

Welcome to the *Introductory* General CAS Course



Adapting to sanitary conditions of Covid we have changed the venue and also the dates to 25.September - 8.October 2021



Everness Hotel in Chavannes de Bogis

ktu
1922
kauno technologijos universitetas

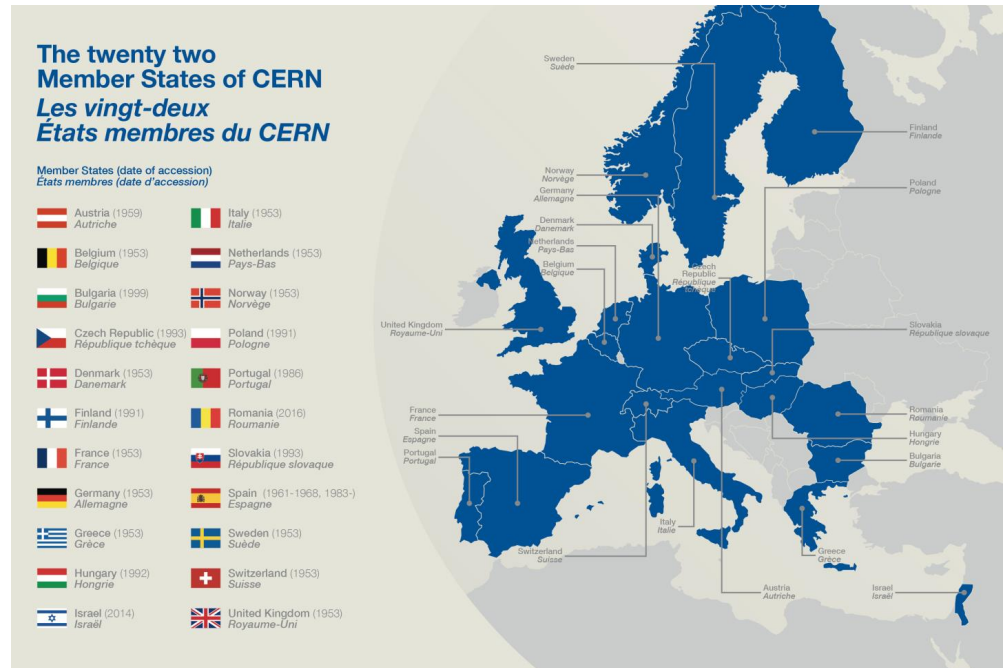
4/5.2021



First residential course organized by CERN within the Covid pandemic !

Why are we in Switzerland now?

- CAS visits all CERN member states and associated member states in turn.
- CAS-RF course in Lithuania (Kaunas, spring 2020) cancelled due to Covid – but hotel contract only postponed
- This course scheduled originally for Kaunas – then placed closed to CERN in order to facilitate all Covid related preparations.



(Anti)-Covid Measures

- **You have heard/you will hear many details on this subject. Here my most important message:**

It is not only the responsibility of the CAS team to organize this course appropriately, it is also your responsibility to follow the instructions!

We cannot (and do not want) to control everything, just do it!

- The most important things:
 - Sanitary pass to get here and stay here
 - **Sanitary pass to get into the bus for the excursion!**
 - face masks everywhere except in lecture room and at the dining table.
 - Collective Covid control at three days during the 2 weeks.
(see next slide)
- Presence is obligatory and will be controlled with a paper registration form**

Program for the 2021 CAS - Introduction to Accelerator Physics

	sam 25/09	dim 26/09	lun 27/09	mar 28/09	mer 29/09	jeu 30/09	ven 01/10	sam 02/10	dim 03/10	lun 04/10	mar 05/10	mer 06/10	jeu 07/10	ven 08/10
08:30		Opening Schmickler	Transverse Linear Beam Dynamics I Hillert	Longitudinal BD in Circular Machines II Tecker	Beam Instrumentation Forck	Free	Collective Effects I Li	Exursion	Collective Effects III Li	Electron Beam Dynamics I Rivkin	Free	Cyclotrons II/FFAs Seidel	Injection and Extraction Tecker	
09:30		Electromagnetic Theory I Shreyber	Time and Frequency domain signals I Schmickler	Transverse Linear Beam Dynamics III Hillert	Transverse Linear Beam Dynamics V Hillert		Collective Effects II Li		Collective Effects IV Li	Electron Beam Dynamics II Rivkin		A first taste of Non-Linear Beam Dynamics I Bartosik	Particle motion in Hamiltonian Formalism II Papaphilippou	
09:45							Coffee							
10:45		History of particle acceleration Sheehy	Transverse Linear Beam Dynamics II Hillert	Warm Magnets / power converters de Rijk	Beam Diagnostics Forck		Sources Knie		Discussion collective effects Li	Discussion electron beam dynamics Rivkin		Vacuum Seidel	Synchrotron light circular machines Prat	
11:15		Lunch												
12:15		Electromagnetic Theory II Shreyber	Linear Accelerators I Alesini	Transverse Linear Beam Dynamics IV Hillert	Advanced accelerator concepts I Ferrario	Machine & People Protection Issues Forck	Linear Imperfections - corrections Ziemann	Exursion	RF systems I Damerau	RF systems II Damerau	Colliders and luminosity Schmickler	A first taste of Non-Linear Beam Dynamics II Bartosik	FELs Prat	Departure day
13:45		Accelerator Applications Sheehy	Time and Frequency domain signals II Schmickler	Superconducting Magnets de Rijk	Linear Imperfections I Ziemann	Linear Imperfections II Ziemann	Secondary beams and targets Knie		Hands-ON calculations (longitudinal) - Intro Damerau et al.	Introduction to Non-Linear longitudinal Beam Dynamics Damerau	Cyclotrons I Seidel	Particle motion in Hamiltonian Formalism I Papaphilippou	Designing a synchrotron - a real life example Papaphilippou	
14:45									Coffee					
15:00		Kinematics of Particle Beams - Relativity Gianfelice	Longitudinal BD in Circular Machines I Tecker	Computational tools I Latina	Computational tools II Latina	Hands-ON Lattice calculations III Sterbini et al.	Hands-ON Lattice calculations V Sterbini et al.		Hands-ON calculations (longitudinal) - I Damerau et al.	Hands-ON calculations (longitudinal) - III Damerau et al.	Q&A/study time I all	Q&A/study time II all	Closing Schmickler	
16:00		1 slide 1 minute	Linear Accelerators II Alesini	Hands-ON Lattice calculations I Sterbini et al.	Advanced accelerator concepts II Ferrario	Hands-ON Lattice calculations IV Sterbini et al.	Hands-ON Lattice calculations VI Sterbini et al.	Hands-ON calculations (longitudinal) - II Damerau et al.	Hands-ON calculations (longitudinal) - IV Damerau et al.	Q&A/study time I all	Q&A/study time II all			
16:30														
17:30		Welcome reception		Hands-ON Lattice calculations II Sterbini et al.	Discussion session			Hands-ON calculations (longitudinal) - V Damerau et al.	Poster session	** Seminar ** tbd				
18:30														
19:30		Dinner at Hotel											Banquet	
21:00		Cinema event												

Covid safety measures

The tests will take place in the lecture theatre on:

Monday 27 September, at 10:45 AM during the coffee break,
Thursday 30 September, 1/2 h before the course starts,
at 13:15, during the lunch break,
Monday 4 October, at 10:45 AM during the coffee break.

For the test, you will need to duly **fill and sign** these provided **forms before** the tests:

Consent: Only needed once to record your consent. This form is to be returned to the nurses during the 1st test on Monday 27 September.

Questionnaire Pre-testing : this form is to be returned for each test.

Numbers: You have been attributed a number for the test. Please use the place with the corresponding number in the lecture theatre during the tests.

As already mentioned, these tests do not replace individual PCR tests, but they will allow us to be informed if any participant carries the virus.

The CERN Accelerator School

- Established at the beginning of 1983
 - To preserve and transmit knowledge accumulated, at CERN and elsewhere, on particle accelerators and colliders of all kinds
- This provided a framework for a series of courses
 - General accelerator physics
 - Introduction to Accelerator Physics
 - Advanced Accelerator Physics
 - Specialized topic in the field
 - 50 to 70 hours teaching in ~2 week intensive residential courses
- About 90 courses held so far
- Occasional courses in the framework of the US-CERN-Japan-Russia Joint Accelerator School (JAS), from 2022: IAS (International Accelerator School)
 - 14 schools held so far (since 1985)

Scope

Accelerator Physics

Relativity / Electro-Magnetic
Theory / Transverse Beam
Dynamics / Longitudinal Beam
Dynamics / Linear Imperfections
and Resonances / Synchrotron
Radiation / Electron Beam
Dynamics / Multi-Particle Effects
/ Non-Linear Dynamics Beam
Instabilities / Landau Damping /
Beam-Beam Effects

Accelerator Systems

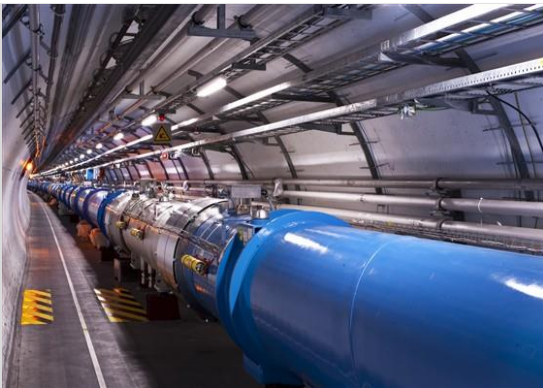
Particle Sources / RFQ / LEBT
RF Systems / Beam
Measurement / Feedback
Systems / Beam Injection and
Extraction / Beam Transfer
Power Convertors / Warm
Magnets / Superconducting
Magnets / Vacuum Systems
Machine Protection Systems
Radiation and Radioprotection

Accelerators

Linear Accelerators
Synchrotron Light Machines
FELs
FFAGs
Cyclotrons
Synchrotrons
Colliders

Applications

High Energy Physics
Nuclear Physics
Industrial Applications
Medical Applications
Cancer Therapy



The CERN Accelerator School holds courses in all of the Member States of CERN

2019

1: Wakefield
acceleration (Sesimbra,
Portugal), March

2: Advanced General
Slangerup (Denmark),
June

3. Introductory General
Vysoke (Slovakia),
September

4. JAS on Ion Colliders
Dubna (Russia)
November



What's new at CAS since 2018?

- More courses/year
 - Introductory General Course **every** year (September)
 - Advanced General Course remains every second year (June)
 - Basic (non-residential) course in the vicinity of CERN every year also open for people from outside CERN: = CAS@ESI now called Basic-CAS (video version in 2021)
- Joint Accelerator School (JAS) course every **second year (next in Juli 2022 in Canada (superconductivity))**
- Major topical courses every 4-5 years (beam instrumentation, RF, vacuum, magnets...)
- New topical courses never done at CAS (i.e. mechanical engineering)
- students grants for every course
- Splendid website <http://cas.web.cern.ch/>

Future Courses

- 2022:
 - March/April:
Digital Signal Processing for applications in accelerators and high energy physics, first joint CAS-CSC course in Göttingen (Germany)
 - April/May:
Normal Conducting Magnets and their diagnostics, Baden (Austria)
 - June:
General Advanced Course, tbd
 - Juli:
1st IAS: Superconductivity, Saskatoon (Canada)
 - September: General Introductory Course, tbd (maybe Kaunas)
 - ???

Detail on the program of this course

- Most of the time Lectures
- Supported by Hands-ON calculations on transverse and longitudinal beam dynamics
- Strong focus on beam dynamics
- Overview of technologies and accelerator types
- Teaching Method:
 - no parallel teaching
 - large number of internationally known experts as teachers, proposed and selected by a large program committee
- no final examination (like all CAS courses)

program

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21:00										Cinema event				

...more on this course...

- The lecturers stay (if possible) a little longer than just for their lecture. Spend this time with them...
...make friends...find a subject for your thesis?...
...find a job?....
- Networking is an essential part of each CAS course.
 - one slide-one minute
 - excursion
 - film evening
 - ...need volunteers for “program committee”

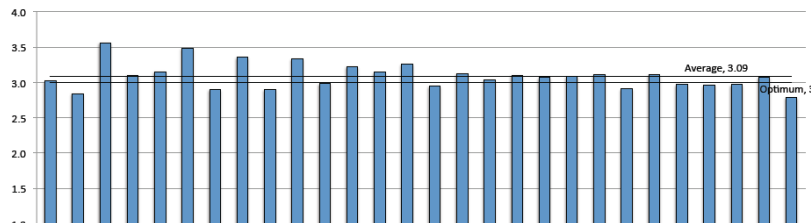
Feedback

- Please, please, please
— Give us your feedback

LEVEL	CONTENT	PRESENTATION
1 – Much too low	1 – Completely uninteresting	1 – Very poor
2 – Low	2 – Uninteresting	2 – Poor
3 – Just right	3 – Of some interest	3 – Fair
4 – Too high	4 – Interesting	4 – Good
5 – Much too high	5 – Very interesting	5 – Very good

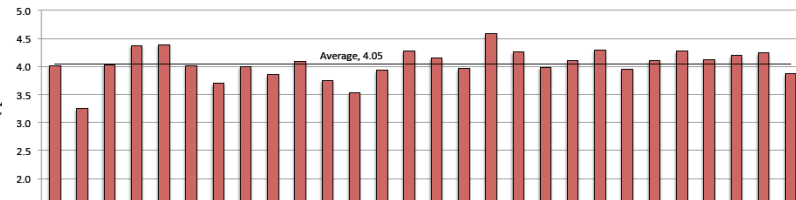
CERN Accelerator School, Superconductivity for Accelerators, Erice, Apr/May 2013 - Replies from 60/94 students

Level



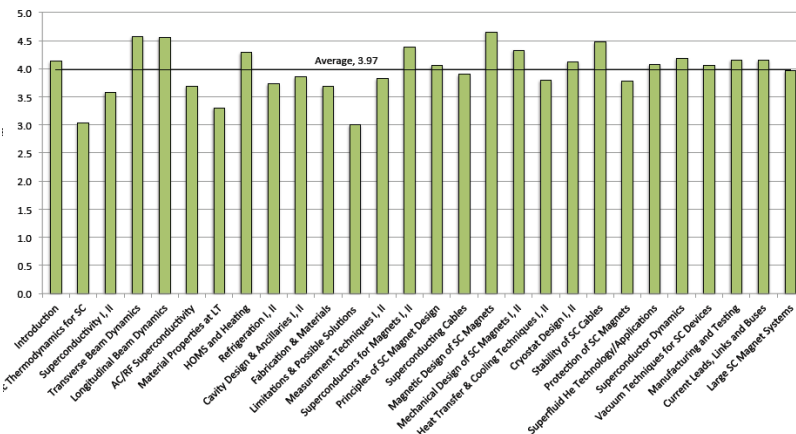
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Content



CERN Accelerator School, Superconductivity for Accelerators, Erice, Apr/May 2013 - Replies from 60/94 students

Presentation



TITLE	LEVEL	CONTENT	PRESENTATION
Recap. Transverse Beam Dynamics I, II			
Introduction to RF Measurement Techniques			
Introduction to Beam Instrumentation and Diagnostics I, II			
Introduction to Optics Design			
Introduction to Lattice Cells			
Recap. Longitudinal Beam Dynamics I, II			
Introduction to Insertions			
Wakefields and Impedances			
Space Charge in Linear Machines			
Introduction to Non-Linear Dynamics			
Beam Instabilities - Longitudinal			
Space Charge in Circular Machines			
Energy Recovery Linacs			
Landau Damping I, II			
Beam Instabilities - Transverse			
Instabilities in Linacs			
Feedback Systems I, II			
Electron Cloud and Instabilities			
Advanced Concepts for Beam-Driven Acceleration			
Beam-Beam Effects			
Timing and Synchronisation			
NLD Methods I, II, III			
Beam Cooling			
NLD Phenomenology I, II			
Advanced Magnet Technologies			
High Brightness Beam Diagnostics			
Low Emittance Machines I, II			
Insertion Devices			
Advanced Concepts for Laser-Driven Acceleration			

Details for evaluation

- We added a forth category: relevance
- The Evaluation form is a webform accessible from our indico registration site.
- Can be edited, saved and modified as often as you need.
- Please fill in regularly, not at the end.
- All evaluations are treated anonymously.

More on the organizational side...

- Registration with Delphine, Maria and Michaela
→ badge, bag, program, info....still possible
- During the first week of the course we will organize in detail the departure day.
- CAS office open every day.
- Wednesday this week the latest we need to know if you will participate in the excursion (Gruyere, cheese and chocolate factories)
- In order not to waste food we will ask 48 hours in advance who will stay for dinner.
 - Deadline for submitting a “one-slide-one minute”:
Lunchtime today