Fourth International Accelerator School for Linear Colliders – Curriculum (v.5, 06/08/2009)

September 7-18, 2009, Beijing, China

Daily Schedule

Breakfast	08:00 – 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
Dinner	17:30 – 19:00
Tutorial & homework	19:00 – 22:00

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

	Morning	Afternoon	Evening
September 7		*Arrival, registration*	*Reception*
September 8	Introduction	ILC	Tutorial & homework
September 9	CLIC	Muon collider	Tutorial & homework
September 10	Joint lecture: Linac basics	Course A: Accelerator physics Course B: RF technology	Tutorial & homework
September 11	Course A: Accelerator physics Course B: RF technology		Tutorial & homework
September 12	*Excursion*	*Excursion*	*Free time*
September 13	Course A: Accelerator physics Course B: RF technology		Tutorial & homework
September 14	Course A: Accelerator physics Course B: RF technology		Tutorial & homework
September 15	Course A: Accelerator physics Course B: RF technology	*Site visit to IHEP*	Tutorial & homework
September 16	Course A: Accelerator physics Course B: RF technology		Tutorial & homework
September 17	Course A: Accelerator physics Course B: RF technology	Study time	Tutorial & homework
September 18	Final exam	*Free time*	*Banquet;* *Student Award Ceremony*
September 19	*Departure*		

Program

	Tuesday, September 8	Wednesday, September 9	Thursday, September 10	Friday, September 11
Morning 09:00 – 12:30	**Opening remarks** **Hesheng Chen** (IHEP) **Lecture I1 – Introduction** (3 hrs) **Barry Barish** (GDE/ 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) **Sami Tantawi** (SLAC)
Afternoon 14:00 – 17:30	**Lecture I2 – ILC** (3 hrs) **Barry Barish** (GDE/ 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) **Sami Tantawi** (SLAC)	**Course A: Accelerator physics** **Lecture A1 – Linac** (cont'd) **Daniel Schulte** (CERN) **Course B: RF technology** **Lecture B1 – Room temperature RF** (cont'd) **Sami Tantawi** (SLAC)
Evening 19:00 – 22:00	Tutorial & homework	Tutorial & homework	Tutorial & homework	Tutorial & homework

Program (cont'd)

	Saturday, September 12	Sunday, September 13	Monday, September 14	Tuesday, September 15
Morning 09:00 – 12:30	**Excursion**	**Course A: Accelerator physics** **Lecture A2 – Sources** (6 hrs) **Masao Kuriki** (Hiroshima U.) **Course B: RF technology** **Lecture B1 – Room temperature RF** (cont'd) **Sami Tantawi** (SLAC)	**Course A: Accelerator physics** **Lecture A3 – Beam delivery system and beam-beam** (6 hrs) **Olivier Napoly** (Saclay) **Course B: RF technology** **Lecture B2 – Superconducting RF** (cont'd) **Kenji Saito** (KEK)	**Course A: Accelerator physics** **Lecture A4 – Damping rings** (12 hrs) **Andy Wolski** (U. of Liverpool) **Course B: RF technology** **Lecture B2 – Superconducting RF** (cont'd) **Kenji Saito** (KEK)
Afternoon 14:00 – 17:30	**Excursion**	**Course A: Accelerator physics** **Lecture A2 – Sources** (cont'd) **Masao Kuriki** (Hiroshima U.) **Course B: RF technology** **Lecture B2 – Superconducting RF** (12 hrs) **Kenji Saito** (KEK)	**Course A: Accelerator physics** **Lecture A3 – Beam delivery system and beam-beam** (cont'd) **Olivier Napoly** (Saclay) **Course B: RF technology** **Lecture B2 – Superconducting RF** (cont'd) **Kenji Saito** (KEK)	**Site visit to IHEP**
Evening 19:00 – 22:00	*Free time*	Tutorial & homework	Tutorial & homework	Tutorial & homework

	Wednesday, September 16	Thursday, September 17	Friday, September 18	Saturday, September 19
Morning 09:00 – 12:30	**Course A: Accelerator physics** **Lecture A4 – Damping rings** (cont'd) **Andy Wolski** (U. of Liverpool) **Course B: RF technology** **Lecture B3 – LLRF & high power RF** (9 hrs) **Stefan Simrock** (DESY)	**Course A: Accelerator physics** **Lecture A4 – Damping rings** (cont'd) **Andy Wolski** (U. of Liverpool) **Course B: RF technology** **Lecture B3 – LLRF & high power RF** (cont'd) **Stefan Simrock** (DESY)	**08:00 – 12:30 Final exam** (4.5 hrs)	**Departure**
Afternoon 14:00 – 17:30	**Course A: Accelerator physics** **Lecture A4 – Damping rings** (cont'd) **Andy Wolski** (U. of Liverpool) **Course B: RF technology** **Lecture B3 – LLRF & high power RF** (cont'd) **Stefan Simrock** (DESY)	**Study time**	*Free time*	
Evening 19:00 – 22:00	Tutorial & homework	Tutorial & homework	Banquet; Student Award Ceremony	

Notes on the Program:

1. This year's program contains major changes from what was done in previous years. Excluding the arrival day (September 7) and the final examination day (September 18), there are a total of 10 school days. The time is divided as follows: 2 days for required courses, 1 day for an excursion, 6 days for elective courses, 0.5 day for a site visit to IHEP and 0.5 day for study time for preparation for the final exam.
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) beam delivery system and beam-beam effects, and (4) damping rings.
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 the homework assignments. The exam papers will be graded immediately after the exam and results announced in the evening of September 18 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 (~ 1 month 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 a lecture outline 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.