

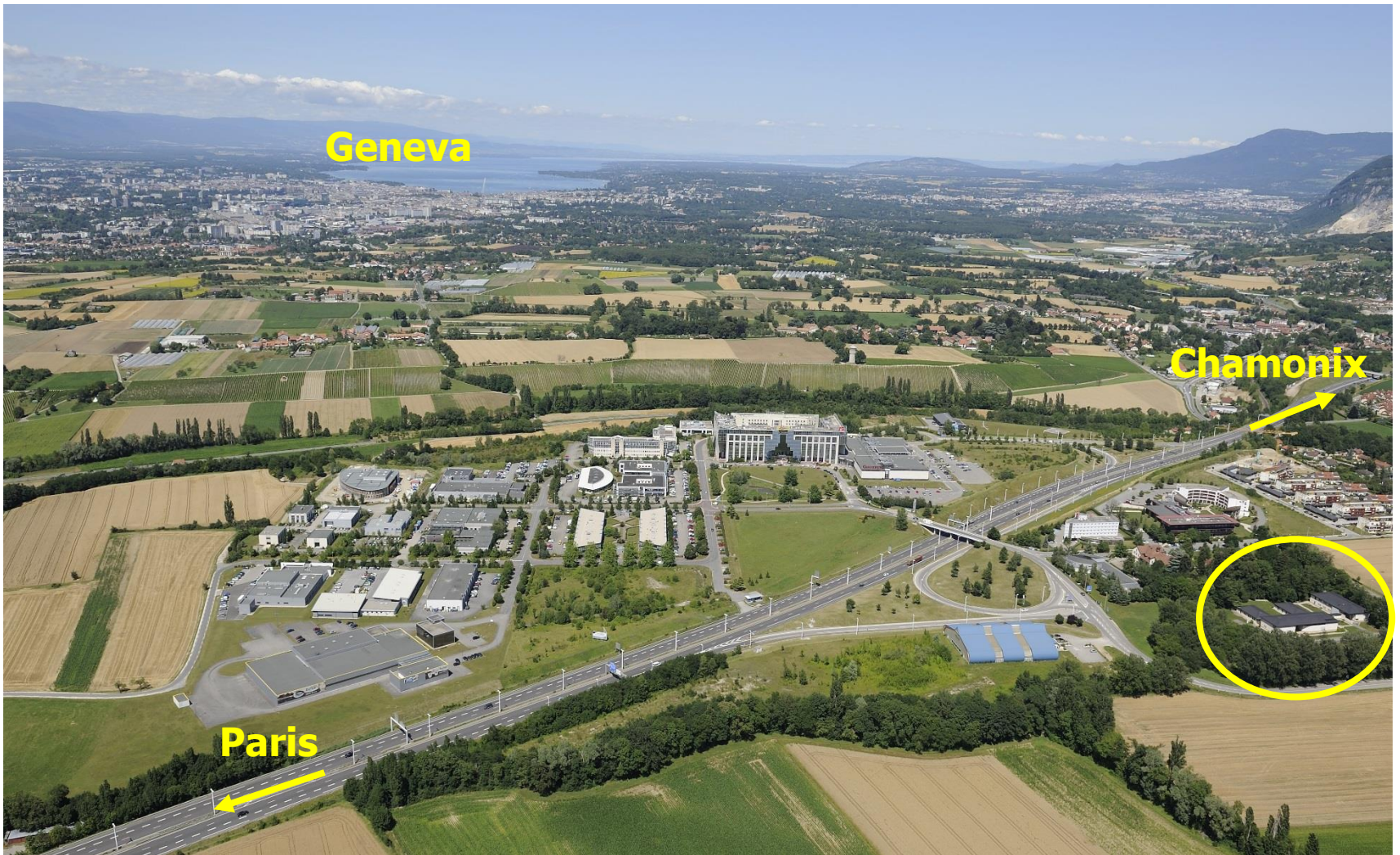
Welcome to JUAS 2020 Course 2

The technology and applications of particle accelerators

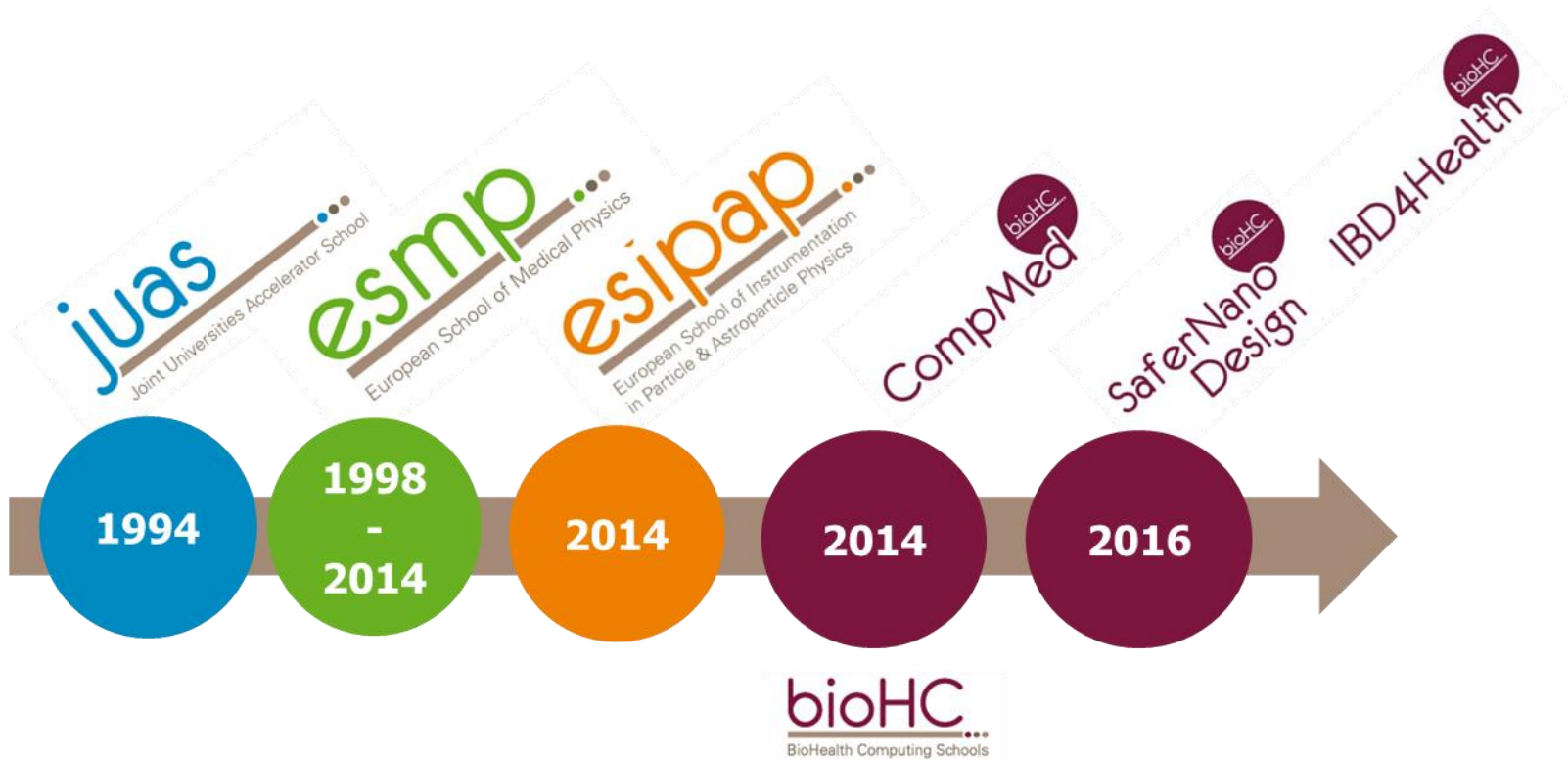
Philippe Lebrun
Director, JUAS

ESI Archamps Technopole
17 February 2020

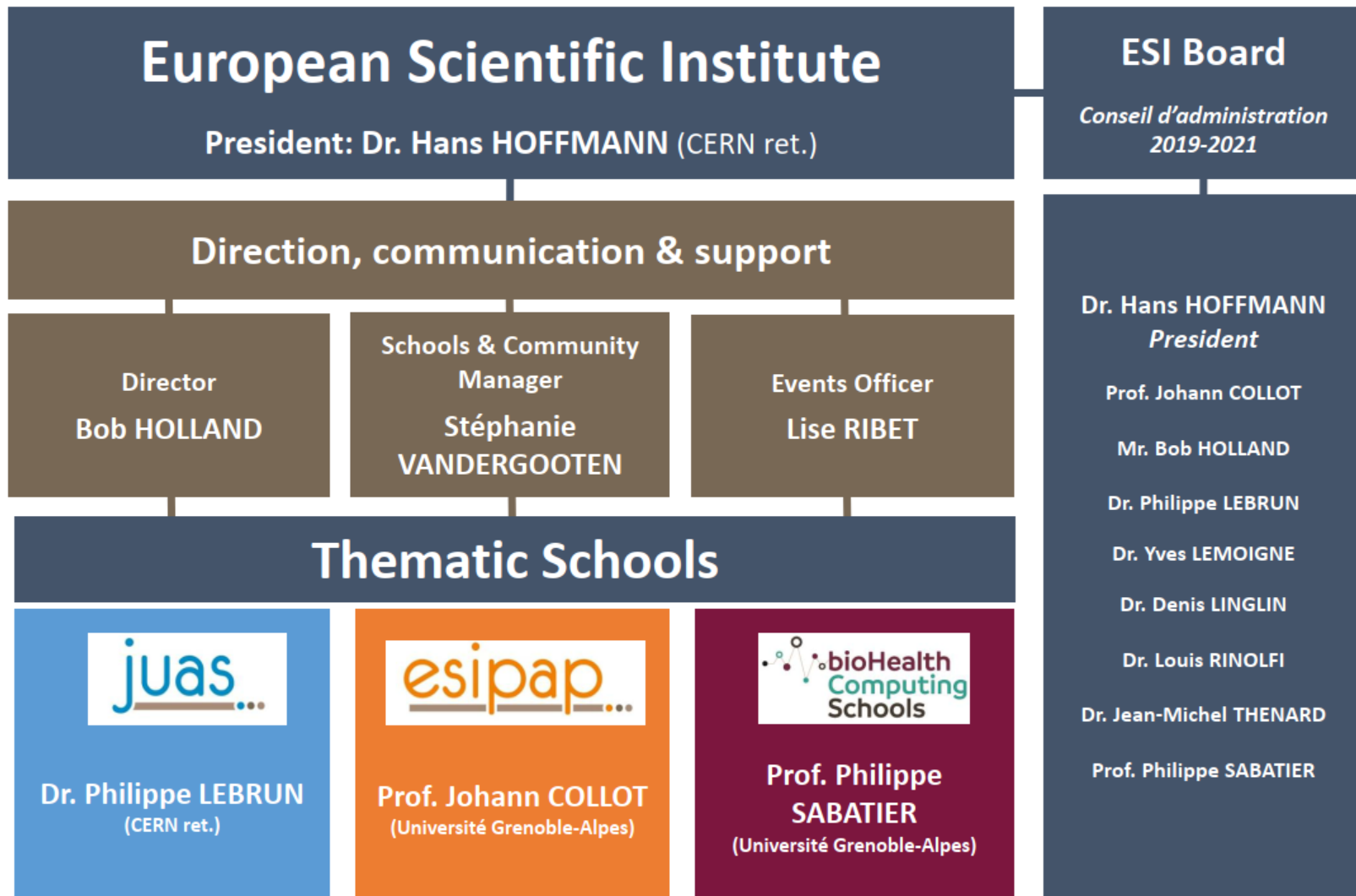
ESI Archamps Technopole, host of JUAS



ESI Scientific Schools



ESI Organization



JUAS mission

- Invented a century ago as instruments of basic science, particle accelerators have also become essential tools of applied science, engineering and medicine. There are today more than 40'000 particle accelerators in operation worldwide. Their design, construction and operation have developed into a specific domain of science and technology, resulting in a growing demand for training
- The mission of the Joint Universities Accelerator School (JUAS) is primarily to train graduate students from its Partner Universities in the science, technology and applications of particle accelerators
- For this purpose, JUAS holds two five-week courses yearly at the European Scientific Institute (ESI) in Archamps, taught by renowned experts from universities and laboratories and accredited by the Partner Universities:
 - A course on the Science of Particle Accelerators
 - A course on the Technology and Applications of Particle Accelerators
- Depending on the availability of places, JUAS also welcomes graduate students from other universities as well as professionals
- Additionally, JUAS contributes to knowledge dissemination and outreach in the field of particle accelerators

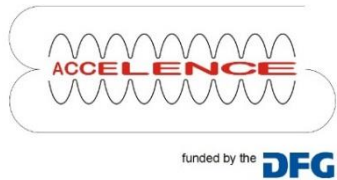
16 Partner Universities offer JUAS as an accredited component of a Master and/or Doctoral programme



UiO : Universitetet i Oslo



JUAS is supported by 23 European research programmes, particle accelerator facilities, hospitals and private companies



A brief history of JUAS

- Origins (1994)
 - Accelerator courses given by CERN staff at Université Joseph Fourier in Grenoble
 - Creation of ESI by Département de la Haute-Savoie (France)
- Previous directors
 - M. Rey-Campagnolle (founder)
 - J. Le Duff
 - F. Méot
 - L. Rinolfi
- More than 1000 students trained
- JUAS alumni active in many accelerator laboratories worldwide
- We have celebrated the 25th session of JUAS in 2018, and the 25th anniversary of ESI in 2019

Welcome new Director designate

- JUAS 2020 will be my last session as Director of the school
- Dr. John Jowett has been appointed new Director designate, he is already with us and will be in charge from JUAS 2021 onwards



JUAS pedagogy

- Two courses, each 4 weeks + 1 week exams
 - *The science of particle accelerators*
 - *The technology and applications of particle accelerators*
- Expert lecturers from universities, national labs and CERN
- Lectures + tutorials + seminars + workshops + practical work + lab visits
- Syllabus and appointment of lecturers submitted to Advisory Board
- Lecture slides are available in INDICO prior to the lectures/tutorials
- No distribution of paper documents, except lecture write-ups when available
- Students are required to have a computer/tablet, get USB stick with memory space to download material
- «Refresher» lecture and tutorial documents available to students well before the course for personal work
- Written exams
- Oral presentations by students on design workshops and practical work

JUAS - TIMETABLE 2020 - WEEK 6

Schedule 2020	Monday Feb 17	Tuesday Feb 18	Wednesday Feb 19	Thursday Feb 20	Friday Feb 21
09:00		Introduction to RF <i>A. Mostacci</i>	Vacuum systems <i>V. Baglin / R. Kersevan</i>	Vacuum systems <i>V. Baglin / R. Kersevan</i>	RF Engineering <i>F. Caspers / M. Wendt / M. Bozzolan</i>
10:00		Coffee Break	Coffee Break	Coffee Break	RF Engineering <i>F. Caspers / M. Wendt / M. Bozzolan</i>
10:15		Introduction to RF <i>A. Mostacci</i>	Vacuum systems <i>V. Baglin / R. Kersevan</i>	Vacuum systems <i>V. Baglin / R. Kersevan</i>	
11:15		Introduction to RF <i>A. Mostacci</i>	Vacuum systems <i>V. Baglin / R. Kersevan</i>	Vacuum systems <i>V. Baglin / R. Kersevan</i>	Coffee Break
12:15	12:00 OFFICIAL OPENING (welcome & building visit)	<i>A. Mostacci</i>	<i>V. Baglin / R. Kersevan</i>	<i>V. Baglin / R. Kersevan</i>	Bus leaves at 11:30 from JUAS (Lunch at CERN, R2, offered by ESI)
	13:00 WELCOME LUNCH	BREAK	BREAK	BREAK	
14:00	14:00 Presentation of JUAS & Introduction of students <i>P. Lebrun</i>	RF Engineering <i>F. Caspers / M. Wendt / M. Bozzolan</i>	Vacuum systems <i>V. Baglin / R. Kersevan</i>	RF Engineering <i>F. Caspers / M. Wendt / M. Bozzolan</i>	
15:00	Coffee Break	RF Engineering <i>F. Caspers / M. Wendt / M. Bozzolan</i>	RF Engineering <i>F. Caspers / M. Wendt / M. Bozzolan</i>	RF Engineering <i>F. Caspers / M. Wendt / M. Bozzolan</i>	VISIT AT CERN AD / ELENA LINAC 4 Vacuum lab Bus leaves at 17:30 from CERN
15:15	Introduction to CERN practical days Magnet, Superconductivity, RF, Vacuum, CLEAR	Coffee Break	Coffee Break	Coffee Break	
16:00		RF Engineering <i>F. Caspers / M. Wendt / M. Bozzolan</i>	RF Engineering <i>F. Caspers / M. Wendt / M. Bozzolan</i>	RF Engineering <i>F. Caspers / M. Wendt / M. Bozzolan</i>	
16:15		RF Engineering <i>F. Caspers / M. Wendt / M. Bozzolan</i>	RF Engineering <i>F. Caspers / M. Wendt / M. Bozzolan</i>	RF Engineering <i>F. Caspers / M. Wendt / M. Bozzolan</i>	
17:15	CHECK-IN AT THE RESIDENCE & SHOPPING FOR GROCERIES	Particle accelerators, instruments of discovery in physics - Seminar (incl. ESIPAP students) - <i>Ph. Lebrun</i>	Accelerator driven system Seminar (incl. ESIPAP students) <i>M. Baylac</i>		
18:15				AFTER WORK AT ESI	

JUAS - TIMETABLE 2020 - WEEK 7

Schedule 2020	Monday Feb 24	Tuesday Feb 25	Wednesday Feb 26	Thursday Feb 27	Friday Feb 28
09:00	Beam instrumentation <i>P. Forck</i>	Beam instrumentation <i>P. Forck</i>	Beam instrumentation <i>P. Forck</i>	<i>Bus leaves at 8:00 from JUAS</i> <i>(4 hours of travel by bus)</i> VISIT AT PSI <i>(Lunch, dinner and coffee breaks offered by PSI, night at PSI offered by ESI)</i>	VISIT AT PSI <i>(Lunch and coffee breaks offered by PSI)</i>
10:00	Coffee Break	Coffee Break	Coffee Break		
10:15	Beam instrumentation <i>P. Forck</i>	Beam instrumentation <i>P. Forck</i>	Beam instrumentation <i>P. Forck</i>		
10:30	Beam instrumentation <i>P. Forck</i>	Beam instrumentation <i>P. Forck</i>	Beam instrumentation <i>P. Forck</i>		
11:15	Beam instrumentation <i>P. Forck</i>	Beam instrumentation <i>P. Forck</i>	Beam instrumentation <i>P. Forck</i>		
12:15	WORKING LUNCH	BREAK	BREAK		
14:00	Beam instrumentation <i>P. Forck</i>	Beam instrumentation <i>P. Forck</i>	Beam instrumentation <i>P. Forck</i>	Accelerator Controls <i>E. Zimoch</i>	
15:00	Superconducting RF Cavities <i>F. Caspers</i>	Superconducting RF Cavities <i>F. Caspers</i>	Superconducting RF Cavities <i>F. Caspers</i>		
16:00	Coffee Break	Coffee Break	Coffee Break		
16:15	Superconducting RF Cavities <i>F. Caspers</i>	Superconducting RF Cavities <i>F. Caspers</i>	Superconducting RF Cavities <i>F. Caspers</i>	Accel. for hadron therapy Seminar <i>M. Schippers</i>	<i>Bus leaves at 14:30 from PSI</i> <i>(4 hours of travel by bus)</i>
17:15			Building Large Accelerators Seminar <i>Ph. Lebrun</i>	Novel Accelerators on a chip Seminar <i>B. Hermann</i>	
18:15			AFTER WORK AT ESI		

JUAS - TIMETABLE 2020 - WEEK 8

Schedule 2020	Monday Mar 2	Tuesday Mar 3	Wednesday Mar 4	Thursday Mar 5	Friday Mar 6
09:00				<p><i>Bus leaves at 8:00 from JUAS</i></p> <p><i>(Lunch at CERN, offered by ESI)</i></p> <p>PRACTICAL DAYS AT CERN</p> <p>RF coordinators: F. Caspers M. Wendt M. Bozzolan</p> <p>VACUUM coordinators: V. Baglin R. Kersevan</p> <p>MAGNET coordinators: J. Bauche L. Fiscarelli</p> <p>SUPERCONDUCTIVITY coordinator: J. Fleiter</p> <p>CLEAR coordinators: R. Corsini W. Farabolini</p> <p><i>Bus leaves at 17:30 from CERN</i></p>	<p><i>Bus leaves at 8:00 from JUAS</i></p> <p><i>(Lunch at CERN, offered by ESI)</i></p> <p>PRACTICAL DAYS AT CERN</p> <p>RF coordinators: F. Caspers M. Wendt M. Bozzolan</p> <p>VACUUM coordinators: V. Baglin R. Kersevan</p> <p>MAGNET coordinators: J. Bauche L. Fiscarelli</p> <p>SUPERCONDUCTIVITY coordinator: J. Fleiter</p> <p>CLEAR coordinators: R. Corsini W. Farabolini</p> <p><i>Bus leaves at 17:30 from CERN</i></p>
10:00	<p>9:00 - 10:30 Introduction to Magnets</p> <p>G. De Rijck</p>	<p>Superconducting magnets P. Ferracin</p>	<p>Mini-workshop Normal conducting Magnets J. Bauche & T. Zickler</p>		
10:15		Coffee Break	Coffee Break		
11:15	Coffee Break	<p>Superconducting magnets P. Ferracin</p>	<p>Mini-workshop Normal conducting Magnets J. Bauche & T. Zickler</p>		
11:15	<p>10:45 - 12:15 Normal Conducting magnets T. Zickler</p>	<p>Superconducting magnets P. Ferracin</p>	<p>Mini-workshop Normal conducting Magnets J. Bauche & T. Zickler</p>		
12:15	WORKING LUNCH	BREAK	BREAK		
14:00	<p>Normal Conducting magnets T. Zickler</p>	<p>Cryogenics for Superconducting Devices Ph. Lebrun</p>	<p>Mini-workshop Superconducting Magnets P. Ferracin & D. Schoerling</p>		
15:00	<p>Normal Conducting magnets T. Zickler</p>	<p>Normal Conducting magnets T. Zickler</p>	<p>Mini-workshop Superconducting Magnets P. Ferracin & D. Schoerling</p>		
16:00	Coffee Break	Coffee Break	Coffee Break		
16:15	<p>Superconducting magnets P. Ferracin</p>	<p>Normal Conducting magnets T. Zickler</p>	<p>Mini-workshop Superconducting Magnets P. Ferracin & D. Schoerling</p>		
17:15	<p>Superconducting magnets P. Ferracin</p>	<p>Normal Conducting magnets T. Zickler</p>	<p>Mini-workshop Superconducting Magnets P. Ferracin & D. Schoerling</p>		
18:15	<p>Superconducting magnets P. Ferracin</p>	<p>Normal Conducting magnets T. Zickler</p>			

JUAS - TIMETABLE 2020 - WEEK 9

Schedule 2020	Monday March 9	Tuesday March 10	Wednesday March 11	Thursday March 12	Friday March 13
09:00	Particle Sources T. Thuillier	Low Energy Electron Accelerators W. Mondelaers	Survey and Alignment of Accelerators H. Mainaud-Durand	Life-cycle and operability of particle accelerators S. Meyroneinc	High Power Proton Linacs S. Bousson
10:00	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break
10:15	Particle Sources T. Thuillier	Low Energy Electron Accelerators W. Mondelaers	Survey and Alignment of Accelerators H. Mainaud-Durand	Life-cycle and operability of particle accelerators S. Meyroneinc	High Power Proton Linacs S. Bousson
11:15	Particle Sources T. Thuillier	Low Energy Electron Accelerators W. Mondelaers	Survey and Alignment of Accelerators H. Mainaud-Durand	Life-cycle and operability of particle accelerators S. Meyroneinc	High Power Proton Linacs S. Bousson
12:15	BREAK	BREAK	SANDWICH SNACK OFFERED BY ESI	SANDWICH SNACK OFFERED BY ESI	LUNCH OFFERED
14:00	Particle Sources T. Thuillier	Acc. for medical & industrial applications W. Kleeven	VISIT & EXPERIMENTAL WORK AT BERGOZ INSTRUMENTATION E. Touzain <i>Bus leaves at 17:30 from BERGOZ</i>	<i>Bus leaves at 13:15 from JUAS</i>	Radiation safety X. Queralt
15:00	Particle Sources T. Thuillier	Acc. for medical & industrial applications W. Kleeven		Radiation Oncology : Biology, Physics & Clinical Applications Seminar P. Tsoutsou	Radiation safety X. Queralt
16:00	Coffee Break	Coffee Break		Therapeutic Applications at Geneva Hospital	Coffee Break
16:15	Energy recovery linacs Seminar M. Arnold	Acc. for medical & industrial applications W. Kleeven		<i>Bus leaves at 17:30 from HUG</i>	Radiation safety X. Queralt
17:15					

JUAS - TIMETABLE 2020 - WEEK 10

Schedule 2020	Monday March 16	Tuesday March 17	Wednesday March 18	Thursday March 19	Friday March 20
09:00	Presentation of reports on practical work	EXAMINATION Beam Instrumentation Written session	EXAMINATION RF Written session	EXAMINATION Magnets Written session	
10:30		Coffee Break	Coffee Break	Coffee Break	
11:00	Presentation of reports on practical work	EXAMINATION Subject TBD Written session	EXAMINATION Subject TBD Written session	DISCUSSION SUMMARY OF JUAS LECTURES	
12:30		WORKING LUNCH	BREAK	BREAK	
14:00	Free for preparation of examinations				
15:00					
16:00 16:15					
17:15					

JUAS 2020 Course 2 Examination

- Written examination
 - 5 topics, each allocated one and a half hours
 - RF engineering (coefficient 12)
 - Magnets, normal conducting (coefficient 12)
 - Beam instrumentation (coefficient 12)
 - Remaining two topics (each coefficient 6) announced in week 9 (i.e. one week before examination)
 - Students have access to paper documents and computer/tablet with USB stick
 - WIFI and wire connections disabled in exam room
 - No cell phone or connected electronic device allowed
- Written reports
 - NC magnets design workshop (coefficient 3)
 - SC magnet design workshop (coefficient 3)
- Oral report
 - Practical days at CERN (coefficient 3)

Practical Days at CERN on 5 & 6 March 2020 Oral presentations on 16 March 2020

- Two full days at CERN
 - One subject per day per student
 - Students asked to rank their preferences
- Five subjects proposed (see presentations later)
 - RF
 - Vacuum
 - Magnets
 - Superconductivity
 - Beam measurements on CLEAR linear accelerator
- Students, in groups of 4 maximum, prepare oral reports on one of the two subjects they have worked on during the practical days
- Oral presentations (max 15 minutes) to be made at ESI on Monday 16 March morning and evaluated by a panel of the group coordinators and ESI/JUAS

⇒ Please indicate your preferences on the form circulated, before 21 February

Attendance Certificates & Grade Sheets Master and Doctoral students

- If not taking the exams, they get
 - **Certificate of Attendance** with mention «has opted not to take the examinations»
- If taking the exams, they get
 - **Certificate of Attendance** with
 - Overall grade of student
 - Overall class average grade & standard deviation
 - **Grade Sheet** with, for each subject
 - Student grade
 - Class average grade
- Class average grades are based only on results of Master and Doctoral students
- All grades out of 20

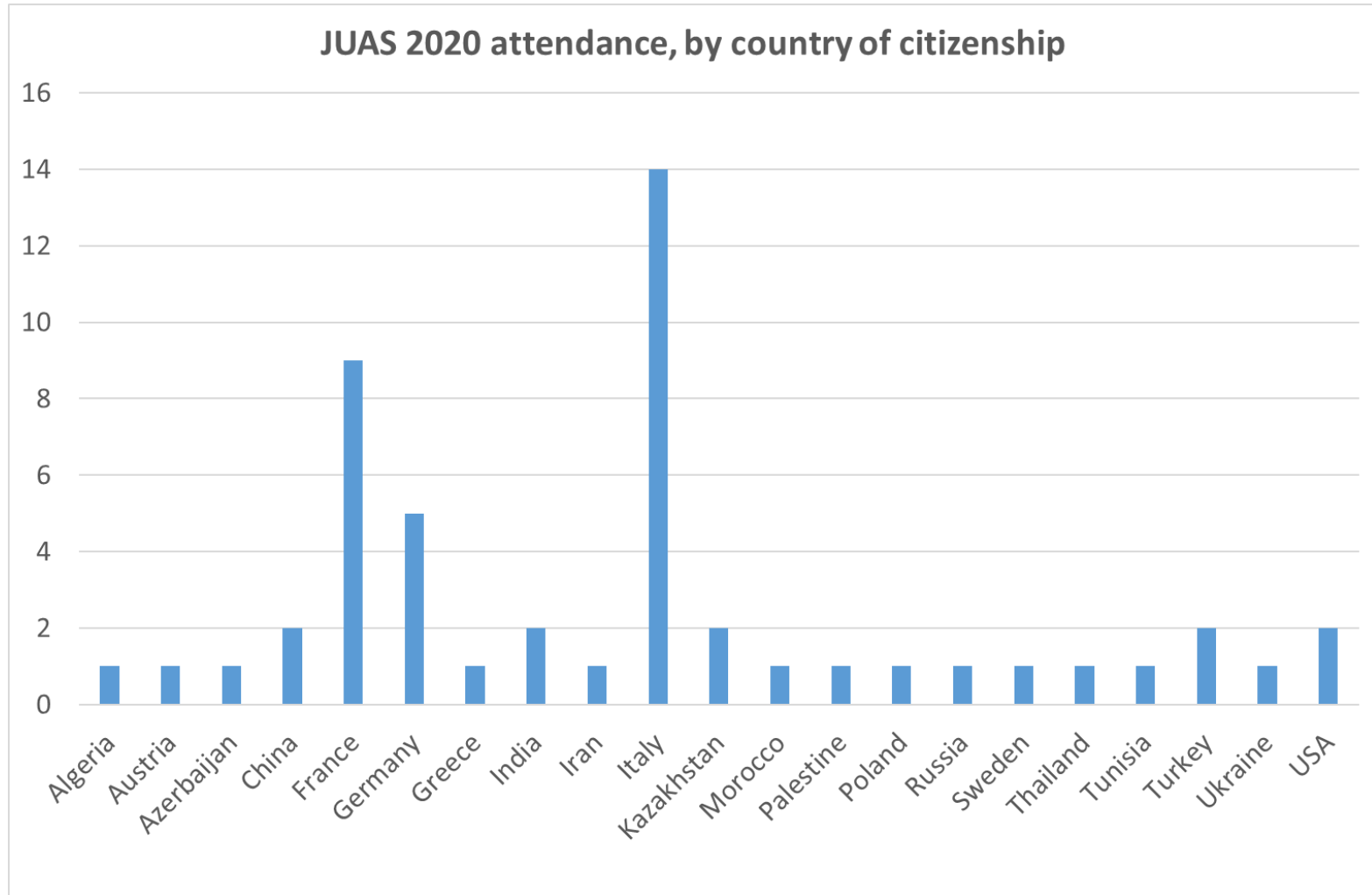
Attendance Certificates & Grade Sheets Professional students

- All students get
 - **Certificate of Attendance**, bearing no mention relative to examinations
- If taking the exams, they get additionally
 - **Grade Sheet** with, for each subject, the student grade
- Grades of Professional students are not included in class averages
- All grades out of 20

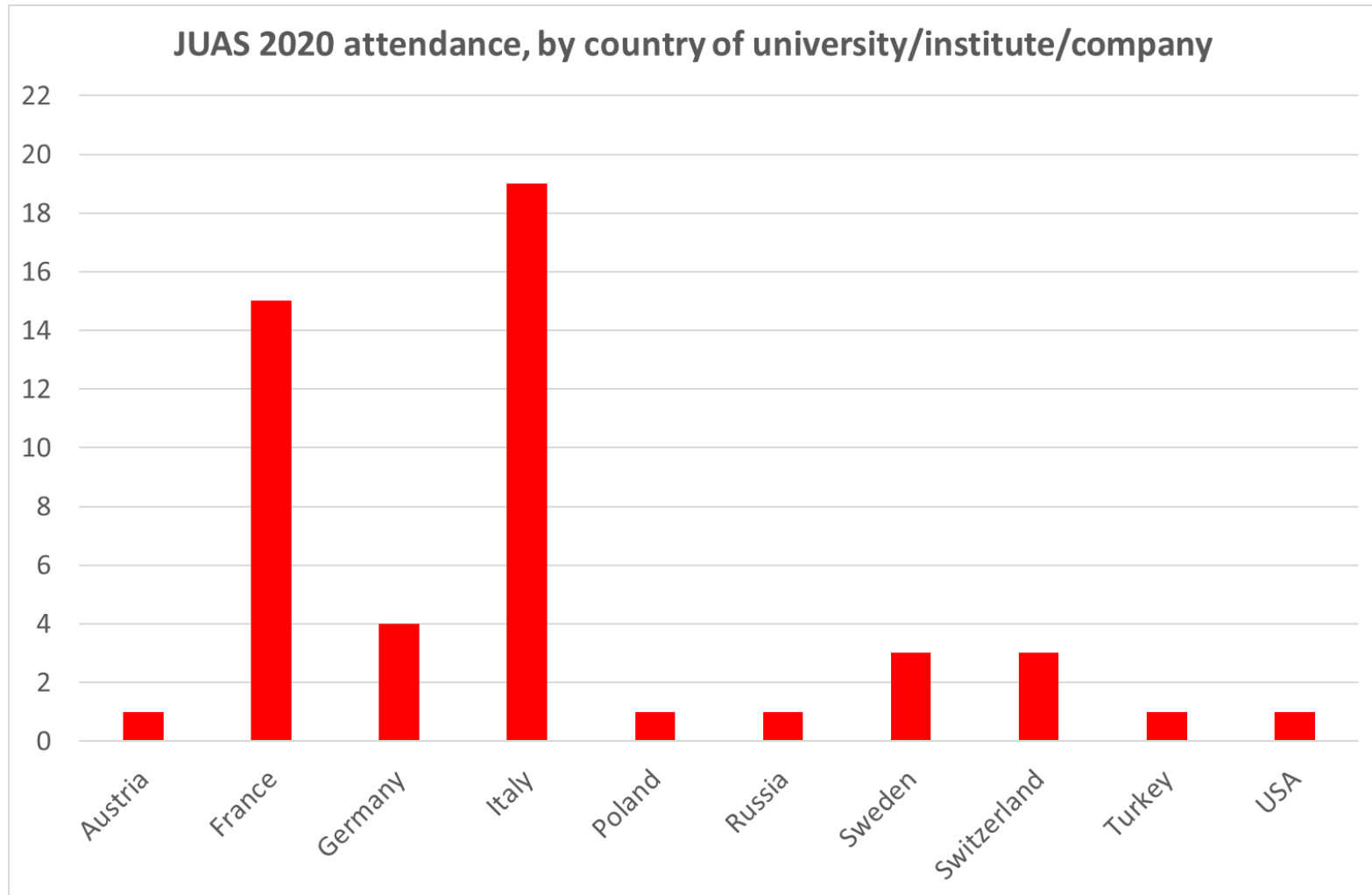
Evaluation of lectures and seminars by students

- The students are asked (anonymously) to evaluate the lectures and seminars, on the basis of several criteria:
 - Fulfilment of personal learning expectations
 - Quality of slides and written documents
 - Level of treatment of the subject
 - Quality of oral presentation
 - Guidance during lectures and tutorials
- The students are also asked for possible improvements to the course
- Evaluation is done on-line using Google Forms
- Evaluation results are communicated
 - Individually to the lecturers
 - Statistically to the JUAS Advisory Board

Origin of JUAS 2020 students



Origin of JUAS 2020 students



JUAS code of conduct [1/2]

- **Mutual respect**

- Freedom of opinion and of belief
- Cultural diversity
- Gender equality

⇒ Constitution of France, Article 1

- *La France... assure l'égalité devant la loi sans distinction d'origine, de race ou de religion. Elle respecte toutes les croyances*
- *France... shall ensure the equality before the law, without distinction of origin, race or religion. It shall respect all beliefs*

- **No dress code, but**

⇒ Loi du 11 octobre 2010 interdisant la dissimulation du visage dans l'espace public

- *Nul ne peut, dans l'espace public, porter une tenue destinée à dissimuler son visage*
- *Nobody may, in public space, wear a dress hiding his/her face*

JUAS code of conduct [2/2]

- **Behaviour**

- **Arrive on time** at the lectures
- **Individual and collective behaviour**, in particular during visits, must not impair the good reputation of JUAS... but rather improve it further!

- **Examinations**

- Respect the ban on cell phones and connected electronic devices
- Cheating will result in immediate exclusion

Job opportunities

- Studying at JUAS is a good opportunity to find a position
 - Internship in national or international laboratory
 - Summer job
 - PhD grant
 - Post doctoral
 - ...
- Do not hesitate to
 - Talk to the lecturers during coffee and lunch breaks
 - Talk to the people you will meet during laboratory visits

- Consult our updated job opportunity web site

<http://www.esi-archamps.eu/Thematic-Schools/JUAS/Job-opportunities>

Developing the JUAS network

- CV Yearbook
 - We publish a CV (curriculum vitae) Yearbook
 - Introducing JUAS,
 - Containing the curriculum vitae of each JUAS 2020 student (with his/her agreement)
 - Distributed to our partner universities and industrial sponsors
- Alumni network
 - Build up the JUAS Alumni network using social media
- More information will be communicated to you on these matters during the Course

Have a pleasant and fruitful time at JUAS!

