Fifth International Accelerator School for Linear Colliders – Curriculum (v.5, 10/25/2010)

October 25 – November 5, 2010, Villars-sur-Ollon, Switzerland

Daily Schedule

Breakfast	07:00 – 09:00
Morning	09:00 – 12:30, including ½-hour break
Lunch	12:30 – 14:00
Afternoon	14:00 – 17:30, including ½-hour break
Tutorial & homework	18:00 – 20:30
Dinner	20:30 – 22:00

List of Courses (black: required, red and blue: elective)

	Morning	Afternoon	Evening
October 25		*Arrival, registration*	*Reception*
October 26	Introduction	ILC	Tutorial & homework
October 27	CLIC	Muon collider	Tutorial & homework
October 28	Joint lecture: Linac basics	Course A: Accelerator physics Course B: RF technology	Tutorial & homework
October 29	Course A: Accelerator physics Course B: RF technology	*Excursion*	Tutorial & homework
October 30	Course A: Accelerator physics Course B: RF technology		Tutorial & homework
October 31	Course A: Accelerator physics Course B: RF technology		Tutorial & homework
November 1	Course A: Accelerator physics Course B: RF technology	*Excursion*	Tutorial & homework
November 2	Course A: Accelerator physics Course B: RF technology		Tutorial & homework
November 3	Course A: Accelerator physics Course B: RF technology		Tutorial & homework
November 4	Study time		Study time
November 5	Final exam	*Free time*	*Banquet;* *Student Award Ceremony*
November 6	*Departure for a site visit to CERN*		

Program

	Tuesday, October 26	Wednesday, October 27	Thursday, October 28	Friday, October 29
Morning 09:00 – 12:30	**Opening remarks** **Lecture I1 – Introduction** (3 hrs) **Barry Barish** (Caltech) • Tera scale physics • ILC and LHC • Layout of the ILC • Parameter choices & optimization • Other possible future lepton colliders: CLIC and the muon collider • Detectors	**Lecture I3 – CLIC** (3 hrs) **Frank Tecker** (CERN) • Klystron vs. beam driven acceleration • CLIC layout • Parameter choices & optimization • Driver beam stability • Comparison of the CLIC and ILC • Technical challenges	**Joint lecture of Courses A & B:** **Linac basics** (3 hrs) **Daniel Schulte** (CERN)	**Course A: Accelerator physics** **Lecture A1 – Linac** (cont'd) **Daniel Schulte** (CERN) **Course B: RF technology** **Lecture B1 – Room temperature RF** (cont'd) **Erk Jensen** (CERN)
Afternoon 14:00 – 17:30	**Lecture I2 – ILC** (3 hrs) **Barry Barish** (Caltech) • e- and e+ sources • Bunch compressors and spin rotators • Damping rings • Main linac • Beam delivery system • Civil construction issues	**Lecture I4 – Muon collider** (3 hrs) **Bob Palmer** (BNL) • Muon collider basics • Machine layout • Major sub-systems • Challenges	**Course A: Accelerator physics** **Lecture A1 – Linac** (9 hrs) **Daniel Schulte** (CERN) **Course B: RF technology** **Lecture B1 – Room temperature RF** (12 hrs) **Erk Jensen** (CERN)	**Excursion**
Evening 18:00 – 20:30	Tutorial & homework	Tutorial & homework	Tutorial & homework	Tutorial & homework

Program (cont'd)

	Saturday, October 30	Sunday, October 31	Monday, November 1	Tuesday, November 2
Morning 09:00 – 12:30	**Course A: Accelerator physics** **Lecture A1 – Linac** (cont'd) **Daniel Schulte** (CERN) **Course B: RF technology** **Lecture B1 – Room temperature RF** (cont'd) **Alexej Grudiev** (CERN)	**Course A: Accelerator physics** **Lecture A2 – Sources** (cont'd) **Masao Kuriki** (Hiroshima U.) **Course B: RF technology** **Lecture B2 – Superconducting RF** (12 hrs) **Jean Delayen** (ODU/Jlab)	**Course A: Accelerator physics** **Lecture A3 – Damping rings** (cont'd) **Mark Palmer** (Cornell U.) **Course B: RF technology** **Lecture B2 – Superconducting RF** (cont'd) **Jean Delayen** (ODU/Jlab)	**Course A: Accelerator physics** **Lecture A3 – Damping rings** (cont'd) **Mark Palmer** (Cornell U.) **Course B: RF technology** **Lecture B2 – Superconducting RF** (cont'd) **Jean Delayen** (ODU/Jlab)
Afternoon 14:00 – 17:30	**Course A: Accelerator physics** **Lecture A2 – Sources** (6 hrs) **Masao Kuriki** (Hiroshima U.) **Course B: RF technology** **Lecture B1 – Room temperature RF** (cont'd) **Walter Wuensch** (CERN)	**Course A: Accelerator physics** **Lecture A3 – Damping rings** (12 hrs) **Mark Palmer** (Cornell U.) **Course B: RF technology** **Lecture B2 – Superconducting RF** (cont'd) **Jean Delayen** (ODU/Jlab)	**Excursion**	**Course A: Accelerator physics** **Lecture A3 – Damping rings** (cont'd) **Mark Palmer** (Cornell U.) **Course B: RF technology** **Lecture B3 – LLRF & high power RF** (9 hrs) **Stefan Simrock** (ITER)
Evening 18:00 – 20:30	Tutorial & homework	Tutorial & homework	Tutorial & homework	Tutorial & homework

	Wednesday, November 3	Thursday, November 4	Friday, November 5	Saturday, November 6
Morning 09:00 – 12:30	**Course A: Accelerator physics** **Lecture A4 – Beam delivery system and beam-beam** (6 hrs) **Andrei Seryi** (John Adams Inst.) **Course B: RF technology** **Lecture B3 – LLRF & high power RF** (cont'd) **Stefan Simrock** (ITER)	**Study time**	**08:00 – 12:30 Final exam** (4.5 hrs)	**Departure for a site visit to CERN**
Afternoon 14:00 – 17:30	**Course A: Accelerator physics** **Lecture A4 – Beam delivery system and beam-beam** (cont'd) **Andrei Seryi** (John Adams Inst.) **Course B: RF technology** **Lecture B3 – LLRF & high power RF** (cont'd) **Stefan Simrock** (ITER)	**Study time**	*Free time*	
Evening 18:00 – 20:30	Tutorial & homework	Study time	Banquet at 20:00; Student Award Ceremony	

Notes on the Program:

1. There are a total of 10 school days in this year's program, excluding the arrival day (October 25) and the final examination day (November 5). The time is divided as follows: 2 days for required courses, 6 days for elective courses, 2 half-days for excursion, 1 day for study time for preparation for the final exam. There will also be a site visit to CERN on November 6.
2. The required course consists of four lectures: Introduction, ILC, CLIC and the muon collider. Every student must take this course.
3. There are two elective courses: Course A (the red course) is accelerator physics, Course B (the blue course) is RF technology. They will run in parallel. Each student will choose one of these.
4. The accelerator physics course consists of lectures on four topics: (1) linac, (2) sources, (3) damping rings, and (4) beam delivery system and beam-beam effects.
5. The RF technology course consists of lectures on three topics: (1) room temperature RF, (2) superconducting RF, and (3) LLRF and high power RF.
6. There is a half-day joint lecture on linac basics for students taking both Courses A and B.
7. There will be homework assignments, but homework is not counted in the grade. There will be a final examination. Some of the exam problems will be taken from variations of the homework assignments. The exam papers will be graded immediately after the exam and results announced in the evening of November 5 at the student award ceremony.
8. There is a tutorial and homework period every evening. It is part of the curriculum and students are required to attend. Lecturers will be available in the evening of their lecture day during this period.
9. Lecturers have been asked to cover the basics as well as possible. Their teaching material will be made available online to the students well ahead of time (a few weeks prior to the school). Students are strongly encouraged to study this material prior to the beginning of the school.
10. Lecturers of the elective courses are required to provide lecture syllabus as soon as possible in order to help students make their selection.
11. All lecturers are responsible for the design of homework and exam problems as well as the answer sheet. They are also responsible for grading the exams.
12. The award ceremony will honor the top (~10) students based on their exam scores.