The CERN Accelerator School

Closing remarks

Hermann Schmickler

A bit of history

- This course first time ever
- Idea for course born during last Linear Collider School and during FCC week in Berlin
- Visit and choice of hotel in June 2017
  (hotel transformation was announced at that moment for November 2017)
- Program committee meeting at CERN in May 2017
  → decision: 13 days, 56 hours lectures, 3h discussion session, 10 h case studies, 1 seminar, 1 podium
  → list of speakers and subjects
  → NO PROCEEDINGS
- 13 iterations of program
- Total of 65 students (low participation from US and Asia)

	Wed, 21.2.2018	Thu, 22.2.2018	Fri 23.2.2018	Sat, 24.2.2018	Sun, 25.2.2018	Mon, 26.2.2018	Tue, 27.2.2018	Wed, 28.2.2018	Thu, 1.3.2018	Fri,2.3.2018	Sat, 3.3.2018	Sun, 4.3.2018	Mon, 5.3.2018	Tue,6.3.2018
08:30	Arrival day and registration	Course Opening / Seminar H.Schmickler / L. Rivkin	Detectors for high energy colliders/Machine detector interface I L.Linssen	Recap of long. BD F.Tecker	Collider Diagnostics / Measurement of critical beam parameters I J.Wenniger	Beam-Beam Effects/Beamstrahlung I W.Herr	Instabilities in high energy colliders and their mitigation I O.Boine-Fr…	Excursion	Superconducting RF systems I E.Jensen	Normalconducting & permanent magnets T. Zickler	Low Level RF challenges/timing systems I A. Gallo	Interaction of particles with matter N. Mokhov	Normal conducting high gradient Rf systems II W.Wuensch	Departure day
09:20		Discussion								Discussion				
09:30		High energy physics at colliders M. Mangano	Recap of transverse BD I H.Schmickler	Large colliders critical technologies to be announced	Circular Hadron Collider beam dynamics I M.Syphers	Circular Lepton Collider beam dynamics/damping rings I K. Oide	Circular Lepton Collider beam dynamics/damping rings II K. Oide		positron production M. Kuriki	Superconducting RF systems III E.Jensen	Low Level RF challenges/timing systems II A. Gallo	Normal conducting high gradient Rf systems I W.Wuensch	Kickers & Septa M.Paraliev	
10:30		Coffee									Coffee			
11:00		Luminosity goals, critical parameters B. Muratori	Detectors for high energy colliders/Machine detector interface II L.Linssen	Circular Hadron Collider beam dynamics III D. Schulte	Collider Diagnostics / Measurement of critical beam parameters II J.Wenniger	Beam-Beam Effects/Beamstrahlung II W.Herr	Instabilities in high energy colliders and their mitigation II O.Boine-Fr…		Superconducting RF systems II E.Jensen	magnet vibration and feedbacks A.Seryi	RF power systems, CLIC drive beam S. Doebert	machine protection concepts N. Mokhov	alignment&metrology/requirements and realization D. Missiaen	
11:50		Discussion									Discussion			
12:00		Introduction to a Muon Collider and Gamma Collider W.Chou	Recap of transverse BD II H.Schmickler	Discussion Session I B. Holzer	Circular Hadron Collider beam dynamics II M.Syphers	injection and extraction M.Aiba	Discussion Session II B. Holzer		Large colliders civil engineering and siting J.Osborne	Lessons learnt from SLC F. Zimmermann	Discussion III B. Holzer	Final Focus layouts and stability considerations A. Seryi	High Energy Ion Colliders J. Jowett	
13:00		Lunch								Lunch				
14:30		Linear Collider studies overview S.Stapnes	Linear Collider Beam dynamics I D.Schulte	Case Studies Introduction WH/BH/DS	Free	Case Studies II WH/BH/DS	Case Studies IV WH/BH/DS		Superconducting material/cables C. Senatore	Case Studies VI WH/BH/DS	Free	Case Studies VIII WH/BH/DS	Reliability Engineering/Availibity of a large collider complex M.Zerlauth	
15:30		Large circular colliders overview(including h-e option) M.Benedikt	Emittance Preservation in Hadron Machines H. Schmickler	Case Studies I WH/BH/DS		Case Studies III WH/BH/DS	Case Studies V WH/BH/DS		Superconducting magnets /Low temperature Superconductors L. Bottura	Case Studies VII WH/BH/DS		Case Studies IX WH/BH/DS	Case Studies Presentations I WH/BH/DS	
16:30		Coffee				Coffee				Coffee			Coffee	
17:00		Lessons learnt from LEP/LHC M.Lamont	Linear Collider Beam dynamics II D.Schulte	polarized electron beams/energy calibration J.Wenninger		SwissFEL, the X-ray free electron laser at PSI H. Braun	Vacuum Challenges R.Kersevan		Superconducting magnets /High temperature Superconductors L. Bottura	Advanced future Collider Concepts P. Muggli		collimators & Dumps & Masks M.Seidel	Case Studies Presentations II WH/BH/DS	
18:00		Reception											Closing	
18:30		Podium discussion: Future of high energy colliders							Medical Applications of accelerator technologies at PSI A. Lomax					
19:30		late dinner (20h)	dinner						Dinner			Gala Dinner	Dinner	

The whole course on one slide (1/2)

- Status of present large scale projects, physics case, strategies, politics….
- Beam dynamics:
  - transverse and longitudinal recap
  - Hamiltonian description
  - …up to 6D maps for a few elements
  - applied to FF systems
  - beam-beam
  - a first glance at instabilities
- No further treatment of
  - collective effects
  - non linear beam dynamics
  - Landau damping

Advanced CAS

The whole course on one slide (2/2)

- Technologies

- “enabling technologies”:

  FCC-hh : high field magnets, MP
  FCC-e+e-: SC RF
  ILC, CLIC: high gradient RF, RF power generation +++

- “technologies needing performance improvements”

  vacuum, quadrupole stability, collimation, kickers&septa, alignment and metrology, warm magnets, synchronization

- Not covered:
  beam instrumentation, power converters, sources, cooling, controls, operations….

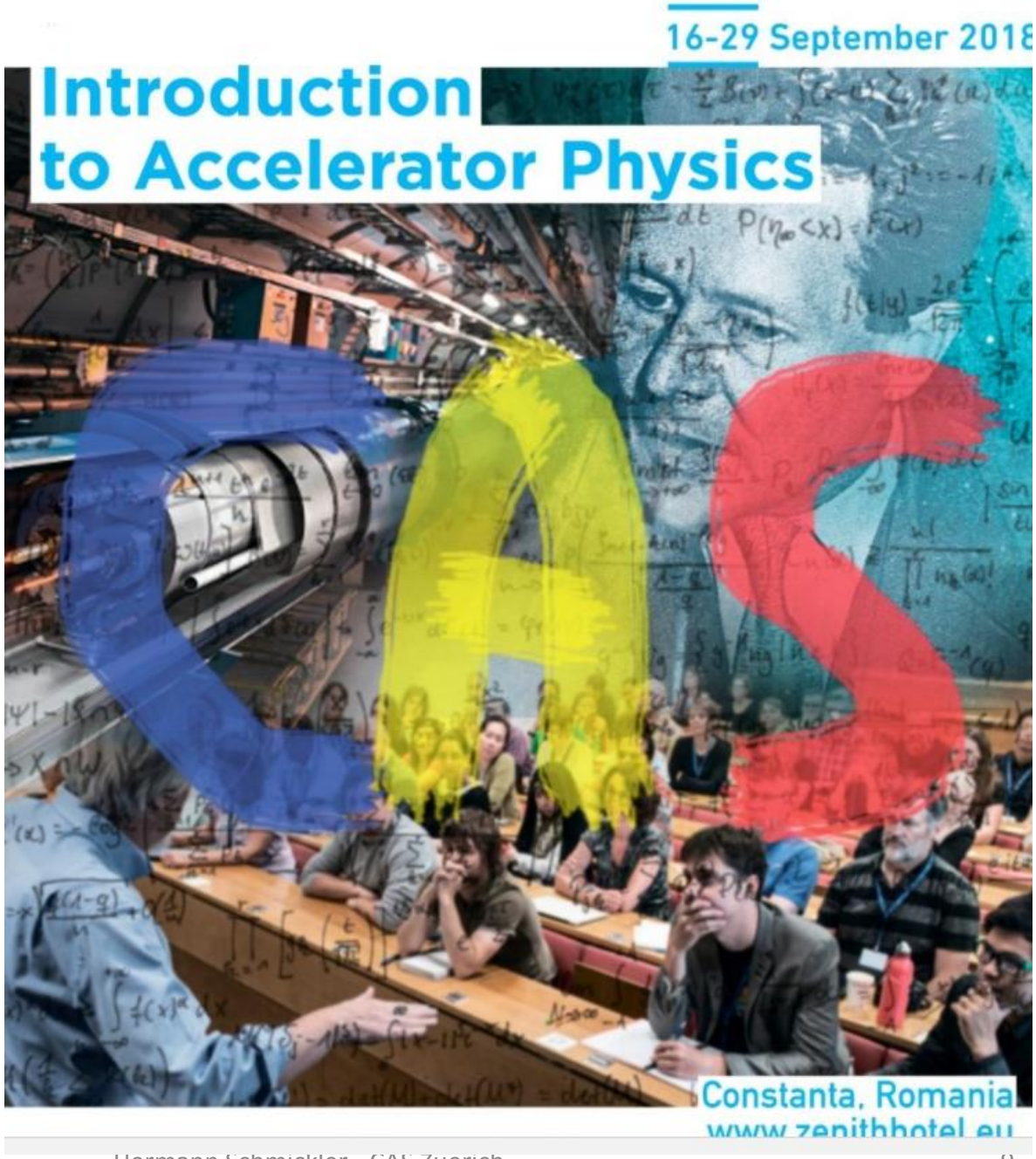
Feedback I

- Comments to the program
- Balance of topics (beam dynamics/technologies)
- Balance between collider projects
- Case studies

Next to come


BEAM INSTRUMENTATION
from 2 to 15 June, 2018
Hotel Gustavelund
Tuusula, Finland
www.gustavelund.fi
Find more about Finish mythology at https://en.wikipedia.org/wiki/Aino_(mythology)

And then

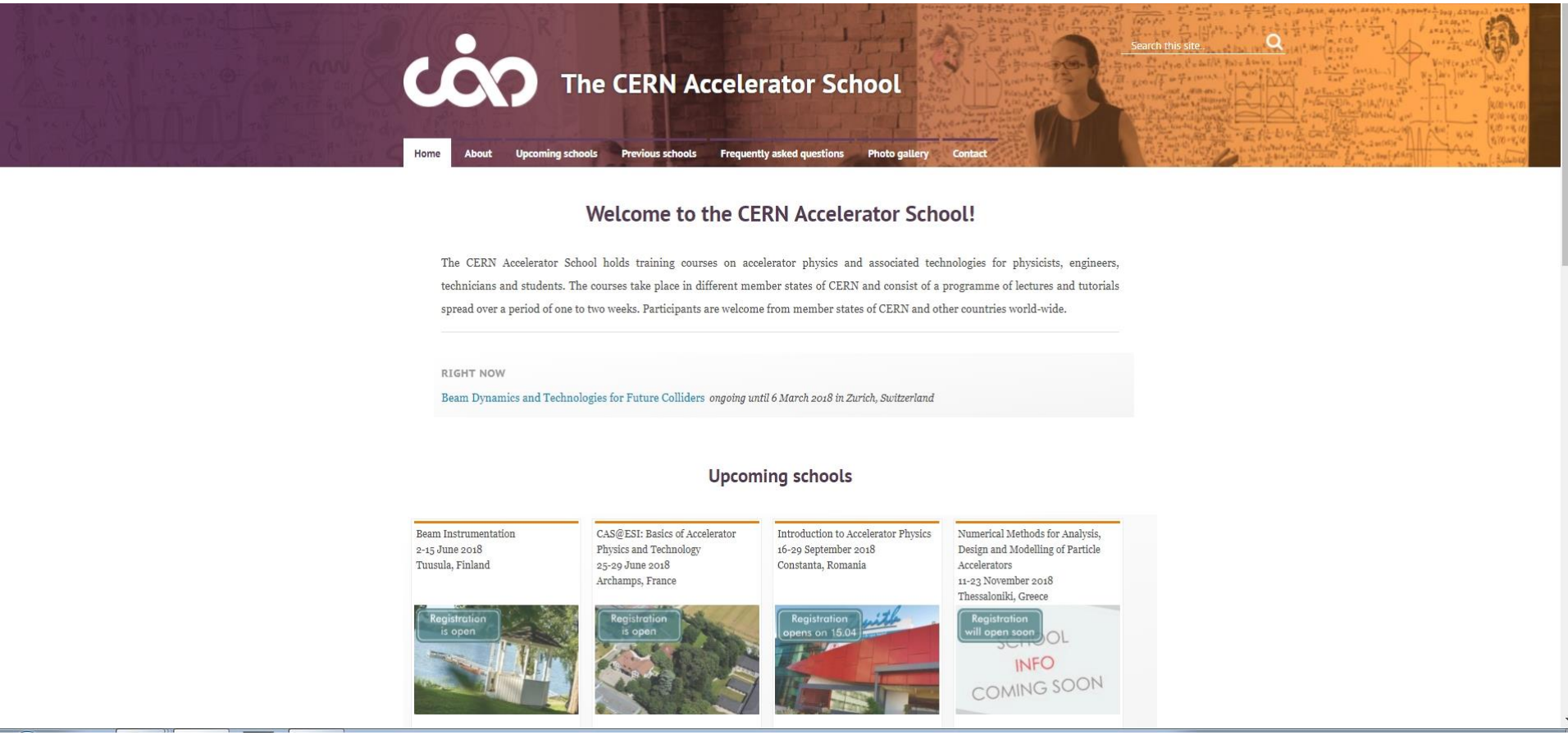

16-29 September 2018
Introduction
to Accelerator Physics
Constanta, Romania
www.zenithhotel.eu

And more in the future:

	Period I Feb-April	Period II May-June	Period IIb End June	Period III Sept-Oct	Period IV Nov-Dec	**JAS 2017: RF** Japan (Hayama)
2018	**Future Colliders** Switzerland	**Beam Instrumentation** Finland	**Short Introduction** local	**General Introduction** Romenia	**Comp. Methods** Greece	
2019	**Advanced Acc. Concepts** Portugal (Lisbon)	**General Advanced** Danmark	**Short Introduction** local	**General Introduction** Slovakia	**RF** associate member state	**JAS: Ion Colliders** Russia
2020	**Warm magnets** Austria	**Mechanical Engineering**	**Short Introduction** local	**General Introduction**	**tbd**	
2021	**Digital Signal Processing**	**General Advanced**	**Short Introduction** local	**General Introduction**	**tbd** associate member state	**JAS: Very Advanced Beam Dynamics** Canada (Saskatoon)???

Our website: http://cas.web.cern.ch/

Author: Anastasiya



Feedback II

- How did you know about this course?

- What we do:

- Design, print and distribute 500 posters
- Our webpage
- Facebook, twitter…

- What else?

Feedback

- Please help us
- Very important
  - F
  - F
- Abou
  - The lectures
  - The tutorials
  - The place
  - Anything else

VACUUM FOR PARTICLE ACCELERATORS
6-16 June, 2017
Glumslov, Sweden

YOUR IMPRESSIONS OF THE PROGRAMME

Please mark each lecture with a number 1 to 5 in each of the three columns labelled "Level, Content and Presentation". The meaning of the numbers is as shown below. Please return this sheet to Barbara Strasser or Roger Bailey as soon as possible when completed. Your answers are confidential.

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
Introduction to Cryogenics			
Cryopumping			
Industrial Vacuum Applications			
Beam Induced Desorption			
Beam-Gas Interaction			
Surface Characterisation			
Interactions between Beams and Vacuum System Walls			
Surface Cleaning & Finishing			
Thin-Film Coating			
Controlling Particles/Dust in Vacuum Systems			
Beam Induced Radioactivity & Radiation Hardness			
Radiation Damage and its Consequence			
Control & Diagnostic			
Vacuum Design Aspects			
Manufacturing & Assembly for Vacuum Technology			
The Real Life of Operation			
Challenges for Vacuum Technology of Future Accelerators			

If you have any general comments about the course, please write them on the reverse side of this page.

With the new online version much more feedback than in the past
Thank You!

“Testmonials” on the CAS website

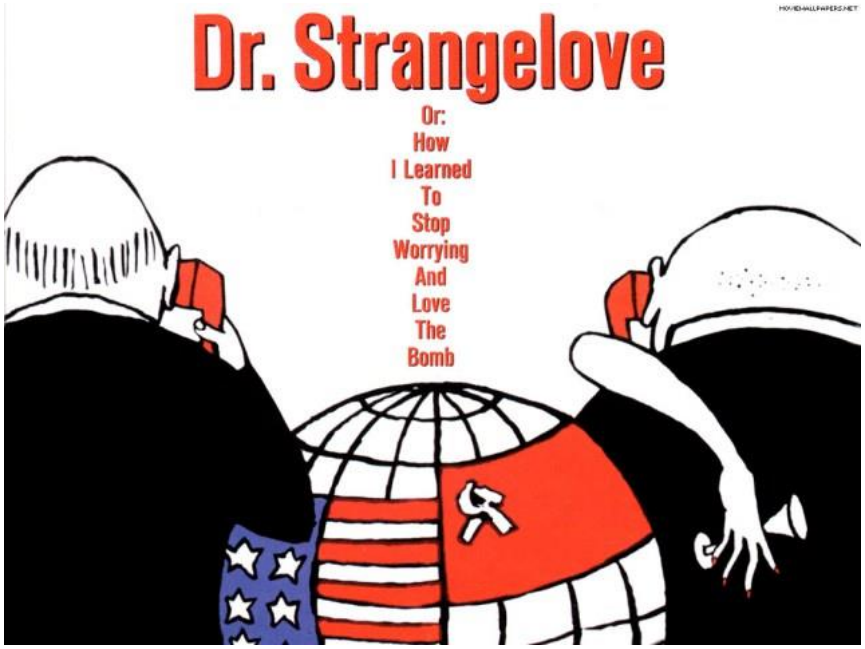
- All it needs:
  - a photo
  - name + affiliation + CAS course
  - “a sentence”

What I would like to get from you:

- Some testimonials
- Photos for the website
- Feedback

Social life during course:

- Next to the course teaching the most important aspect of the school
  “ electronic training will never replace CAS courses”
- What happened:
  - people socialising (and even working) up to late in the evenings
  - lots of interactions students <-> teachers
  - cinema evening
  - excursion
  - PSI visit
  - gala dinner



1: Dr. Strangelove: 9/12 pts
2: The 3 idiots: 8/12 pts
3: Pink Floyd: The wall 7/12 pts

Program:

21:00 – 21:15
Short clips
21:15 - 21:30
drinks, pop-corn…
21:30 film

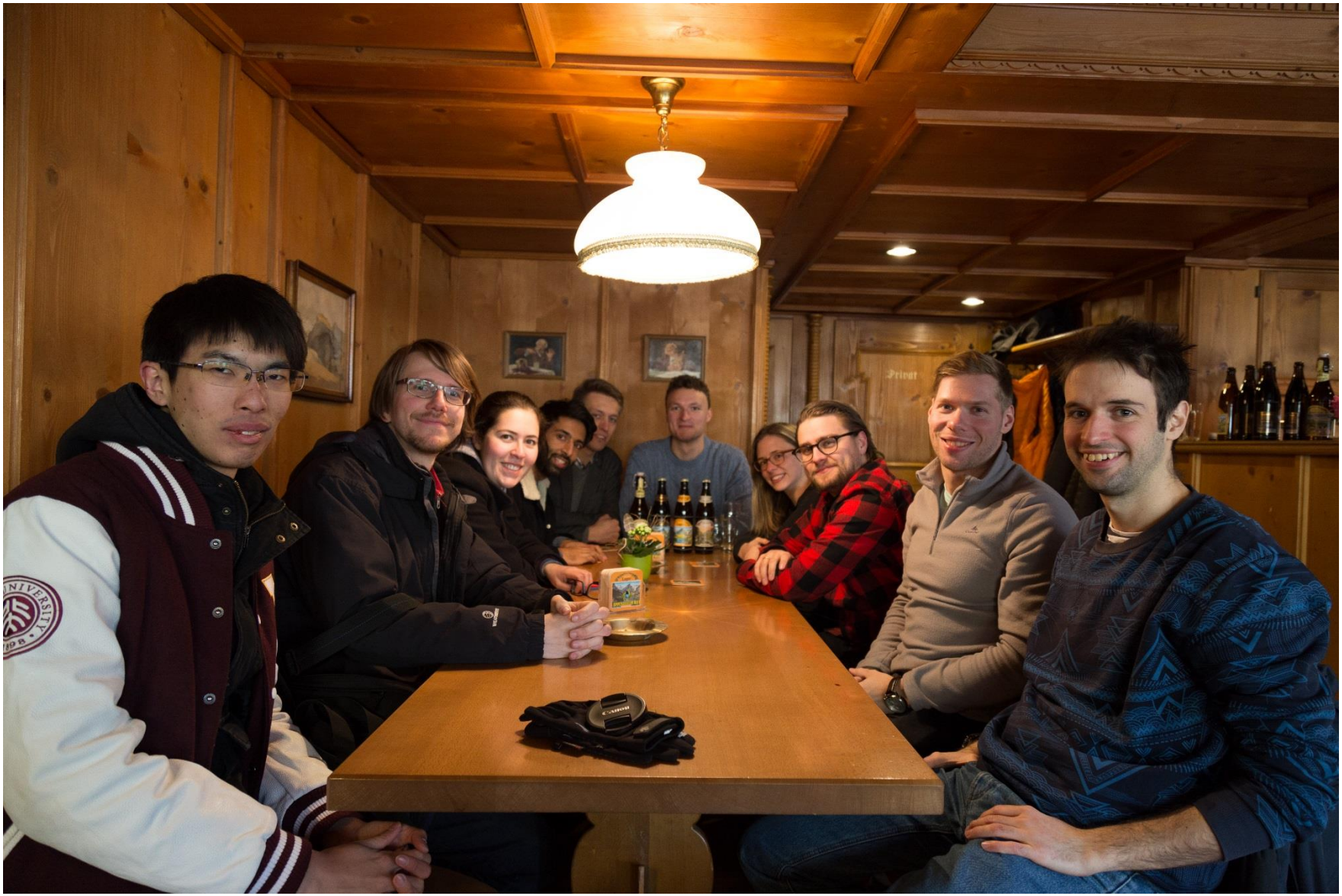
event will happen in “Romeo”


GLÜCK IST DAS EINZIGE,
DAS SICH VERDOPPELT, WENN MAN ES TEILT.«
"Happiness is the only thing that doubles when you share it."
Albert Schweitzer


CAS


WSLA.1.0.2
WSLA.1.0.3
WSLA.1.0.4
WSLA.1.0.5
MPS KOPFSTATION
WSLA.1.0.16


Appenzeller


Privat

Last not least:

- This course would not have happened without:
  - lecturers: they do all the work for “love”
- the case study leaders:
  - Werner Herr & Frank Tecker
  - Bernhard Holzer & Weiren Chou
  - Daniel Schulte
- The “souls” of the event:
  - Barbara Strasser
  - Delphine Rivoiron
  - Anastasiya Safronava

- Marlen Bugmann & Lenny Rivkin from PSI
- YOU