

The CERN Accelerator School holds courses in all of the member states of CERN

The Twenty Member States of CERN

Member States (Dates of Accession)

- AUSTRIA (1959)
- BELGIUM (1953)
- BULGARIA (1999)
- CZECH FR (1993)
- DENMARK (1953)
- FINLAND (1991)
- FRANCE (1953)
- GERMANY (1953)
- GREECE (1953)
- HUNGARY (1992)
- ITALY (1953)
- NETHERLANDS (1953)
- NORWAY (1953)
- POLAND (1991)
- PORTUGAL (1986)
- SLOVAK FR (1993)
- SPAIN (1/1961-12/1968-1/1983)
- SWEDEN (1953)
- SWITZERLAND (1953)
- UNITED KINGDOM (1953)

**2013, Trondheim
Norway**

The CERN Accelerator School (CAS) and Norwegian University of Science and Technology (NTNU) are organizing a course on

Advanced Accelerator Physics

18 – 29 August, 2013

Trondheim, Norway

The course will be of interest to physicists and engineers who wish to extend their knowledge of Accelerator Physics. The program offers core lectures on accelerator physics in the mornings and course work on dedicated specialized topics in the afternoons. Participants will select one afternoon course from the three available. Seminars and tutorials will complete the program.

Contact: CERN Accelerator School
CH-1211 Geneva 23 Fax: +41 22 767 54 60
www.cern.ch/schools/CAS

CERN AC_ES36C_16-03-1999

ADVANCED ACCELERATOR PHYSICS COURSE – TRONDHEIM, NORWAY, 18 – 29 August, 2013

Time	Sunday 18 August	Monday 19 August	Tuesday 20 August	Wednesday 21 August	Thursday 22 August	Friday 23 August	Saturday 24 August	Sunday 25 August	Monday 26 August	Tuesday 27 August	Wednesday 28 August	Thursday 29 August
08:30		Opening Talks	Transverse Dynamics II	New Tools for Non Linear Dynamics I	New Tools for Non Linear Dynamics II	Non Linear Dynamics II	Low Emittance Machines III		Landau Damping I	Landau Damping II	Timing and Synchronization	
09:30		Transverse Dynamics I	B. Holzer Longitudinal Dynamics II	W. Herr Beam Instabilities I	W. Herr Beam Instabilities II	O. Bruning Low Emittance Machines I	A. Wolski Space Charge		W. Herr RF Cavity Design	W. Herr High Field Magnets	H. Schlarb Feedback Systems I	
10:30		B. Holzer COFFEE	F. Tecker COFFEE	G. Rumolo COFFEE	G. Rumolo COFFEE	A. Wolski COFFEE	M. Ferrario COFFEE		E. Jensen COFFEE	G. de Rijk COFFEE	H. Schmickler COFFEE	
11:00		R Longitudinal Dynamics I	I Introduction to Beam Diagnostics	M Machine Protection	T Longitudinal Dynamics	L Linear Accelerators I	T Transverse Dynamics	E	T T3	M Medical Applications	T T4	
12:00		F. Tecker Introduction to Beam Instrumentation	H. Schmickler Insertions	R. Schmidt Private Study	M. Vretenar Private Study	M. Vretenar Private Study	M. Vretenar Instabilities in Linacs	X	U Beam-beam	C Private Study	U Feedback Systems II	
13:00		L R. Jones LUNCH	B. Holzer LUNCH	LUNCH	O. Bruning LUNCH	LUNCH	M. Ferrario LUNCH		R T. Pieloni LUNCH	LUNCH	H. Schmickler LUNCH	
15:00		D Lattice Cells	C1	C1	F R E	Low Emittance Machines II	C1	I	C1	C1	C1	
16:00		A B. Holzer RF Measurement Concepts	C2	C2	A F T E	A. Wolski Linear Accelerators II	C2	O	C2	C2	C2	
17:00		Y F. Caspers TEA	C3	C3	R N O N	M. Vretenar Linear Accelerators I	C3	N	C3	C3	C3	
17:30		Discussion Session	TEA C1	TEA C1	R N O N	Seminar Linear Colliders	TEA Poster Session		TEA Seminar Northern Lights	TEA Seminar Norwegian Petroleum Research	TEA Closing Talk	
18:30		Dinner	C2	C2	O N	E. Adli Dinner	Dinner		A. Egeland Dinner	M. Landro Dinner	F. Gianotti Special Dinner	
20:00		Dinner	C3	C3								
21:30		Discussion Session	Discussion Session	Discussion Session					Discussion Session	Discussion Session		

Course 1 = RF Measurements Techniques (F. Caspers and P. Kowina) Course 2 = Beam Instrumentation and Diagnostics (R. Jones, H. Schmickler, K. Wittenburg, M. Gasior, T. Lefevre)
Course 3 = Optics Design and Corrections (W. Herr, O. Bruning, B. Holzer, V. Kain, Y. Papaphilippou)

Generalities

- 80 selected out of 93 applicants
 - 10 unable to come, so 70
- All lectures in Britannia Hall
 - Except last day, Meeting room 5
- All afternoon courses at NTNU
- Coffee breaks in the Britannia
 - outside Britannia Hall
- Tea breaks in the University
 - cafeteria near to course room
- Secretariat, Barbara Strasser
 - Britannia, Meeting room 7
 - University, R30
- Breakfast Lunch and Dinner all at the Britannia Hotel
 - Lunch in Palmehaven
 - Dinner in Speilshalen (except Saturday, in Britannia hall)
- Handouts provided each morning

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09:30		Transverse Dynamics I	B. Holzer	W. Herr	W. Herr	O. Brunning	A. Wolski	W. Herr	W. Herr	H. Schlarb		
10:30	A	B. Holzer	F. Tecker	G. Rumolo	G. Rumolo	A. Wolski	M. Ferrario	E. Jensen	G. de Rijk	H. Schmickler		
11:00	R	COFFEE	COFFEE	COFFEE	COFFEE	COFFEE	COFFEE	COFFEE	COFFEE	COFFEE		
11:30	R	Longitudinal Dynamics I	Introduction to Beam Diagnostics	Machine Protection	T1	Linear Accelerators I	T2	T3	Medical Applications	T4		
12:00	I	F. Tecker	H. Schrackler	R. Schmidt	R. Schmidt	M. Vretenar	M. Vretenar	C. Biscari	C. Biscari	Non-Linear Dynamics		
12:30	V	Introduction to Beam Instrumentation	Insertions	Private Study	Non-Linear Dynamics I	Private Study	Instabilities in Linacs	Beam-beam	Private Study	Feedback Systems I		
13:00	L	R. Jones	B. Holzer		O. Brunning		M. Ferrario	T. Pieloni		H. Schmickler		
15:00	D	Lattice Cells	C1	C1	F	Low Emittance Machines II	C1	C1	C1	C1		
16:00	A	B. Holzer	C2	C2	R	A. Wolski	C2	C2	C2	C2		
16:00	Y	RF Measurement Concepts	C3	C3	A	Linear Accelerators II	C3	C3	C3	C3		
17:00		F. Caspers	TEA	TEA	E	M. Vretenar	TEA	TEA	TEA	TEA		
17:30		Discussion Session	C1	C1	N	Seminar Linear Colliders	Poster Session	Seminar Northern Lights	Seminar Norwegian Petroleum Research	Closing Talk		
18:30		TEA	C2	C2	O	E. Adli	Dinner	A. Egeland	M. Landro	F. Gianotti		
20:00		Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Special Dinner		
21:30		Discussion Session	Discussion Session	Discussion Session	Discussion Session	Discussion Session	Discussion Session	Discussion Session	Discussion Session	Discussion Session		

Course 1 = RF Measurements Techniques (F. Caspers and P. Kowina) Course 2 = Beam Instrumentation and Diagnostics (R. Jones, H. Schmickler, K. Wittenburg, M. Gasior, T. Lefevre)
Course 3 = Optics Design and Corrections (W. Herr, O. Brunning, B. Holzer, V. Kain, Y. Papaphilippou)

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Afternoon Courses

Time	18 August	19 August	20 August	21 August	22 August	23 August	24 August	25 August	26 August	27 August	28 August	29 August
08:30		Opening Talks	Transverse Dynamics II	New Tools for Non-Linear Dynamics I	New Tools for Non-Linear Dynamics II	Non-Linear Dynamics I	Low Emittance Machines III		Landau Damping I	Landau Damping II	Timing and Synchronization	
09:30		Transverse Dynamics I	B. Holzer	W. Herr	W. Herr	O. Brunning	A. Wolski		W. Herr	W. Herr	H. Schlarb	
10:30	A	B. Holzer	F. Tecker	G. Rumolo	G. Rumolo	A. Wolski	M. Ferrario		E. Jensen	G. de Rijk	H. Schmickler	
11:00	R	COFFEE	COFFEE	COFFEE	COFFEE	COFFEE	COFFEE		COFFEE	COFFEE	COFFEE	
11:30	R	Longitudinal Dynamics I	Introduction to Beam Diagnostics	Machine Protection	T1	Linear Accelerators I	T2		T3	Medical Applications	T4	
12:00	I	F. Tecker	H. Schrackler	R. Schmidt	R. Schmidt	M. Vretenar	M. Vretenar		Low Emittance Machines	C. Biscari	Non-Linear Dynamics	
12:30	V	Introduction to Beam Instrumentation	Insertions	Private Study	Non-Linear Dynamics I	Private Study	Instabilities in Linacs		Beam-beam	Private Study	Feedback Systems II	
13:00	L	R. Jones	B. Holzer		O. Brunning		M. Ferrario		T. Pieloni		H. Schmickler	
15:00	D	Lattice Cells	C1	C1	F	Low Emittance Machines II	C1		C1	C1	C1	
16:00	A	B. Holzer	C2	C2	R	A. Wolski	C2		C2	C2	C2	
16:00	Y	RF Measurement Concepts	C3	C3	A	Linear Accelerators II	C3		C3	C3	C3	
17:00		F. Caspers	TEA	TEA	E	M. Vretenar	TEA		TEA	TEA	TEA	
17:30		Discussion Session	C1	C1	N	Seminar Linear Colliders	Poster Session		Seminar Northern Lights	Seminar Norwegian Petroleum Research	Closing Talk	
18:30		TEA	C2	C2	O	E. Adli	Dinner		A. Egeland	M. Landro	F. Gianotti	
20:00		Dinner	Dinner	Dinner	Dinner	Dinner	Dinner		Dinner	Dinner	Special Dinner	
21:30		Discussion Session	Discussion Session	Discussion Session	Discussion Session	Discussion Session	Discussion Session		Discussion Session	Discussion Session	Discussion Session	

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Afternoon Courses

- Chance to try something new!
- 14 hours ++ of practical training
- Sign up for the course of preference (~equal numbers)
 - At the secretariat absolute latest by coffee on Tuesday AM

Course	Location	Coordinator	Tutors week 1	Tutors week 2
C1 RF	Høgskoleringen	F.Caspers	P.Kowina	P.Kowina
C2 BI	Natural Science D1 - 102	H.Schmickler	K.Wittenberg, R.Jones, M.Gasior	K.Wittenberg, T.Lefevre
C3 Optics	Natural Science D1 - 185	W.Herr	B.Holzer, V.Kain, O.Bruning	B.Holzer, V.Kain, Y.Papaphilippou

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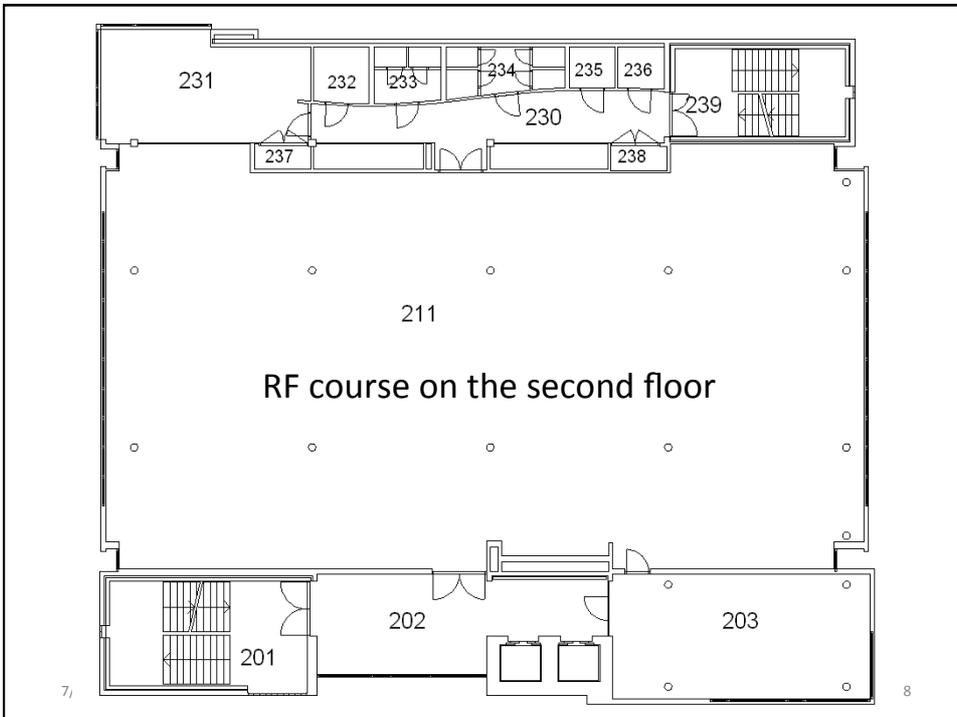
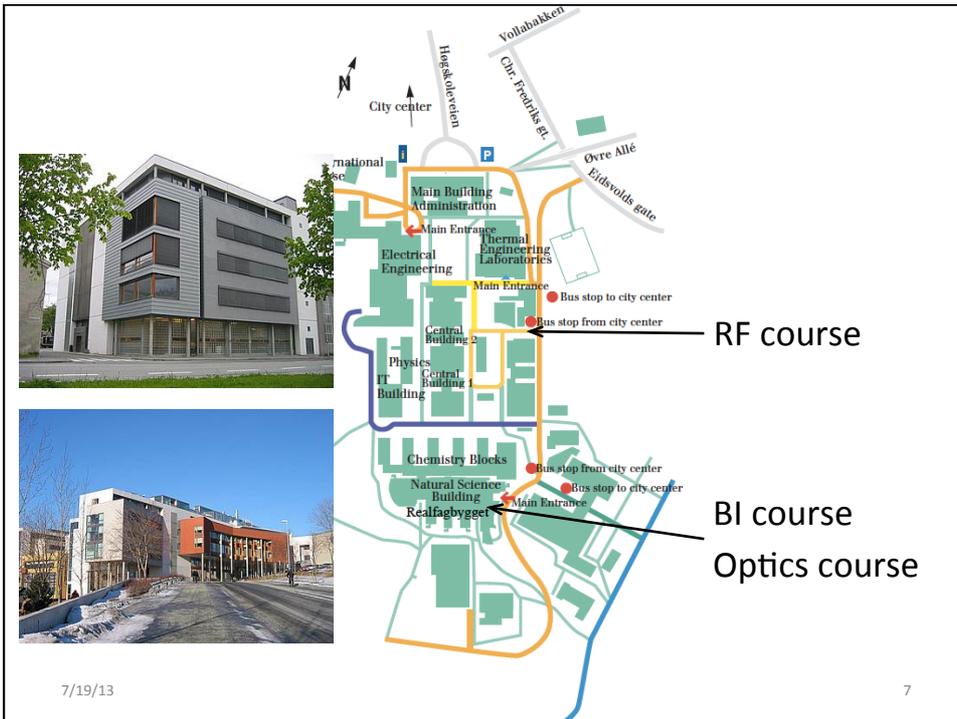
Walking ☀️

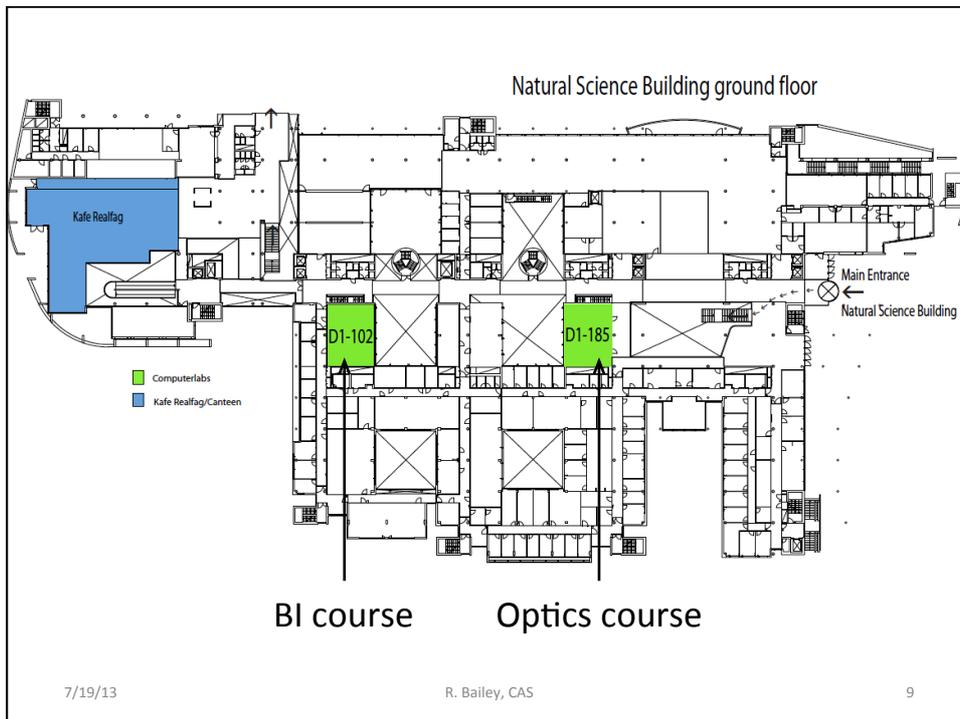
How to get from Britannia Hotel to the afternoon courses at NTNU come rain or shine

By bus ☁️

Trondheim Dronningens gate - D3 (Trondheim) 11:05 5

Gleshaugen Nord (Trondheim) 11:13





Tutorials

Time	18 August	19 August	20 August	21 August	22 August	23 August	24 August	25 August	26 August	27 August	28 August	Monday 29 August
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09:30		Transverse Dynamics I	B. Holzer Longitudinal Dynamics II	W. Herr Beam Instabilities I	W. Herr Beam Instabilities II	O. Bruning Low Emittance Machines I	A. Wolski Space Charge		W. Herr RF Cavity Design	W. Herr High Field Magnets	H. Schlarb Feedback Systems I	
10:30		B. Holzer COFFEE	F. Tecker COFFEE	G. Rumolo COFFEE	G. Rumolo COFFEE	A. Wolski COFFEE	M. Ferrario COFFEE		E. Jensen COFFEE	G. de Rijk COFFEE	H. Schmickler COFFEE	
11:00		R Longitudinal Dynamics I	I Introduction to Beam Diagnostics	R Machine Protection	I T1 Longitudinal Dynamics	X Linear Accelerators I	O T2 Transverse Dynamics	E	X T3	C Medical Applications	R T4 Non-Linear Dynamics	E
12:00		F. Tecker Introduction to Beam Instrumentation	H. Schnickler Insertions	R. Schmidt Private Study	M. Vretenar Non Linear Dynamics I	M. Vretenar Private Study	U Instabilities in Linacs		C Beam-beam	U Private Study	R Feedback Systems II	A F T E R
13:00		R. Jones LUNCH	B. Holzer LUNCH		O. Bruning LUNCH		M. Ferrario LUNCH		S T. Pieloni LUNCH		H. Schmickler LUNCH	B R E A K F A S T
15:00		D Lattice Cells	C1	C1	F R E E	I Low Emittance Machines II	C1	O	I C1	C1	C1	
16:00		A B. Holzer RF Measurement Concepts	C2	C2	E A F T E R	A. Wolski Linear Accelerators II	C2	N	O C2	C2	C2	
17:00		F. Caspers TEA	TEA	TEA	R N O N	M. Vretenar TEA	TEA		C C3	C3	C3	
17:30		Discussion Session	C1	C1	R O N	Seminar Linear Colliders	Poster Session		TEA Seminar Northern Lights	TEA Seminar Norwegian Petroleum Research	TEA Closing Talk	
18:30			C2	C2		E. Adli Dinner	Dinner	Dinner	A. Egeland Dinner	M. Landro Dinner	F. Gianotti Special Dinner	
20:00		Dinner	Dinner	Dinner	Dinner			Dinner	Dinner	Dinner	Dinner	
21:30			Discussion Session	Discussion Session					Discussion Session	Discussion Session		

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Tutorials

- Exercises set by the 4 lecturers mentioned
 - Tutorials for each in 3 roughly equal groups
 - TG1 Surnames A to H Britannia Hall
 - TG2 Surnames I to P Meeting room 10, Britannia
 - TG3 Surnames Q to Z Meeting room 11, Britannia

Tutorial	TG1 (A to H)	TG2 (I to P)	TG3 (Q to Z)
	Britannia Hall	Meeting room 10	Meeting room 11
T1 Longitudinal Dynamics	W.Herr	B.Holzer	O.Bruning
T2 Transverse Dynamics	B.Holzer	V.Kain	W.Herr
T3 Low Emittance Machines	A.Wolski	W.Herr	Y.Papaphilippou
T4 Non-Linear Dynamics	W.Herr	Y.Papaphilippou	T.Pieloni

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09:30		Transverse Dynamics I	Longitudinal Dynamics II	Beam Instabilities I	Beam Instabilities II	Low Emittance Machines I	Space Charge		RF Cavity Design	High Field Magnets	Feedback Systems I	
10:30		B. Holzer COFFEE	F. Tecker COFFEE	G. Rumolo COFFEE	G. Rumolo COFFEE	A. Wolski COFFEE	M. Ferrario COFFEE		E. Jensen COFFEE	G. de Rijk COFFEE	H. Schmickler COFFEE	
11:00		Longitudinal Dynamics I	Introduction to Beam Diagnostics	Machine Protection	T1 Longitudinal Dynamics	Linear Accelerators I	T2 Transverse Dynamics		T3 Low Emittance Machines	Medical Applications	T4 Non-Linear Dynamics	
12:00		F. Tecker	H. Schmickler	R. Schmidt	O. Bruning	M. Vretenar			C. Biscari			
12:00		Introduction to Beam Instrumentation	Insertions	Private Study	Non Linear Dynamics I	Private Study	Instabilities in Linacs		Beam-beam	Private Study	Feedback Systems II	
13:00		R. Jones LUNCH	B. Holzer LUNCH		O. Bruning LUNCH		M. Ferrario LUNCH		T. Pieloni LUNCH		H. Schmickler LUNCH	
15:00		Lattice Cells	C1	C1	F R E E A F T E R N O N	Low Emittance Machines II	C1		C1	C1	C1	
16:00		B. Holzer RF Measurement Concepts	C2	C2	A F T E R N O N	A. Wolski Linear Accelerators II	C2		C2	C2	C2	
17:00		F. Caspers TEA	TEA	TEA	R E S T A N T	M. Vretenar TEA			TEA	TEA	TEA	
17:30		Discussion Session	C1	C1	O N S T A N T	Seminar Linear Colliders	Poster Session		Seminar Northern Lights	Seminar Norwegian Petroleum Research	Closing Talk	
18:30			C2	C2		E. Adli Dinner			A. Egeland Dinner	M. Landro Dinner	F. Gianotti Dinner	
20:00		Dinner	Dinner	Dinner								
21:30			Discussion Session	Discussion Session					Discussion Session	Discussion Session		

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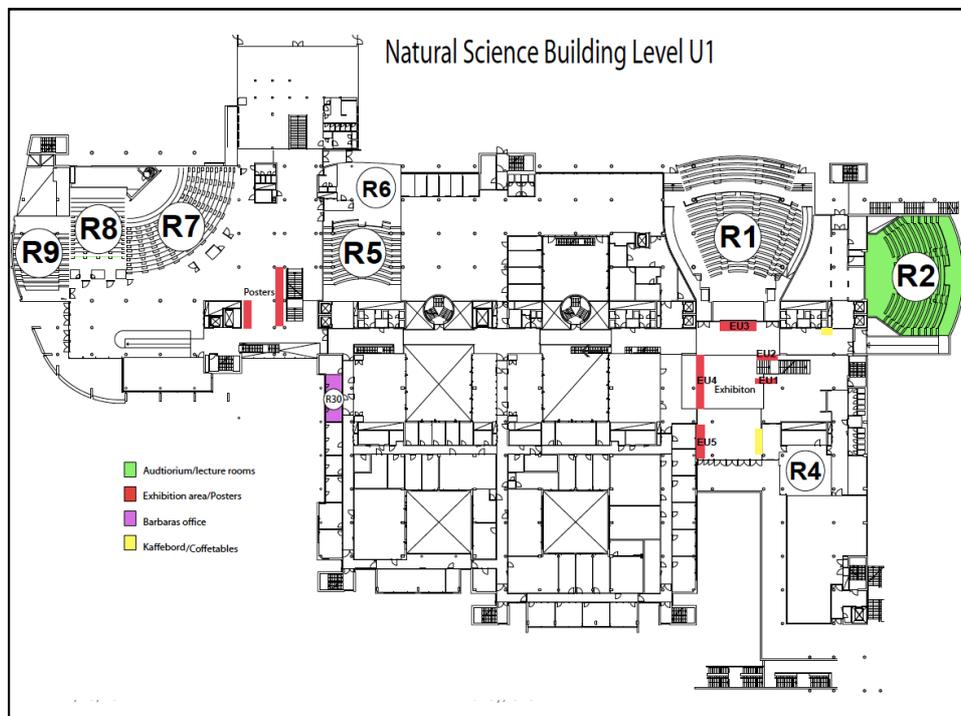
No-lecture periods

- Private Study
 - To work on exercises, wherever you like
- Discussion sessions
 - First one is here
 - Others are in the hotel bar
 - Discuss with lecturers outside the amphitheater
 - Go into detail which is maybe not of interest to all
- Poster session
 - At the university in AU 1-6
 - Mount from Thursday, take down Tuesday
- Seminars in the second week
 - At the university in Auditorium R2
- Free Afternoon
 - Is exactly that
 - If you decide **not to take dinner at the hotel** (after the free afternoon or otherwise) **please let Barbara know** the day before so that we can inform the hotel
- School photo
 - Afternoon tea break on Wednesday 21st

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Exhibition and HR stand

- CERN exhibition
 - Already installed in the University
 - Will remain throughout and beyond the school
- CERN HR stand
 - Will be installed tomorrow
 - Will be manned Tuesday and Wednesday

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Excursion

- Sunday August 25, all day
 - Løkken verk <http://en.oi.no/>
 - Depart by bus at 09.00
 - Trip on old train to the mine
 - Guided tour of mine
 - Lunch at the mine
 - Return to Trondheim by bus

 - We have reserved for everyone !
 - We need to know if you will come or not
 - Please **tell Barbara YES or NO by coffee Wednesday AM**

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WiFi

- WiFi in the hotel
 - Username and password provided by the front desk
 - You will need one for each device
- WiFi in the university
 - Eduroam if you have it
 - NTNU guest
 - The NTNU guest network is for visitors who cannot use Eduroam
 - Note that NTNU guest only gives you limited access to the Internet
 - To connect to NTNU guest
 - Click on the wireless icon on your taskbar
 - Select ntnuguest and click connect (koble til)

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Feedback

- Please, please, please, please
- Give us your feedback on the lectures
- For each lecture (series)
 - Level 1 to 5, 3 is ideal, 4,5 too high, 1,2 too low
 - Content 1 to 5, higher is better
 - Presentation 1 to 5, higher is better

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