Preface

The Scottish Universities Summer Schools in Physics (SUSSP) was established in 1960, and since then there have been 68 schools (up to the end of 2011). A quick glance at the list of past schools indicates just how wide ranging the SUSSP school topics have been, and represents the breadth of research in Physics which continues to be conducted in Scottish Universities.

The 66th school in the SUSSP series (SUSSP66) was held over 10 days at Heriot-Watt University, Edinburgh, Scotland, between the 11 and 21 of August 2010. The topic of the school was the broad area of "Ultrafast Nonlinear Optics", and it consisted of lectures from 14 renowned international experts in this highly research active area. This book consists of 13 contributed chapters, each of which is either authored or co-authored by one or more of the SUSSP66 lecturers or executive committee members.

The field of Ultrafast Nonlinear Optics is broad and multidisciplinary, and encompasses areas concerned with both the generation and measurement of ultrashort pulses of light, as well as those concerned with the applications of such pulses. Ultrashort pulses are extreme events – both in terms of their durations, and also the high peak powers which their short durations can facilitate. These extreme properties make them powerful experimental tools. On one hand, their ultrashort durations facilitate the probing and manipulation of matter on incredibly short timescales. On the other, their ultrashort durations can facilitate high peak powers which can drive highly nonlinear light-matter interaction processes. The chapters contained within this book cover a complete range of topics, both applied and fundamental in nature, within the area of Ultrafast Nonlinear Optics.

Including lecturers, guest lecturers, organisers and students, SUSSP66 attracted 133 participants from 28 countries. This included 14 lecturers, 4 guest lecturers and 115 students. Over the 10 working days of the school, there were 42 lectures, 1 computer laboratory based tutorial session, 2 panel discussions (1 industry focused, and 1 on future directions) and 2 lively poster sessions where students presented 82 posters.

The soliton reenactment team

In addition to the academic-related activities, the packed social programme also formed an important and highly enjoyable part of the school. Students were invited to take part in various activities, such as a trip to the Edinburgh Military Tattoo, a coach tour to the Scottish Highlands, a guided scientific history walk round Edinburgh which culminated in a well-deserved dram at the top of Arthur's seat, hiking in the Pentland hills, a Scottish Ceilidh and a banquet to finish the school. The students also organised a number of social events themselves – including a commendable attempt by a small band of enthusiastic students to reenact the first observation of a soliton – made by John Scott Russell on the Union Canal nearby the Heriot-Watt University Riccarton Campus (see picture above). The SUSSP66 executive committee sincerely thank Ruth Livingstone and Tobi Lamour for coordinating the social programme – their considerable effort was a key to its success. The executive committee also thank the numerous post-graduate students from the Physics Department at Heriot-Watt University for helping with the social events.

The executive committee are also extremely grateful to the SUSSP66 sponsors: the Scottish Universities Physics Alliance (SUPA), the UK Engineering and Physical Sciences Research Council (EPSRC), the European Physical Society (EPS), the Institute of Physics (IOP) – Quantum Information, Quantum Optics and Quantum Control group, the IOP – Quantum Electronics and Photonics group, the Atomic Weapons Establishment (AWE), Innolume, Venteon, Toptica, Thorlabs, Philips, Coherent, Molecular Machines and Industry (MMI), the James Watt Institute for High Value Manufacturing, Elliot Scientific, Stratton Technologies, Time-Bandwidth, M-Squared Lasers, the Royal Society of Edinburgh, Newport, Spectra-Physics, the European Office of Aerospace Research and Development, the Air Force Office of Scientific Research, the United States Air Force Research Laboratory, the Scotland-Stanford Universities Partnership (SU2P), the Scottish Universities Summer Schools in Physics (SUSSP), the Scottish chapter of the IEEE Photonics Society, Selex-Galileo, Taylor and Francis, Fastlite, Laser Quantum, the Optical Society of America (OSA), Fast-Dot and Alcatel-Thales.

The executive committee hope that this book will act as part of a lasting legacy of an extremely interesting and fulfilling school, where participants not only expanded their knowledge, but also formed lasting friendships and networks.

Edinburgh, January 2012 Robert R. Thomson

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