



Heriot-Watt University  
Edinburgh, Scotland  
11-21 August 2010



## PROGRAMME

Wednesday 11 <sup>th</sup> August	
12:30 – 18:30	<b>Arrival and Collection of Registration Materials</b> (Heriot-Watt main reception)
18:30 – 19:30	<b>Dinner</b> (Main dining hall)
19:30 – 20:15	<b>Welcome and Opening Remarks</b> ( <i>Prof. Derryck Reid</i> ) Cairn Auditorium, Heriot-Watt Postgraduate Centre <i>This will be the venue for all lectures during SUSSP66</i>
20:15 – 22:00	<b>Wine Reception</b> (Top floor of Postgraduate Centre)

Thursday 12 <sup>th</sup> August	
07:30 – 08:45	<b>Breakfast</b> (Main dining hall)
08:45 – 09:00	<b>Welcome &amp; Orientation</b> ( <i>Prof. Derryck Reid</i> )
09:00 – 10:00	<b>Lecture: Coherent X-Ray Imaging 1</b> ( <i>Prof. Margaret Murnane</i> ) The extreme nonlinear optics of coherent X-ray generation from lasers
10:00 – 11:00	<b>Lecture: Ultrafast Nonlinear Fibre Optics 1</b> ( <i>Prof. John Dudley</i> ) Basics of nonlinear pulse propagation in fibres
11:00 – 11:30	<b>Tea/Coffee</b>
11:30 – 12:30	<b>Lecture: Applications of Ultra-Intense, Short Laser Pulses 1</b> ( <i>Prof. Ken Ledingham</i> ) How intense short pulse laser beams produce beams of electrons, protons, ions & photons
12:30 – 13:30	<b>Lunch</b> (Top floor of Postgraduate Centre)
13:30 – 14:30	<b>Lecture: Femtosecond Frequency Combs and Applications 1</b> ( <i>Dr Thomas Udem</i> ) Frequency comb principles
14:30 – 15:30	<b>Lecture: Ultrafast Laser Refractive Index Modification &amp; Applications 1</b> ( <i>Dr Robert Thomson</i> ) Ultrafast laser inscription in bulk dielectrics – fundamentals and applications
15:30 – 16:00	<b>Tea/Coffee</b>
16:00 – 18:00	<b>Poster Session 1</b> Foyer of Postgraduate Centre Surnames A-J  <i>Note that poster boards are 600 × 900 mm in <u>portrait</u> format</i>
18:00 – 18:30	<b>Free</b>
18:30 – 19:30	<b>Dinner</b> (Main dining hall)
19:30 – 23:00	<b>Social: Quiz night and Nintendo Wii competition</b> (top floor of Postgraduate Centre)



<b>Friday 13<sup>th</sup> August</b>	
07:30 – 08:45	<b>Breakfast</b> (Main dining hall)
08:45 – 09:00	<b>Welcome &amp; Orientation</b> ( <i>Prof. Derryck Reid</i> )
09:00 – 10:00	<b>Lecture: Coherent X-Ray Imaging 2</b> ( <i>Prof. Margaret Murnane</i> ) Lensless imaging at the nanoscale using coherent X-ray beams
10:00 – 11:00	<b>Lecture: Ultrafast Nonlinear Fibre Optics 2</b> ( <i>Prof. John Dudley</i> ) Supercontinuum generation
11:00 – 11:30	<b>Tea/Coffee</b>
11:30 – 12:30	<b>Lecture: Applications of Ultra-Intense, Short Laser Pulses 2</b> ( <i>Prof. Ken Ledingham</i> ) Applications of laser produced particle beams in ion oncology and transmutation of radioactive nuclei
12:30 – 13:30	<b>Lunch</b> (Top floor of Postgraduate Centre)
13:30 – 14:30	<b>Lecture: Femtosecond Frequency Combs and Applications 2</b> ( <i>Dr Thomas Udem</i> ) Frequency comb applications – part 1
14:30 – 15:30	<b>Lecture: Ultrafast Laser Refractive Index Modification &amp; Applications 2</b> ( <i>Prof. Ajoy Kar</i> ) Ultrafast laser inscription of active waveguide devices
15:30 – 16:00	<b>Tea/Coffee</b>
16:00 – 17:30	<b>Guest Lecture: Prof. Wilson Sibbett</b> ( <i>University of St Andrews</i> ) Celebrating ultrashort-pulse lasers
17:30 – 18:00	<b>Free</b>
18:00 – 00:00	<b>Dinner followed by Ceilidh*</b> (James Watt Centre II)  *A traditional Celtic social gathering with folk music & dancing

<b>Saturday 14<sup>th</sup> August</b>	
07:30 – 08:45	<b>Breakfast</b> (Main dining hall)
08:45 – 09:00	<b>Welcome &amp; Orientation</b> ( <i>Prof. Derryck Reid</i> )
09:00 – 10:00	<b>Lecture: Coherent X-Ray Imaging 3</b> ( <i>Prof. Margaret Murnane</i> ) Imaging molecules using coherent electrons and lasers
10:00 – 11:00	<b>Lecture: Ultrafast Nonlinear Fibre Optics 3</b> ( <i>Prof. John Dudley</i> ) Emerging research topics and new applications
11:00 – 11:30	<b>Tea/Coffee</b>
11:30 – 12:30	<b>Lecture: Femtosecond Frequency Combs and Applications 3</b> ( <i>Dr Thomas Udem</i> ) Frequency comb applications – part 2
12:30 – 13:30	<b>Lunch</b> (Top floor of Postgraduate Centre)
13:30 – 15:30	<b>Tutorial Session: Ultrafast Nonlinear Fibre Optics</b> ( <i>Prof. John Dudley</i> ) Practical numerical methods for modelling the propagation of ultrafast pulses  This will be in room EM2.52
15:30 – 16:00	<b>Tea/Coffee</b>
16:00 – 17:00	<b>Lecture: Applications of Ultra-Intense, Short Laser Pulses 3</b> ( <i>Prof. Ken Ledingham</i> ) Future directions for even more intense laser beams
17:00 – 18:00	<b>Lecture: Advances in Ultrafast Laser Sources 1</b> ( <i>Prof. Ursula Keller</i> ) Passive modelocked solid state lasers
18:00 – 19:00	<b>Free</b>
19:00 – 23:00	<b>Barbeque</b> (Chaplaincy)

<b>Sunday 15<sup>th</sup> August</b>	
07:30 – 09:30	<b>Breakfast</b> (Main dining hall)
	<p><b>Free Day</b></p> <p>Chose from the following organised activities*:</p> <p>(a) Coach tour to the Scottish Highlands (£12). Coach will depart from outside the main reception at 14:00</p> <p>(b) Escorted trip into Edinburgh (£3) with optional open-top bus tour (£12) or walk up Arthur's Seat. Meet outside main reception at 14:00</p> <p>(c) Talent night rehearsal (a room in the Chaplaincy will be available all afternoon and evening – sign up sheets for time slots will be in the foyer of the Postgraduate Centre)</p> <p>Or alternatively, do your own thing...</p> <p>A packed lunch is provided in place of lunch in the dining hall. Please collect your packed lunch at breakfast</p> <p><i>* You must sign up for activities by 22:30 on Thursday 12<sup>th</sup> August</i></p>
18:30 – 20:00	<b>Dinner</b> (Main dining hall)

<b>Monday 16<sup>th</sup> August</b>	
07:30 – 08:45	<b>Breakfast</b> (Main dining hall)
08:45 – 09:00	<b>Welcome &amp; Orientation</b> (Prof. Derryck Reid)
09:00 – 10:00	<b>Lecture: <i>Materials Processing Using Ultrafast Lasers 1</i></b> (Prof. Stefan Nolte) Fundamentals of ultrafast micromachining
10:00 – 11:00	<b>Lecture: <i>Nonlinearity and Wavelength Conversion in Fibres 1</i></b> (Dr William Wadsworth) Fibre structures for ultrafast fibre optics
11:00 – 11:30	<b>Tea/Coffee</b>
11:30 – 12:30	<b>Lecture: <i>Advances in Ultrafast Laser Sources 2</i></b> (Prof. Ursula Keller) Semiconductor saturable absorber mirrors (SESAMs)
12:30 – 13:30	<b>Lunch</b> (Top floor of Postgraduate Centre)
13:30 – 14:30	<b>Lecture: <i>Ultrafast Laser Refractive Index Modification &amp; Applications 3</i></b> (Prof. Giulio Cerullo) Optofluidics: Creating microfluidic devices using lasers
14:30 – 15:30	<b>Lecture: <i>Materials Processing Using Ultrafast Lasers 2</i></b> (Prof. Stefan Nolte) Practical aspects of ultrafast micromachining
15:30 – 16:00	<b>Tea/Coffee</b>
16:00 – 16:30	<b>Conference Photograph</b> (Sunken garden) <i>In the event of bad weather, the photograph will be on Thursday 19<sup>th</sup> at 18:30 instead</i>
16:30 – 18:30	<b>FREE</b>
18:30 – 19:30	<b>Dinner</b> (Main dining hall)
19:30 – 21:30	<b>Poster Session 2</b> Foyer of Postgraduate Centre Surnames K-Z  <i>Note that poster boards are 600 × 900 mm in <u>portrait</u> format</i>
21:30 – 23:00	<b>Social: Talent/open mic. night</b> (top floor of Postgraduate Centre)

<b>Tuesday 17<sup>th</sup> August</b>	
07:30 – 08:45	<b>Breakfast</b> (Main dining hall)
08:45 – 09:00	<b>Welcome &amp; Orientation</b> ( <i>Prof. Derryck Reid</i> )
09:00 – 10:00	<b>Lecture: Ultrafast Quantum Control 1</b> ( <i>Prof. Philip Bucksbaum</i> ) Ultrafast control of molecular dynamics
10:00 – 11:00	<b>Lecture: Nonlinearity and Wavelength Conversion in Fibres 2</b> ( <i>Dr William Wadsworth</i> ) Manipulation of pulse duration
11:00 – 11:30	<b>Tea/Coffee</b>
11:30 – 12:30	<b>Lecture: Advances in Ultrafast Laser Sources 3</b> ( <i>Prof. Ursula Keller</i> ) Pulse generation in the one-to-two optical cycle regime
12:30 – 13:30	<b>Lecture: Characterization of Ultra-short Optical Pulses 1</b> ( <i>Prof. Ian Walmsley</i> ) General principles of pulse measurement
13:30 – 14:30	<b>Lunch</b> (Foyer of Postgraduate Centre) During this time there will product exhibitions from the following companies: <i>Thorlabs, Selex-Galileo, Laser Quantum, Time-Bandwidth, Newport Spectra Physics, Venteon, Toptica, Elliot Scientific, M Squared and Coherent</i>
14:30 – 16:15	<b>Industry Focus: Product and Application Presentations</b> ( <i>Selected companies</i> )
14:35 – 14:55	<i>Venteon</i>
14:55 – 15:15	<i>Newport Spectra Physics</i>
15:15 – 15:35	<i>Fastlite</i>
15:35 – 15:55	<i>Coherent</i>
15:55 – 16:15	<i>M Squared</i>
16:15 – 16:45	<b>Tea/Coffee</b> During this time there will product exhibitions from the following companies: <i>Thorlabs, Selex-Galileo, Laser Quantum, Time-Bandwidth, Newport Spectra Physics, Venteon, Toptica, Elliot Scientific, M Squared and Coherent</i>
16:45 – 18:00	<b>Industry Focus: Panel Discussion</b> ( <i>All lecturers</i> ) What lessons have been learned about bringing ultrafast technology to market?
18:00 – 18:30	<b>Free</b>
18:30 – 19:30	<b>Dinner</b> (Main dining hall)
19:30 – 20:15	<b>Industry Focus: The Coherent Scotland Story</b> ( <i>Prof. Allister Ferguson &amp; Dr Chris Dorman</i> )
20:15 – 21:00	<b>Industry Focus: Keynote address</b> by <i>Thomas M. Baer</i> ( <i>President of the Optical Society of America 2009/2010</i> )
21:00 – 23:00	<b>Wine Reception</b> (Top floor of Postgraduate Centre)



<b>Wednesday 18<sup>th</sup> August</b>		
07:30 – 08:45	<b>Breakfast</b> (Main dining hall)	
08:45 – 09:00	<b>Welcome &amp; Orientation</b> ( <i>Prof. Derryck Reid</i> )	
09:00 – 10:00	<b>Lecture: <i>Nonlinearity and Wavelength Conversion in Fibres 3</i></b> ( <i>Dr William Wadsworth</i> ) Wavelength conversion and supercontinuum	
10:00 – 11:00	<b>Lecture: <i>Attosecond Generation and High-Field Science 1</i></b> ( <i>Prof. Jon Marangos</i> ) Measuring attosecond dynamics with intense lasers	
11:00 – 11:30	<b>Tea/Coffee</b>	
11:30 – 12:30	<b>Lecture: <i>Tuneable Ultra-Broadband Pulse Generation &amp; Applications 1</i></b> ( <i>Prof. Giulio Cerullo</i> ) Ultrafast optical parametric amplifiers	
12:30 – 13:30	<b>Lecture: <i>Applications of Ultrafast Lasers in Bio-Medical Imaging 1</i></b> ( <i>Prof. Jeff Squier</i> ) Introduction to multiphoton microscopy	
	<b>Free Afternoon</b> Choose from the following optional activities*: (a) Local hike in the Pentland hills (£5). Coach leaves from main reception at 14:00 (b) Frisbee & juggling. Meet at main reception at 14:30 (c) 5-a-side football (£3). Meet at main reception at 15:00 Or alternatively, do your own thing... A packed lunch is provided today. Please collect this from the Postgraduate Centre foyer at 13:30 * <i>You must sign up for these activities by 14:00 on Monday 16<sup>th</sup> August</i>	
18:30 – 19:30	<b>Dinner</b> (Main dining hall)	<b>A formal dinner for all invited speakers will be held at The Royal Society of Edinburgh</b> Taxis will leave main reception at 18:00
19:30 – 23:00	<b>Film &amp; games night</b> (Chaplaincy)	

<b>Thursday 19<sup>th</sup> August</b>		
07:30 – 08:45	<b>Breakfast</b> (Main dining hall)	
08:45 – 09:00	<b>Welcome &amp; Orientation</b> ( <i>Prof. Derryck Reid</i> )	
09:00 – 10:00	<b>Lecture: <i>Characterization of Ultra-short Optical Pulses 2</i></b> ( <i>Prof. Ian Walmsley</i> ) Survey of common methods and practices	
10:00 – 11:00	<b>Lecture: <i>Applications of Ultrafast Lasers in Bio-Medical Imaging 2</i></b> ( <i>Prof. Jeff Squier</i> ) Techniques in multiphoton microscopy	
11:00 – 11:30	<b>Tea/Coffee</b>	
11:30 – 12:30	<b>Lecture: <i>Tuneable Ultra-Broadband Pulse Generation &amp; Applications 2</i></b> ( <i>Prof. Giulio Cerullo</i> ) Few-optical-cycle pulse generation	
12:30 – 13:30	<b>Lunch</b> (Top floor of Postgraduate Centre)	
13:30 – 14:30	<b>Lecture: <i>Attosecond Generation and High-Field Science 2</i></b> ( <i>Prof. Jon Marangos</i> ) Generating attosecond pulses by high harmonic generation	
14:30 – 15:30	<b>Lecture: <i>Ultrafast Quantum Control 2</i></b> ( <i>Prof. Philip Bucksbaum</i> ) Probing molecules with high harmonics	
15:30 – 16:00	<b>Tea/Coffee</b>	
16:00 – 17:00	<b>Lecture: <i>Materials Processing Using Ultrafast Lasers 3</i></b> ( <i>Prof. Stefan Nolte</i> ) Applications of ultrafast lasers in materials processing	
17:00 – 18:30	<b>Future Directions: <i>Panel Discussion</i></b> ( <i>All lecturers</i> ) What technologies will define ultrafast nonlinear optics in the next decade?	
18:30 – 19:30	<b>Dinner</b> (Main dining hall)	
19:30 – 23:30	<b>Trip to Royal Edinburgh Military Tattoo</b> Coach to city centre departs at 20:00 from main reception.	

<b>Friday 20<sup>th</sup> August</b>	
07:30 – 08:45	<b>Breakfast</b> (Main dining hall)
08:45 – 09:00	<b>Welcome &amp; Orientation</b> ( <i>Prof. Derryck Reid</i> )
09:00 – 10:00	<b>Lecture: Applications of Ultrafast Lasers in Bio-Medical Imaging 3</b> ( <i>Prof. Jeff Squier</i> ) Novel approaches to multiphoton microscopy
10:00 – 11:00	<b>Lecture: Characterization of Ultra-short Optical Pulses 3</b> ( <i>Prof. Ian Walmsley</i> ) Applications and frontiers
11:00 – 11:30	<b>Tea/Coffee</b>
11:30 – 12:30	<b>Private Study Time</b> Feedback forms for the Summer School will also be given out at this time
12:30 – 13:30	<b>Lunch</b> (Top floor of Postgraduate Centre)
13:30 – 14:30	<b>Lecture: Ultrafast Quantum Control 3</b> ( <i>Prof. Philip Bucksbaum</i> ) Probing molecules with ultrafast x-ray lasers
14:30 – 15:30	<b>Lecture: Tuneable Ultra-Broadband Pulse Generation &amp; Applications 3</b> ( <i>Prof. Giulio Cerullo</i> ) Applications of time-resolved spectroscopy
15:30 – 16:00	<b>Tea/Coffee</b>
16:00 – 17:00	<b>Lecture: Attosecond Generation and High-Field Science 3</b> ( <i>Prof. Jon Marangos</i> ) New approaches to attosecond science
17:00 – 18:00	<b>Concluding Remarks</b> ( <i>Prof. Derryck Reid</i> )
18:00 – 19:00	<b>Free</b>
19:00 – 00:00	<b>Summer School Banquet</b> (College Lounge)

<b>Saturday 21<sup>st</sup> August</b>	
07:30 – 08:45	<b>Breakfast</b> (Main dining hall)
10:00	<b>Check-out and Departure</b> Keys should be returned to main university reception. There is a free left luggage service for those with flights/trains later in the day.