



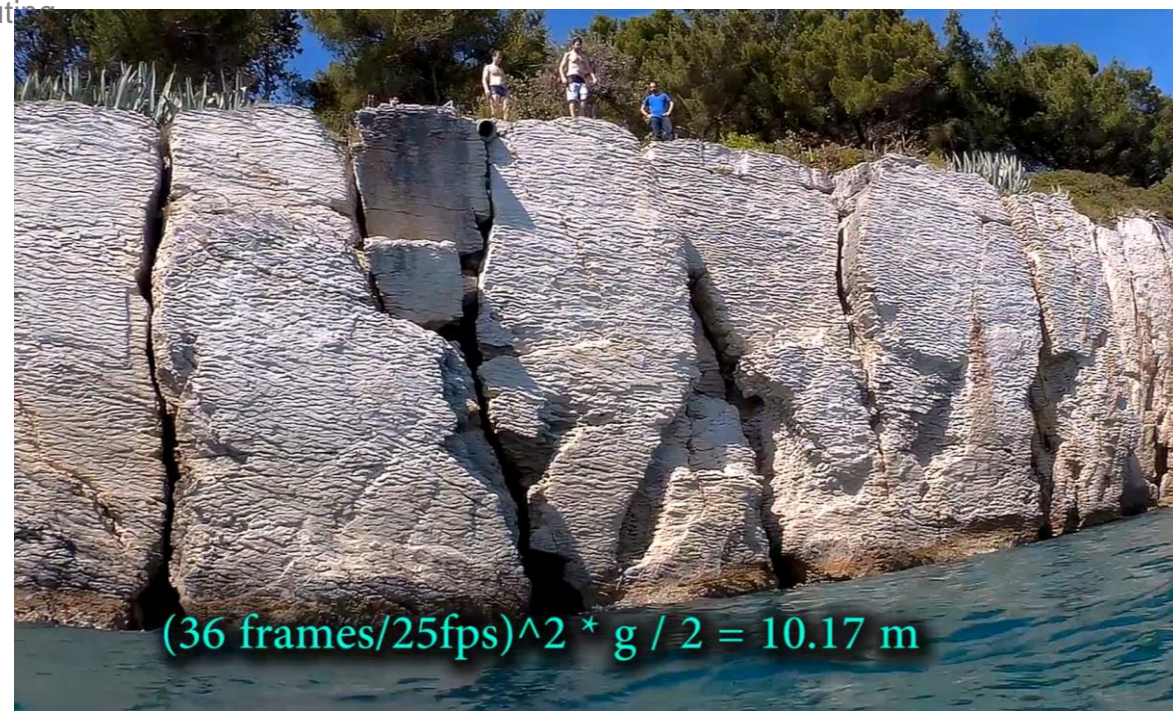
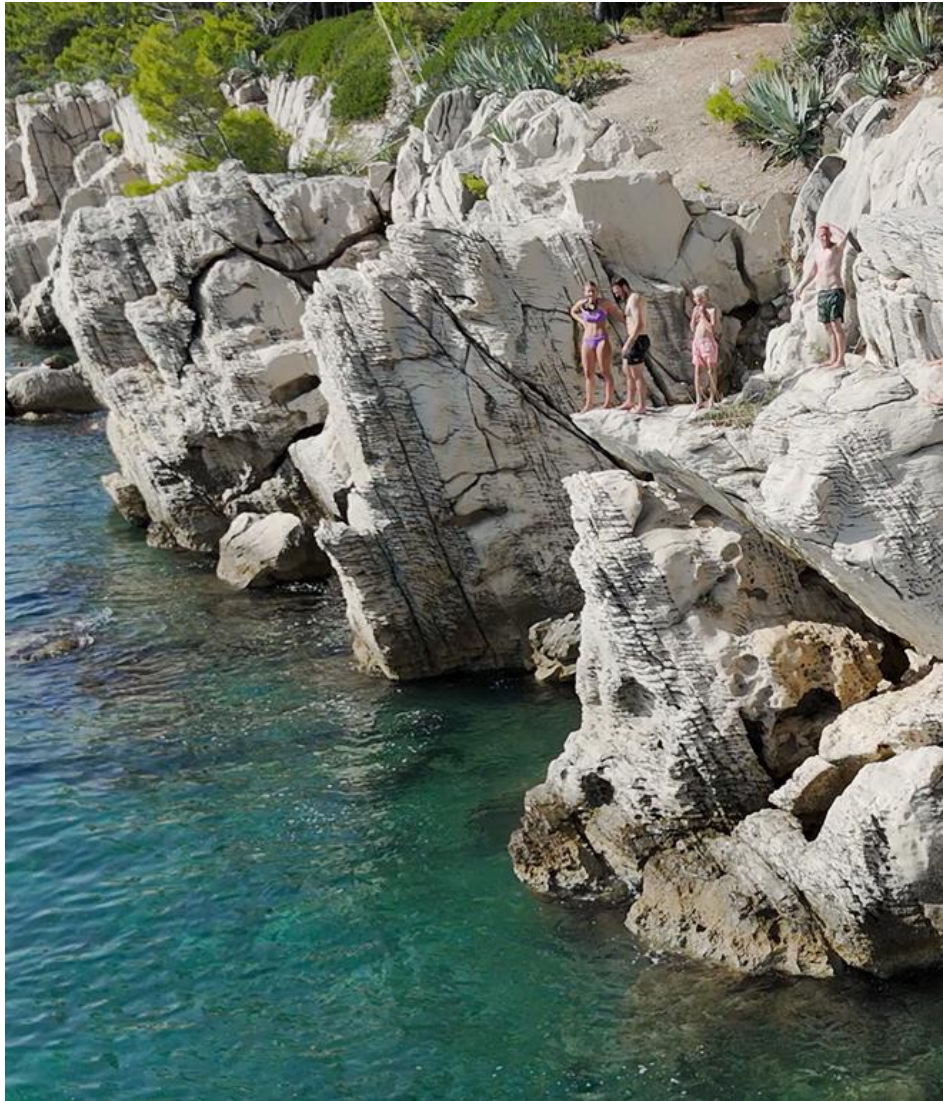
Closing address

Alberto Pace

Drinking Pipi in Split



How high is the cliff ?



Will it rain?



Can weather prevent us having activities??

- ◆ No! It only adds to the legend of the School

<https://www.youtube.com/watch?v=1dZveoBfiww>

Spaceballs, Mel Brooks, 1987



Hiking (Uxbridge, 2010)



Biking (Uxbridge 2010)











Rafting (Split, 2014)



Table tennis tournament

- ◆ Alexandros keeps the tCSC cup
- ◆ Congratulations to Alejandro and Robin

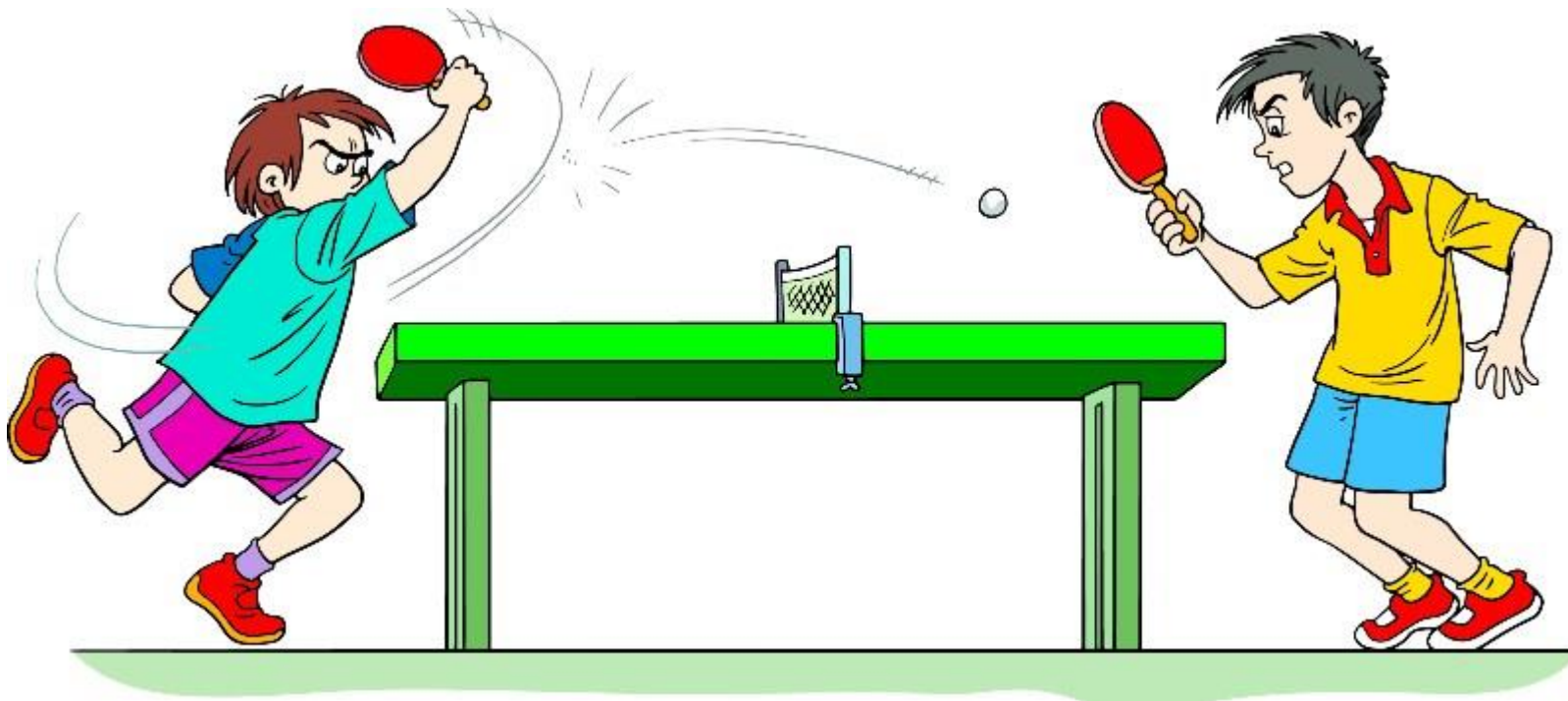


Photo Contest



Important points

- ◆ **Feedback questionnaire**
 - ◆ anonymous feedback about the School, lectures, exercises
 - ◆ details will come by e-mail
 - ◆ **you *must* complete this feedback questionnaire**
 - ◆ **really, please do** – we need your input, so that we can evolve, and get even better!
- ◆ **Certificate of attendance** will be sent out
- ◆ **Electronic version of the booklet** (PDF) is published on tCSC website
 - ◆ accessible only for logged-in people



Now, what's next ?

Post-school networking

tCSC lunches at CERN



tCSC2016

09:49

[blurred]: anyone for lunch today?!

Four CERN Schools of Computing

iCSC 2024

April 2024

Apply now as a lecturer !

tCSC 2024

June 2024

Subscription in February

Come back in 2024 !

CSC 2024

September 2024

Subscription in May

Come back in 2024 !

sCSC 2024

October 2024

Come back in 2024

Attend other CSCs 😊

Advertise CSC
to your colleagues

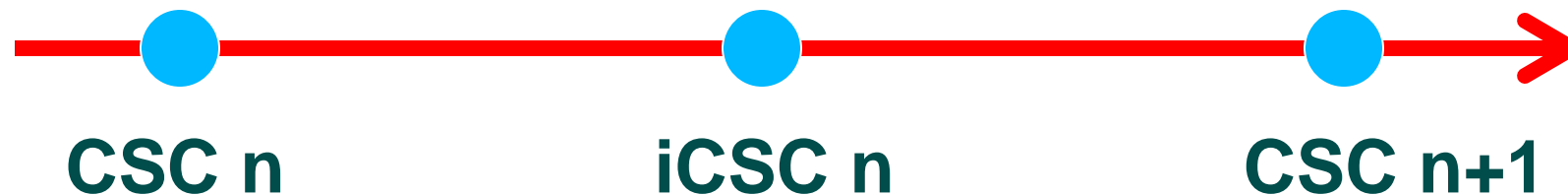


The **inverted** CERN School of Computing

Why an inverted CSC ?

- ◆ At every CSCs, the sum of the knowledge of the students often exceeds the one of lecturer teaching, and that it is frequent to find in the room real experts on particular topics. This is the idea behind iCSC.

Reversing the roles



2024: will be the 15th edition of the iCSC

2005

2005
CERN School of Computing
Inverted CSC-2005
"Where students turn into teachers"

23-25 February 2005, CERN*

Lecturers: all former CSC2004 students
 Patrick Abrieger, University of Geneva, Switzerland
 Robert Arfken, CERN
 Søren Bratsberg, Imperial College, UK
 Bernhard Bruch, University of Strasbourg, France
 Roberto Calabrese, CERN
 Ralf Enders, CERN
 Robert Grosse, CERN
 Paul Huet, CERN
 Christoph Jentzsch, CERN
 Peter Knebel, CERN
 Zoltan Kunszt, CERN

Data Management and Data Bases
Advanced Software Development and Engineering
Web Services in Distributed Computing

*** IT Amphitheatre, Building 31
Free attendance but registration recommended**

2006

2006
CERN School of Computing
Inverted CSC-2006
"Where students turn into teachers"

6-8 March 2006, CERN*

Lecturers: all former CSC2005 students
 Mark Binkov, University of Geneva, Switzerland
 Johannes Brunschweiler, CERN
 Viktor Chepur, University of Strasbourg, France
 Robert Grosse, CERN
 Andrei Haines, CERN
 Ralf Enders, CERN
 Paul Huet, CERN
 Christoph Jentzsch, CERN
 Peter Knebel, CERN
 Zoltan Kunszt, CERN

Computational Intelligence for HEP Data Analysis
The Art of Designing Parallel Applications
Software Testing Fundamentals and Best Practices

*** IT Amphitheatre, Building 31
Free attendance but registration recommended**

2008

2008
CERN School of Computing
Inverted CSC-2008
"Where students turn into teachers"

15 March 2008

**Register now to get the printed booklet
per-lecture attendance possible**

Lecturers: all former CSC2006 students
 John DeGroot, University of Geneva, Switzerland
 Andrei Haines, CERN
 Johannes Brunschweiler, CERN
 Viktor Chepur, University of Strasbourg, France
 Robert Grosse, CERN
 Christoph Jentzsch, CERN
 Peter Knebel, CERN
 Zoltan Kunszt, CERN

Parallel Programming
GPU Computing
Advanced Software Development and Engineering
Web Services in Distributed Computing

*** IT Amphitheatre, Building 31
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2010

2010
CERN School of Computing
Inverted CSC-2010
"Where students turn into teachers"

8-9 March 2010, CERN*

Lecturers: all former CSC2008 students
 John DeGroot, University of Geneva, Switzerland
 Andrei Haines, CERN
 Johannes Brunschweiler, CERN
 Viktor Chepur, University of Strasbourg, France
 Robert Grosse, CERN
 Christoph Jentzsch, CERN
 Peter Knebel, CERN
 Zoltan Kunszt, CERN

GPU Computing in HEP
Computer Vision
Testing for Large Scale Systems
Grid Interpretations by LHC experiments

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2011

2011
CERN School of Computing
Inverted CSC-2011
"Where students turn into teachers"

3-4 March 2011, CERN*

Lecturers: all former CSC2010 students
 John DeGroot, University of Geneva, Switzerland
 Andrei Haines, CERN
 Johannes Brunschweiler, CERN
 Viktor Chepur, University of Strasbourg, France
 Robert Grosse, CERN
 Christoph Jentzsch, CERN
 Peter Knebel, CERN
 Zoltan Kunszt, CERN

Virtualization: what it is, how it works
Server Virtualization
Cloud Computing
Grid Interpretations by LHC experiments

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Free attendance but registration recommended**

2013

2013
CERN School of Computing
Inverted CSC-2013
"Where students turn into teachers"

25-26 February 2013, CERN*

Lecturers: all former CSC2011 students
 John DeGroot, University of Geneva, Switzerland
 Andrei Haines, CERN
 Johannes Brunschweiler, CERN
 Viktor Chepur, University of Strasbourg, France
 Robert Grosse, CERN
 Christoph Jentzsch, CERN
 Peter Knebel, CERN
 Zoltan Kunszt, CERN

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2014

2014
CERN School of Computing
Inverted CSC-2014
"Where students turn into teachers"

24-25 February 2014, CERN*

Lecturers: all former CSC2013 students
 John DeGroot, University of Geneva, Switzerland
 Andrei Haines, CERN
 Johannes Brunschweiler, CERN
 Viktor Chepur, University of Strasbourg, France
 Robert Grosse, CERN
 Christoph Jentzsch, CERN
 Peter Knebel, CERN
 Zoltan Kunszt, CERN

LAN Programming - The basics
GPU Computing in HEP
Computer Vision
Testing for Large Scale Systems
Grid Interpretations by LHC experiments

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2015

2015
CERN School of Computing
Inverted CSC-2015
"Where students turn into teachers"

23-24 February 2015

Lecturers: all former CSC2014 students
 Patrick Abrieger, University of Geneva, Switzerland
 Robert Arfken, CERN
 Søren Bratsberg, Imperial College, UK
 Bernhard Bruch, University of Strasbourg, France
 Roberto Calabrese, CERN
 Ralf Enders, CERN
 Robert Grosse, CERN
 Paul Huet, CERN
 Christoph Jentzsch, CERN
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 Zoltan Kunszt, CERN

Data Management and Data Bases
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2016

2016
CERN School of Computing
Inverted CSC-2016
"Where students turn into teachers"

29 February - 2 March 2016

Lecturers: all former CSC2015 students
 Patrick Abrieger, University of Geneva, Switzerland
 Robert Arfken, CERN
 Søren Bratsberg, Imperial College, UK
 Bernhard Bruch, University of Strasbourg, France
 Roberto Calabrese, CERN
 Ralf Enders, CERN
 Robert Grosse, CERN
 Paul Huet, CERN
 Christoph Jentzsch, CERN
 Peter Knebel, CERN
 Zoltan Kunszt, CERN

Computational Intelligence for HEP Data Analysis
The Art of Designing Parallel Applications
Software Testing Fundamentals and Best Practices

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2017

2017
CERN School of Computing
Inverted CSC-2017
"Where students turn into teachers"

6-8 March 2017

Lecturers: all former CSC2016 students
 John DeGroot, University of Geneva, Switzerland
 Andrei Haines, CERN
 Johannes Brunschweiler, CERN
 Viktor Chepur, University of Strasbourg, France
 Robert Grosse, CERN
 Christoph Jentzsch, CERN
 Peter Knebel, CERN
 Zoltan Kunszt, CERN

Parallel Programming
GPU Computing
Advanced Software Development and Engineering
Web Services in Distributed Computing

*** IT Amphitheatre, Building 31
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2018

2018
CERN School of Computing
Inverted CSC-2018
"Where students turn into teachers"

5 to 8 March 2018

Lecturers: all former CSC2017 students
 John DeGroot, University of Geneva, Switzerland
 Andrei Haines, CERN
 Johannes Brunschweiler, CERN
 Viktor Chepur, University of Strasbourg, France
 Robert Grosse, CERN
 Christoph Jentzsch, CERN
 Peter Knebel, CERN
 Zoltan Kunszt, CERN

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Free attendance but registration recommended**

2019

2019
CERN School of Computing
Inverted CSC-2019
"Where students turn into teachers"

4 to 7 March 2019

Lecturers: all former CSC2018 students
 John DeGroot, University of Geneva, Switzerland
 Andrei Haines, CERN
 Johannes Brunschweiler, CERN
 Viktor Chepur, University of Strasbourg, France
 Robert Grosse, CERN
 Christoph Jentzsch, CERN
 Peter Knebel, CERN
 Zoltan Kunszt, CERN

Virtualization: what it is, how it works
Server Virtualization
Cloud Computing
Grid Interpretations by LHC experiments

*** IT Amphitheatre, Building 31
Free attendance but registration recommended**

2020

2020
CERN School of Computing
Inverted CSC-2020
"Where students turn into teachers"

28 September to 2 October 2020 - online school

Lecturers: all former CSC2019 students
 John DeGroot, University of Geneva, Switzerland
 Andrei Haines, CERN
 Johannes Brunschweiler, CERN
 Viktor Chepur, University of Strasbourg, France
 Robert Grosse, CERN
 Christoph Jentzsch, CERN
 Peter Knebel, CERN
 Zoltan Kunszt, CERN

GPU Computing in HEP
Computer Vision
Testing for Large Scale Systems
Grid Interpretations by LHC experiments

*** IT Amphitheatre, Building 31
Free attendance but registration recommended**

2023

2023
CERN School of Computing
Inverted CSC-2023
"Where students turn into teachers"

6 to 9 March 2023

Lecturers: all former CSC2022 students
 John DeGroot, University of Geneva, Switzerland
 Andrei Haines, CERN
 Johannes Brunschweiler, CERN
 Viktor Chepur, University of Strasbourg, France
 Robert Grosse, CERN
 Christoph Jentzsch, CERN
 Peter Knebel, CERN
 Zoltan Kunszt, CERN

LAN Programming - The basics
GPU Computing in HEP
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The inverted CSC

- ◆ At the end of each main school, we call students present to make proposals. When we receive sufficient proposals of appropriate quality, we organize an inverted school.



- ◆ The students combine their skills and elaborate on CSC related subjects.

The 2023 topics were 13, new record !

- ◆ Cloud & Containers - Everything you need to know
- ◆ Everything that can go wrong in a message passing system
- ◆ Authentication and Authorization for the WLCG
- ◆ Quantum Computing
- ◆ How a real-world C++ compiler works
- ◆ CPU Performance Profiling on Linux in the HEP Context
- ◆ Multiplatform Programming with Python
- ◆ A simple introduction to accelerated computing
- ◆ The most beautiful line you can draw with Kalman filter
- ◆ An introduction to Bayesian neural networks and uncertainty quantification in neural networks
- ◆ Graph Neural Networks: From fundamentals to Physics application
- ◆ MLOps - Going from Good to Great
- ◆ A Crash Course on Reinforcement Learning

This year's lecturer, 10 different institutes



Ahmed Abdelmottaleb
Warwick University



Tom Dack
STFC



Ivan Kabadzhov
Freiburg University



Martin Cejp
CERN



Jack Henschel
CERN



Peter Kicsiny
CERN and EPFL



Piotr Konopka
CERN



Charis Kleio Koraka
Wisconsin Madison



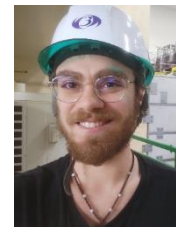
Valeriia Lukashenko
NIKHEF, NL



Michal Maciejewski
Roche



Jacopo Talpini
Milano-Bicocca



Ilias Tsaklidis
CERN



Felix Wagner
HEPHY

Lecturers at the iCSC

- ◆ Many iCSC lecturers have become lecturers at various CSC schools
 - ◆ Sebastian Lopienski (2005), Brice Copy (2005), Zornitsa Zaharieva (2005), Andrzej Nowak (2008), Benjamin Radburn-Smith (2010), Thomas Keck (2016), Daniel Campora (2017) , Eamonn Maguire (2017), Hannah Short (2018), Tom Dack (2023), ...
- ◆ ... And one of them became director of the school





Diplomas and/or Certificate of Attendance

Access your exam result

◆ <https://cern.ch/frog2023>



sCSC – Students' distinctions

- ◆ 25 points of 26
 - ◆ Benedikt Bieringer
 - ◆ Diogo Reis Santos
 - ◆ Vasvi Sharma
 - ◆ Vlad Nastase





Thanks

The lecturers ...



Sebastian Lopienski



Tom Dack



Sven Gabriel



Ste



David Crooks



Barbara Krasovec



Daniel Kouřil

To the Technical and Administrative managers



Kristina Gunne
Administrator



Andrzej Nowicki
Technical Manager

... and the **MEDILS** staff !

Finally ...

◆ Thanks to the **sCSC 2023 participants**



Finally ...

◆ Thanks to the **sCSC 2023 participants**



sCSC 2023 participants

| | |
|----------------------------|---|
| James Acris | Science and Technology Facilities Council, United Kingdom |
| Benedikt Bieringer | Westfälische Wilhelms-Universität-Münster, Germany |
| Diego Cabas Alvarez | CERN, Switzerland |
| Anna (Annika) Churilova | CERN, Switzerland |
| Alessio Cosenza | CERN, Switzerland |
| David Crooks | UK Research and Innovation, United Kingdom |
| Tom Dack | Science and Technology Facilities Council, United Kingdom |
| Konstantinos Dalianis | CERN, Switzerland |
| Sven Gabriel | Nikhef, Amsterdam |
| Kristina Gunne | CERN, Switzerland |
| Robin Hofsaess | Steinbuch Centre for Computing, Germany |
| David Martin Koch | Ludwig-Maximilians-Universität, Germany |
| Violeta Koleva | ARM, United Kingdom |
| Daniel Kouril | Masaryk University, Check Republic |
| Barbara Krasovec | Jožef Stefan Institute, Slovenia |
| Johannes Lange | Universität Hamburg, Germany |
| Sebastian Lopienski | CERN, Switzerland |
| Stefan Lueders | CERN, Switzerland |
| Roberta Miccoli | INFN CNAF, Italy |
| Vlad-Iulius Nastase | University Politehnica of Bucharest, Romania |
| Andrzej Novicki | CERN, Switzerland |
| Raul Nunez Garcia | CERN, Switzerland |
| Alberto Pace | CERN, Switzerland |
| Alexandros Petridis | CERN, Switzerland |
| Callum Pollock | Science and Technology Facilities Council, United Kingdom |
| Elizaveta Ragozina | CERN, Switzerland |
| Diogo Reis Santos | CERN, Switzerland |
| Andries Roeland J Reyskens | CERN, Switzerland |
| Pavithran Sakamuri | Frankfurt Institute for Advanced Studies, Germany |
| Alejandro Sanchez Teruel | CERN, Switzerland |
| Anton Schwarz | CERN, Switzerland |
| Vasvi Sharma | CERN, Switzerland |
| Shrija Rajen Sheth | CERN, Switzerland |
| Roman Sumailov | CERN, Switzerland |
| Miguel Viana | LIP, Portugal |
| Romain Wartel | CERN, Switzerland |
| Leon Welchert | Westfälische Wilhelms-Universität-Münster, Germany |

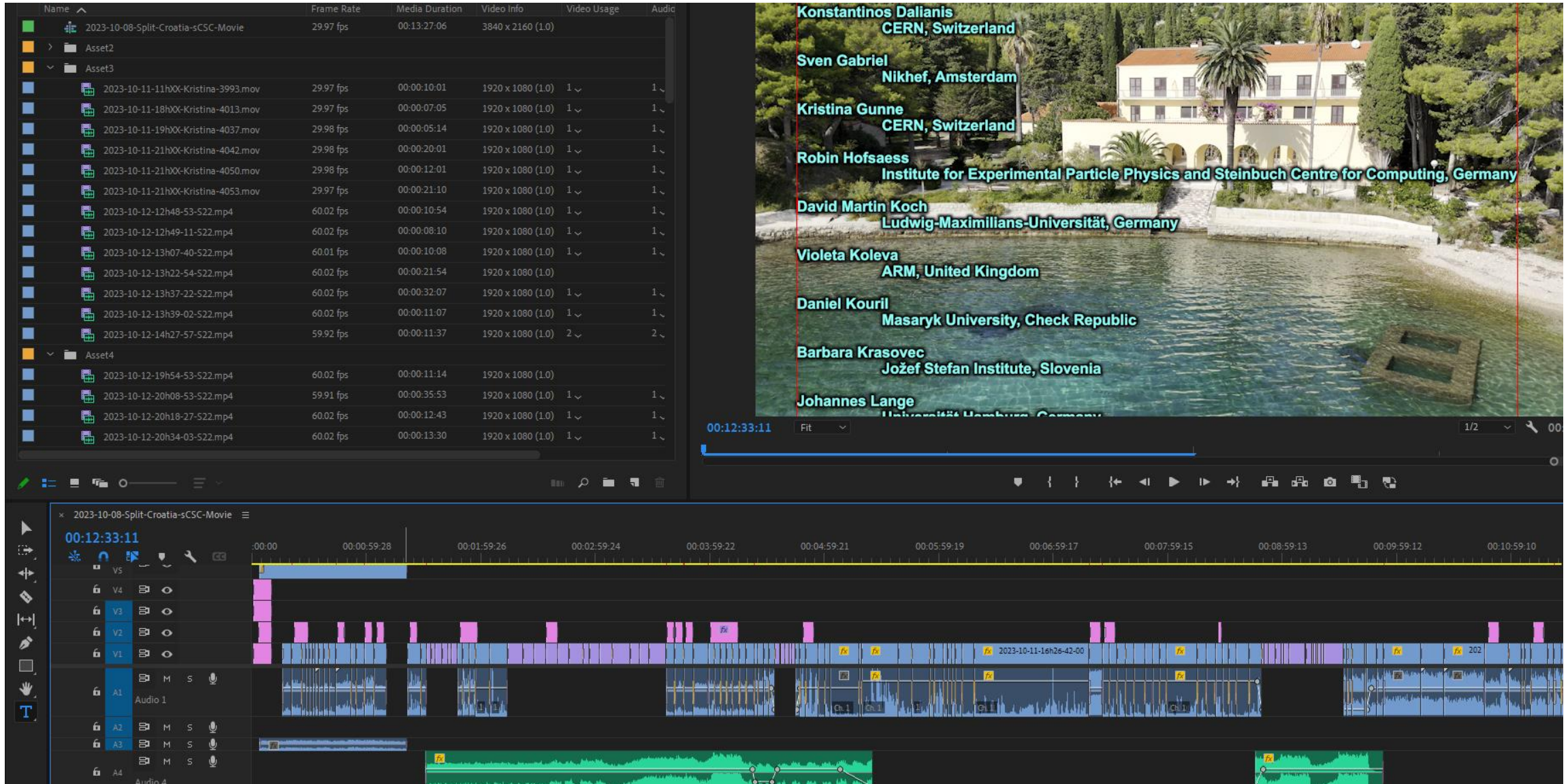


Thank you

All good things come to an end...



But before closing the school



The screenshot displays a video editing software interface. On the left, a project list shows various video assets with columns for Name, Frame Rate, Media Duration, Video Info, Video Usage, and Audio. The main preview window shows a video of a building by a lake with overlaid text listing names and affiliations. The bottom timeline shows multiple tracks for video (V1-V4) and audio (A1-A4).

| Name | Frame Rate | Media Duration | Video Info | Video Usage | Audio |
|-------------------------------------|------------|----------------|-------------------|-------------|-------|
| 2023-10-08-Split-Croatia-sCSC-Movie | 29.97 fps | 00:13:27:06 | 3840 x 2160 (1.0) | | |
| Asset2 | | | | | |
| Asset3 | | | | | |
| 2023-10-11-11h00-Kristina-3993.mov | 29.97 fps | 00:00:10:01 | 1920 x 1080 (1.0) | 1 ↓ | 1 ↓ |
| 2023-10-11-18h00-Kristina-4013.mov | 29.97 fps | 00:00:07:05 | 1920 x 1080 (1.0) | 1 ↓ | 1 ↓ |
| 2023-10-11-19h00-Kristina-4037.mov | 29.98 fps | 00:00:05:14 | 1920 x 1080 (1.0) | 1 ↓ | 1 ↓ |
| 2023-10-11-21h00-Kristina-4042.mov | 29.98 fps | 00:00:20:01 | 1920 x 1080 (1.0) | 1 ↓ | 1 ↓ |
| 2023-10-11-21h00-Kristina-4050.mov | 29.98 fps | 00:00:12:01 | 1920 x 1080 (1.0) | 1 ↓ | 1 ↓ |
| 2023-10-11-21h00-Kristina-4053.mov | 29.97 fps | 00:00:21:10 | 1920 x 1080 (1.0) | 1 ↓ | 1 ↓ |
| 2023-10-12-12h48-53-S22.mp4 | 60.02 fps | 00:00:10:54 | 1920 x 1080 (1.0) | 1 ↓ | 1 ↓ |
| 2023-10-12-12h49-11-S22.mp4 | 60.02 fps | 00:00:08:10 | 1920 x 1080 (1.0) | 1 ↓ | 1 ↓ |
| 2023-10-12-13h07-40-S22.mp4 | 60.01 fps | 00:00:10:08 | 1920 x 1080 (1.0) | 1 ↓ | 1 ↓ |
| 2023-10-12-13h22-54-S22.mp4 | 60.02 fps | 00:00:21:54 | 1920 x 1080 (1.0) | 1 ↓ | 1 ↓ |
| 2023-10-12-13h37-22-S22.mp4 | 60.02 fps | 00:00:32:07 | 1920 x 1080 (1.0) | 1 ↓ | 1 ↓ |
| 2023-10-12-13h39-02-S22.mp4 | 60.02 fps | 00:00:11:07 | 1920 x 1080 (1.0) | 1 ↓ | 1 ↓ |
| 2023-10-12-14h27-57-S22.mp4 | 59.92 fps | 00:00:11:37 | 1920 x 1080 (1.0) | 2 ↓ | 2 ↓ |
| Asset4 | | | | | |
| 2023-10-12-19h54-53-S22.mp4 | 60.02 fps | 00:00:11:14 | 1920 x 1080 (1.0) | 1 ↓ | 1 ↓ |
| 2023-10-12-20h08-53-S22.mp4 | 59.91 fps | 00:00:35:53 | 1920 x 1080 (1.0) | 1 ↓ | 1 ↓ |
| 2023-10-12-20h18-27-S22.mp4 | 60.02 fps | 00:00:12:43 | 1920 x 1080 (1.0) | 1 ↓ | 1 ↓ |
| 2023-10-12-20h34-03-S22.mp4 | 60.02 fps | 00:00:13:30 | 1920 x 1080 (1.0) | 1 ↓ | 1 ↓ |

Konstantinos Dalianis
CERN, Switzerland

Sven Gabriel
Nikhef, Amsterdam

Kristina Gunne
CERN, Switzerland

Robin Hofsaess
Institute for Experimental Particle Physics and Steinbuch Centre for Computing, Germany

David Martin Koch
Ludwig-Maximilians-Universität, Germany

Violeta Koleva
ARM, United Kingdom

Daniel Kouril
Masaryk University, Check Republic

Barbara Krasovec
Jožef Stefan Institute, Slovenia

Johannes Lange
Universität Hamburg, Germany



Summary of the School

- ◆ <https://youtu.be/F6PqgNUWOzM>

