Track 2: Detection
  - Track 3: Response

Stefan Lueders

Sven Gabriel

Tom Dack

Barbara Krasovec

Daniel Kouřil

David Crooks

Sebastian Lopienski

The tuition programme

Sunday, 8 October 2023	Monday, 9 October 2023	Tuesday, 10 October 2023	Wednesday, 11 October 2023	Thursday, 12 October 2023	Friday, 13 October 2023	Saturday, 14 October 2023
	09:00 Opening Session	08:45 Risk and vulnerability management - Sven Gabriel	08:45 Container security - Daniel Kouřil (CESNET)	08:45 Digital forensics: essentials and data acquisition - Daniel Kouřil (CESNET)	08:45 Digital forensics - exercises - Daniel Kouřil (CESNET)	08:45 Departure
	09:45 Security in research and scientific computing - Stefan Lueders (CERN)	09:45 Virtualisation and cloud security - Barbara Krašovec (IJS)	09:45 Container security - exercises - Daniel Kouřil (CESNET)	09:45 Defensible security architecture: how to implement security principles - Barbara Krašovec (IJS)	10:15 Coffee break	
	10:45 Coffee break	10:45 School photo	10:45 Coffee break	10:45 Coffee break	10:30 Introduction to forensics - exercises - Daniel Kouřil	
	11:15 Announcements	10:50 Coffee break	11:15 Announcements	11:15 Announcements	11:45 Announcements	
	11:30 Identity, authentication, authorisation	11:15 Announcements	11:30 Intrusion detection with SOC: deployment and operation - David Crooks (UKRI STFC)	11:30 Digital forensics: data analysis - Daniel Kouřil (CESNET)	12:00 Penetration testing - exercise d...	
12:45 Lunch	12:30 Lunch	11:30 Logging and traceability - David Crooks (UKRI STFC)	12:30 Lunch	12:30 Lunch	12:30 Lunch	
	13:15 Study time and/or daily sports	12:30 Lunch	13:15 Outdoor excursion	13:15 Study time and/or daily sports	13:15 Study time	
14:00 Registration	14:45 Security architecture fundamentals - Barbara Krašovec (IJS)	13:15 Study time and/or daily sports		14:45 Incident response management - Barbara Krašovec (IJS)	14:15 Exam	
	15:45 Coffee break	14:45 Student lightning talks		15:45 Coffee break	15:00 Coffee break	
16:00 Self-presentation: 1 minute per person	16:00 Security operations - lecture 1 - Sven Gabriel	15:45 Coffee break		16:00 Intrusion detection with SOC and AAI - exercises - Tom Dack (Science and Technology Facilities Council STFC (GB)) David Crooks (UKRI STFC)	15:15 Incident response - exercise - David Crooks (UKRI STFC) Romain Wartel (CERN) Tom Dack (Science and Technology Facilities Council STFC (GB)) Sebastian Lopienski (CERN)	
16:40 Welcome to the CERN School...	17:00 Security operations - lecture 2 - Sven Gabriel	16:00 Intrusion detection with SOC: threat intelligence, monitoring, integration and processes				
17:00 Transport to Split	18:00 Network design - exercise - Barbara Krašovec (ISJ)	17:00 Introduction to web penetration testing - Sebastian Lopienski (CERN)			18:15 Closing Session - Alberto Pace (CERN)	
17:30 Visit of Split old town		18:00 Penetration testing - exercises - Sebastian Lopienski (CERN)				
19:15 Outside Welcome Dinner at Restaurant Para Di Soto	19:15 Dinner at MEDILS	19:15 Dinner at MEDILS	18:45 Outside dinner at Kastil Slanica, Omis	19:15 Dinner at MEDILS	19:30 Outside Closing Dinner at Kavanazona (Zona restaurant)	

The school governance

- … is discussed at the School Advisory Committee
  - http://csc.web.cern.ch/advisory-committe
  - Includes several fulltime university professors from different countries
    - Currently: Belgium, Estonia, Germany, Croatia, Italy, Norway, Poland, Spain
  - Two meetings per year

The School Advisory Committee

Arnulf Quadt
Advisory Committee Chair, Programme Committee
Universität Göttingen

Alberto Pace
School Director, Advisory Committee , Programme Committee
CERN

Enrica Porcari
Advisory Committee, CERN IT Department Head
CERN

Kristina Gunne
School Administrative Manager, Advisory Committee
CERN

Jarek Polok
School Technical Manager, Advisory Committee
CERN

Frédéric Hemmer
Advisory Committee, Programme Committee
CERN

Sebastian Łopieński
Advisory Committee
CERN

Pere Mato
Advisory Committee, Programme Committee
CERN

Danilo Piparo
Advisory Committee, Programme Committee
CERN

Are Strandile
Advisory Committee, Programme Committee
CERN

Veronika Zadin
CSC 2023 Local Organising Committee
University of Tartu Institute of Technology

Tauno Tiirats
CSC 2023 Local Organising Committee
University of Tartu Institute of Technology

Margit Meiesaar
CSC 2023 Local Organising Committee
University of Tartu Institute of Technology

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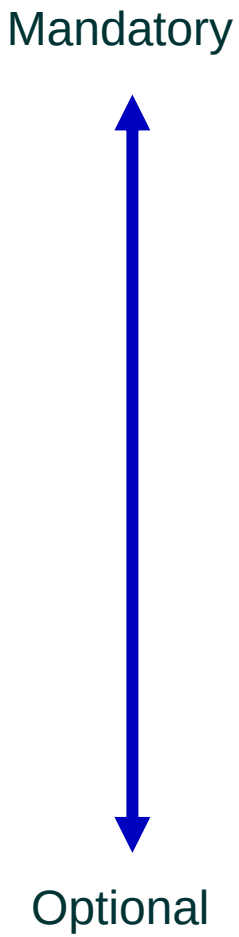

The School culture in “exercises”

- The school has an entire computing infrastructure for exercises. Remotely accessible to the students
  - The quality of the computing infrastructure is a shop window for CERN
- Students works in pair (2-student teams). If possible:
  - 1 student with physics background
  - 1 student with computing background

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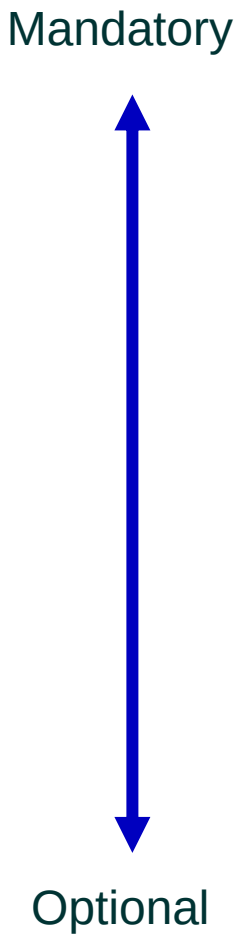

The exam

- A serious and difficult exam, which delivers the diploma
- Evaluate knowledge in two fields
  - Physics
  - Computing

An exam part of the learning process

- In the process of hypotheses testing, we often define the null and the alternative hypotheses. The most robust final results are obtained for ...
  - ... the acceptance of the alternative hypothesis.
  - ... the rejection of the difference between null and alternative hypothesis.
  - ... the acceptance of the ratio of null and alternative hypothesis.
  - ... the rejection of the null hypothesis.

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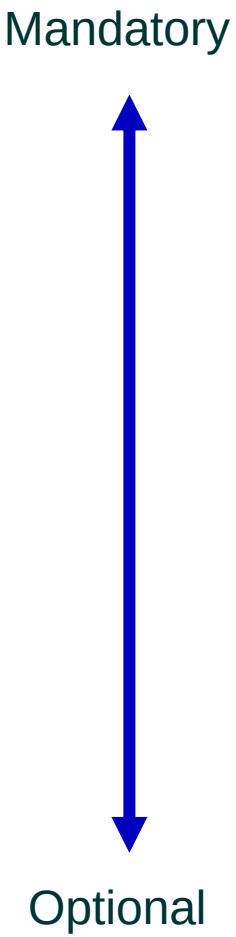

Lunch and Dinners

- Mix of Students + lecturers
- Tables of 8 - 12 persons

(Optional) Social programme

- Excursions
  - Culture
  - History
  - Nature

- Social games

(Optional) Music events

- Many students have hidden talents
- Music values are universal across all cultures

This year in the previous thematic school, here

Sten

Christof

Bernardo

Marcel

Optional Sports ….

the participants give the most value to the school !

Why ?

For example, this year main school (2023)

- 135 applicants participants, 42 nationalities
  - Algeria, Austria, Belgium, Brazil, Canada, China, Croatia, Ecuador, Egypt, Estonia, Germany, Greece, India, Iran, Italy, Jordan, Lebanon, Malaysia, Mexico, Morocco, Netherlands, Oman, Pakistan, Palestinian Territories, Peru, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Thailand, Turkey, Uganda, Ukraine, United Kingdom, United States.
- 32 % female participants (43/135)
- 84 institutes !!

This school numbers

- 26 participants (26% female)
- 13 nationalities
  - Belgium, Bulgaria, Canada, Estonia, Germany, Greece, India, Italy, Portugal, Romania, Spain, Ukraine, United Kingdom
- 10 institutes
  - University of Münster, University Politechnica of Bucharest, Universität Hamburg, STFC, LIP, Ludwig-Maximilians-Universität, INFN CNAF, Frankfurt Institute for Advanced Studies, University of Bath, CERN


UH


INFN
CNAF
Istituto Nazionale di Fisica Nucleare
Centro Nazionale per la Ricerca e lo Sviluppo
nelle Tecnologie Informatiche e Telematiche


LIP


SCC
Steinbuch Centre
for Computing


UKRI
Science and
Technology
Facilities Council


UNIVERSITY OF
BATH


CERN


WWU
MÜNSTER


POLITEHNICA
UNIVERSITATEA
DIN BUCUREȘTI
1818


FIAS Frankfurt Institute
for Advanced Studies


LMU
LUDWIG-
MAXIMILIANS-
UNIVERSITÄT
MÜNCHEN

So …

We have quite some diversity

But where is the value?

Excerpts from reference letters (from the main school)

- … I can indeed state that she is a top-level student, easily among the best 5% I ever met
- He finished his master thesis with a mark of 1.1 (marks range from 1.0 (best) to 5 (failed) and he ranks among the best of the successful master students in Physics.
- His diploma work was given the highest possible mark …
- … compared to the PhD students in my group so far, he ranks among the very best, with exceptional maturity concerning computing and software and a clear view on and experience in data analysis.

Who are the CSC participants ?

- You are young, diverse, come from many countries, from different institutes …
- You have all an outstanding potential and a passion for both computing and science.
- You will work together one weeks to widen your skills but also establish lifetime links with other participants and research institutes across the world that will be useful throughout your future career.
- This is what gives the highest value to the school

It is a small world …

- All top scientists knows each other very well

tCSC 2023, Split, Croatia

sCSC 2023, Split, Croatia

- Are you ready to write history ?


CERN