

Monday 15th

8:30	Welcome	M. Lewitowicz, Deputy Director
	Administration and Logistics	N. Lecesne
	LA ³ NET	Prof. C. Welsch
9:00	Introduction to Lasers I	Prof. L. Roso
	<ul style="list-style-type: none">• Laser Fundamentals• Optical resonators• Gaussian Beams• Laser Pumping• Multimode lasing	
10:30	<i>Coffee break</i>	

Monday 15th

11:00 **Introduction to Lasers II**

Prof. J. Billowes

Introduction to atomic physics for laser spectroscopy including:

- Line broadening
- Different spectroscopy techniques, incl. non-linear
- The search of ionization schemes
- Hyperfine splitting for isomer selection and nuclear physics measurements

12:00 **Beam Shaping**

Dr Marta Divall

Laser beam transport covering

- Optical transport theory, how to preserve laser parameters
- Experimental feedback on how to handle optics
- High beam power transport, remote control
- Losses, things not to do, some laser safety considerations

13:00 **Lunch**

14:30 **Introduction to accelerators** Prof. C. Welsch Monday 15th

- Brief history of acceleratours
- Electron and ion sources, linear accelerators, synchrotron
- Beam porperties :
 - Equation of motion
 - Concept of beam emittance
 - Beam size, bunch length and other parameters to be measured
- rf cavity/laser analogies

15:30 **Applications of Electron Accelerators – Principles of Free-Electrons**
Prof. A. Gillepsie

- Free electon lasers (FEL) : Basic principles
- Undulators, pnderomotive potential and electron bunching
- Small signal gain
- FEL oscillators and SASE (amplifier) systems
- Longitudinal effects

16:30 ***Coffee break***

17:00 Q&A Prof. L. Roso

Tuesday 16th

8:30 **Characterisation of the laser output** Dr D. Walsh

- What properties are required (for different applications) ? Quality definition.
- Wavelength and spectrum
- Temporal / spatial profile
- Power
- cw / pulsed lasers

9:30 **Laser Ions Sources I** B. Marsh

- Motivation
- Principle
- History
- Case example : The ISOLDE resonance Ionization Laser Ion Source (RILIS)
 - Laser/atom interaction region
 - Evaluating the laser requirements
 - Suitable laser types
 - Laser beam transport and monitoring

10:30 ***Coffee break***

Tuesday 16th

11:00

Laser Ions Sources II

B. Marsh

- Ionization Scheme Development
- Improving Selectivity
- Laser Ion Sources Worldwide

12:00

Laser Acceleration I

Dr A. Irman

- Introduction
- Basic theoretical background :
 - Plasma wave excitation
 - Wavebreaking
 - Electron dynamics in plasma
 - Electron injection method

13:00

Lunch

Tuesday 16th

14:30 **Laser Acceleration II**

Dr A. Irman

- ... *continue elements from first part*
- Recent progress in laser-plasma electron acceleration experiment

15:30 **STUDY SESSION**

split in smaller groups

16:30 **Coffee break**

17:00 **Nonlinear optics for accelerator diagnostics**

Dr D. Walsh

Wednesday 17th

8:30

Beam Diagnostics using lasers I

Dr L. Corner

- Transverse beam profile measurements
- Laser wire scanners
- Quality of incoming beam
- Current limitation/R&D efforts internationally

9:30

Beam Diagnostics using lasers II

Prof. A. Gillepsie

- Importance of longitudinal beam diagnostics in accelerators and advanced light sources
- Longitudinal diagnostics – A comparison of experimental techniques
- Determining the details bunch temporal profiles using electro-optic (EO) techniques
- Laser « metamaterials » processing for EO techniques

10:30

Coffee break

11:00

Seminar on X-ray FEL sources

Dr L. Patthey

Wednesday 17th

- Ultrashort X-ray pulses form FEL light sources
- FEL technology
- Science program at XFEL facilities

12:00

Laser materials

H. Gilles and M. Laroche

- An introduction to solid state laser and fiber laser : what materials ? What wavelength ? Main applications
- Solid state laser :
 - Main properties
 - More common cavity geometries
 - Properties of laser emission (CW, Qswitching, a few words on mode locking, see also ultrashort pulsed lasers)
 - Nd Yag laser
 - Ti:sapphire laser

Wednesday 17th

- Fiber lasers:
 - Main properties
 - More common geometries
 - Fiber laser vs solid state laser
 - Some examples
 - Ti:sapphire laser

- Non-linear optic
 - Fréquency conversion (harmonic generation, Raman...)

13:00 ***Lunch***

14:30 ***Visit GANIL facilities***

21:00 ***CAEN WALKING TOUR BY NIGHT***

Thursday 18th

8:30 **Laser optical clocks and accelerator timing systems**

Dr T. Thakker

- Challenges in ultra-fast timing systems
- Synchronization
- Current state-of-the-art (ideally with facility examples) / future R&D program

9:30 **Optical laser requirements, developments and simulations at the European XFEL**

Dr M. Lederer

- Optical laser requirements and developments for the X-Ray experiments at the European XFEL
- Simulations of fibre and parametric amplifiers
- Other aspects of ultrafast lasers

10:30 ***Coffee break***