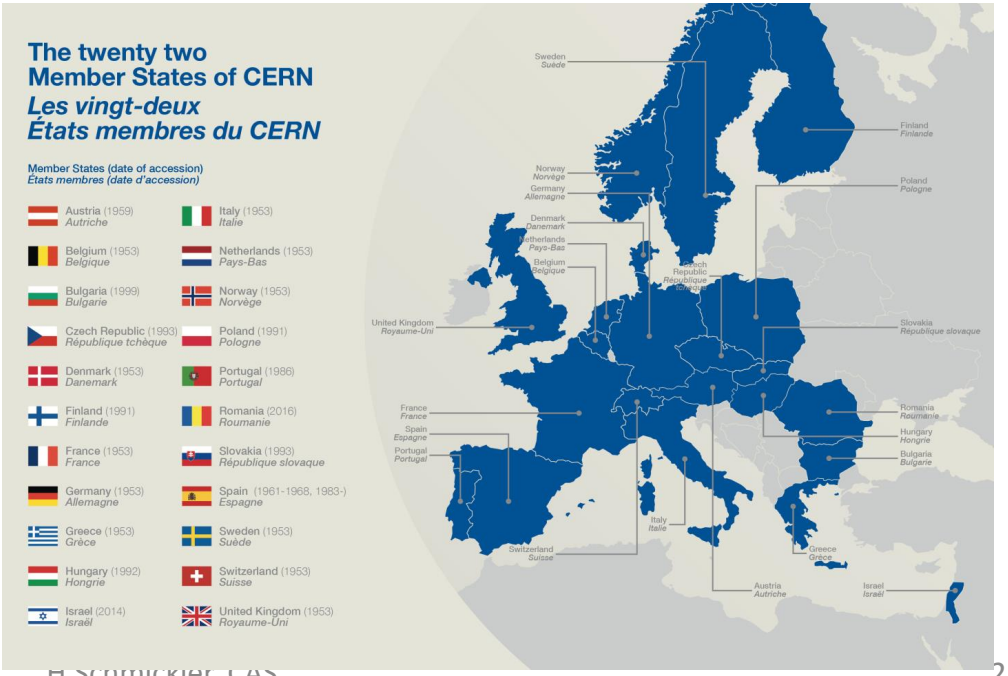
Welcome to the Introductory General CAS Course

Why are we in Slovakia?

- CAS visits all CERN member states and associated member states in turn.
- Last time CAS was in Slovakia was 2012 (Senec).
- Marek Bombara from the Pavol Josef Safarik University in Kosice university "volunteered" to act as local host



Why are we in Vysoke?

- Marek Bombara has convinced us that the East of Slovakia is worth a visit.
- The collaboration with the university of Kosice works well.
- Last year we have visited the area and checked several hotels:
  → Hotel Atrium is the best compromise between facilities, surrounding countryside and cost

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 85 courses held so far
- Occasional courses in the framework of the US-CERN-Japan-Russia Joint Accelerator School (JAS)
  - 14 schools held so far (since 1985)

Scope

Accelerator Physics

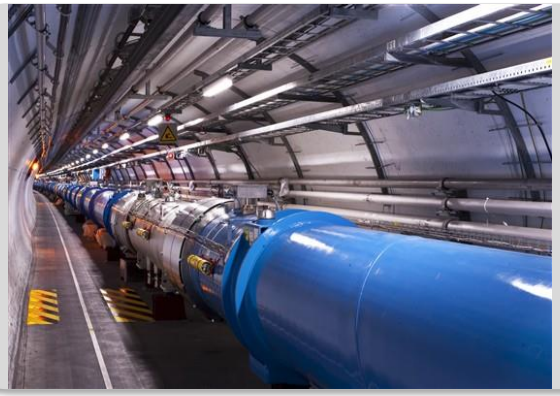
Relativity / Electro-Magnetic Theory / Transverse Beam Dynamics / Longitudinal Beam Dynamics / Linear Imperfections and Resonances / Synchrotron Radiation / Electron Beam Dynamics / Multi-Particle Effects / Non-Linear Dynamics Beam Instabilities / Landau Damping / Beam-Beam Effects

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

Have been to all except Israel and Serbia

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
- Joint Accelerator School (JAS) course every second year
- Major topical courses every 4-5 years (beam instrumentation, RF, vacuum, magnets…)
- New topical courses never done at CAS (i.e. mechanical engineering in June 2020)

- 10 students grants for every course
- New splendid website http://cas.web.cern.ch/

Future Courses

- 2020:
  - RF — in Lithuania (Kaunas)
  - Mechanical Engineering — in Holland (Eindhoven)
  - Introductory — in Serbia ?
  - NC and Perm. Magnets — in Austria (Vienna?)
- 2021:
  - Tools for data acquisition, analysis and storage — joint course with CERN School of Computing
  - Advanced General Course — ???
  - Introductory General Course — in Israel ?
  - Real time control of Particle Accelerators ??? — ???

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

Program for the 2019 CAS - Introduction to Accelerator Physics - High Tatras

	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat
	8.9	9.9.	10.9.	11.9	12.9.	13.9	14.9	15.9.	16.9.	17.9	18.9	19.9	20.9	21.9
08:30	Arrival day and registration	Opening local/Schmickler	Transverse Linear Beam Dynamics I Hillert	Longitudinal BD in Circular Machines II Tecker	Superconducting Magnets de Rijk	free	Collective Effects I Li	Excursion	Collective Effects III Li	Electron Beam Dynamics I Rivkin	Free	Machine & People Protection Issues Forck	Vacuum Seidel	departure day
09:30														
09:45		Electromagnetic Theory I Herr	Transverse Linear Beam Dynamics II Hillert	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		Cyclotrons I Seidel	A first taste of Non-Linear Beam Dynamics II Papaphilippou	
10:45		Coffee							Coffee			Coffee		
11:15		History of particle acceleration Lebrun	Particle motion in Hamiltonian Formalism I Sheehy	Warm Magnets / power converters de Rijk	Time and Frequency domain signals I Schmickler		Sources Faircloth		Discussion collective effects Li	Discussion electron beam dynamics Rivkin		A first taste of Non-Linear Beam Dynamics I Papaphilippou	Synchrotron light circular machines Prat	
12:15		Lunch							Lunch					
13:45		Electromagnetic Theory II Herr	Particle motion in Hamiltonian Formalism II Sheehy	Transverse Linear Beam Dynamics IV Hillert	Time and Frequency domain signals II Schmickler	Linear Imperfections I Ziemann	Linear Imperfections - corrections Ziemann		RF systems I Damerau	RF systems II Damerau	Luminosity and Colliders Schmickler	Cyclotrons II/FFAs Seidel	FELs Prat	
14:45														
15:00		Accelerator Applications Sheehy	Linear Accelerators I Alesini	Injection and Extraction Tecker	Statistical Description of Particle Beams Ferrario	Linear Imperfections II Ziemann	Secondary beams and targets Faircloth		Hands-ON calculations (longitudinal) - Intro Damerau et al.	Introduction to Non-Linear longitudinal Beam Dynamics Damerau	Beam Instrumentation Forck	Beam Diagnostics Forck	Designing a synchrotron - a real life example Papaphilippou	
16:00		Coffee				Coffee			Coffee					
16:30		Kinematics of Particle Beams - Relativity Herr	Longitudinal BD in Circular Machines I Tecker	Hands-ON Lattice calulations - introduction Ziemann et al.	Advanced accelerator concepts Ferrario	Hands-ON Lattice calulations III Ziemann et al.	Hands-ON Lattice calulations V Ziemann 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	
17:30		1 slide 1 minute	Linear Accelerators II Alesini	Hands-ON Lattice calulations I Ziemann et al.	Discussion session	Hands-ON Lattice calulations IV Ziemann et al.	Hands-ON Lattice calulations VI Ziemann et al.		Hands-ON calculations (longitudinal) - II Damerau et al.	Hands-ON calculations (longitudinal) - IV Damerau et al.	Poster session	** Seminar ** tbd		
18:30		Welcome Reception		Hands-ON Lattice calulations II										
19:30						Dinner at Hotel							Banquet	
21:00										cinema event				

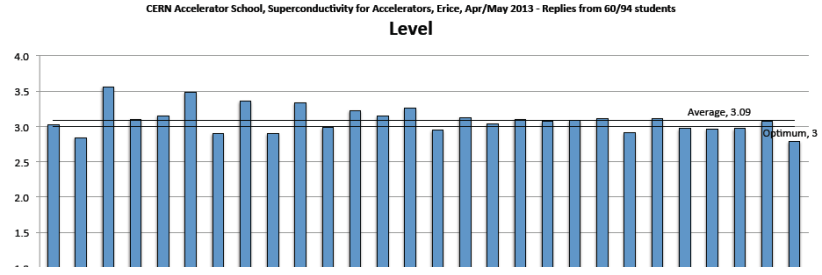
…more on this course…

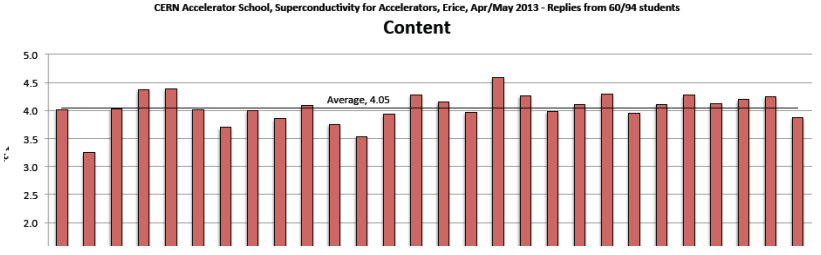
- The lecturers stay (if possible) a little longer than just for their lecture. Spend this time with them…
  …make friends…find a subject for your thesis?...
  …find a job?....
- Networking is an essential part of each CAS course.
  → one slide-one minute
  → excursion
  → film evening
  …need volunteers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

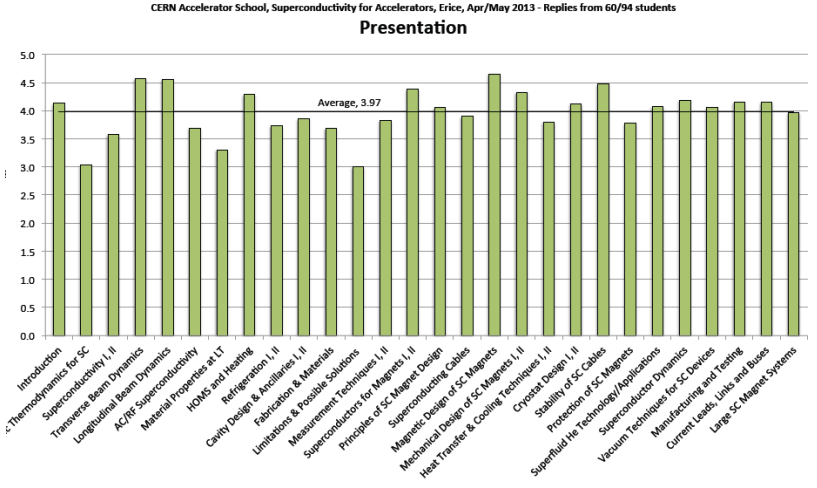
Feedback

- 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

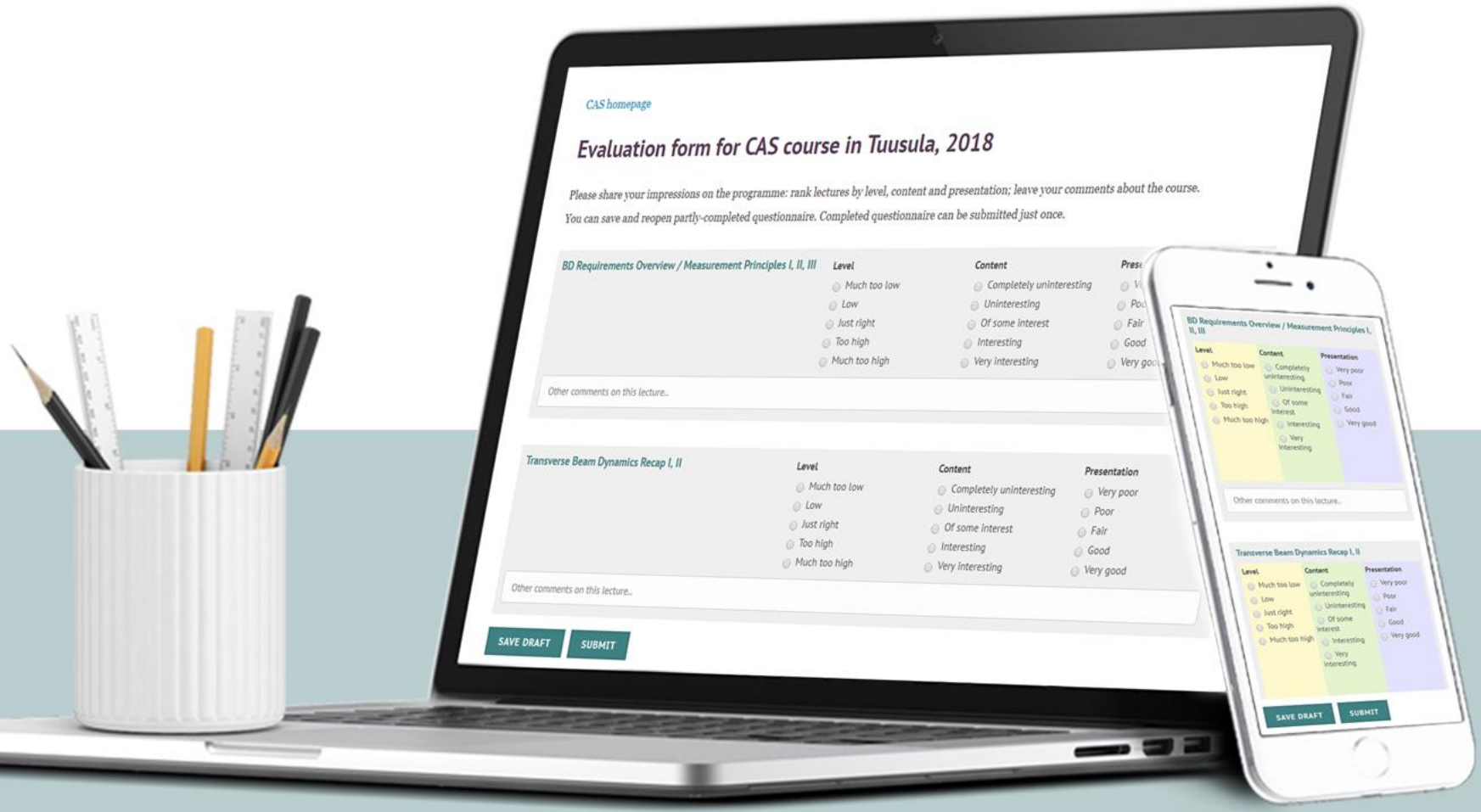






TITLE	LEVEL	CONTENT	PRESENTATION
Recap. Transverse Beam Dynamics I, II			
Introduction to RF Measurement Techniques			
Introduction to Beam Instrumentation and Diagnostics I, II			
Introduction to Optics Design			
Introduction to Lattice Cells			
Recap. Longitudinal Beam Dynamics I, II			
Introduction 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			

Online evaluation



Evaluation form: access

Access to web-form is granted to participants using the email addresses indicated in their Indico registrations

Step 1:

email with the link has been sent to all participants

If you did not receive the email, contact Anastasiya.Safronava@cern.ch

Step 2:

to login use the same email account; it will certainly work for CERN and for Google accounts, but not only

If you cannot login, contact Anastasiya.Safronava@cern.ch

Solutions: provide your Google account if you have one, or a temporary CERN account will be created for you

CAS Promotional Actions

- Testimonials for the web:
  - all you need is a photo and a sentence.
  Have a look at: http://cas.web.cern.ch/

More on the organizational side…

- Registration with Anastasiya & Maria…
  → badge, bag, program, info….still possible
- During the first week of the course we will organize in detail the departure day.
- Marek knows “everything” about practical arrangements
- CAS office open every day during a few hours.

- Deadline for submitting a “one-slide-one minute”:
  Lunchtime today