Feature issue - Femtosecond Lasers and Ultrafast Phenomena
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Feature issue

Femtosecond Lasers and Ultrafast Phenomena

Foreword

The first picosecond laser pulses were obtained over 20 years ago. They brought new impetus to the field of nonlinear optics. More recently developed technology for the production of femtosecond pulses hastened the propagation of this impetus to other related fields of research such as solid state physics, molecular physics, chemical reactivity, biology etc. Unexplored areas of ultrafast phenomena have been opened up to direct measurement. New applications of ultrashort pulses have appeared in optoelectronics, communication and computer technology. The reciprocal effect of technical progress in ultrashort pulse generation and theoretical progress in the analysis of ultrafast light-matter interaction has permitted rapid advances in the race for the shortest and most powerful pulses. Pulses of less than $10^{-14}$ s (only 3 to 4 periods) have been reported recently, as well as pulses with power in the neighbourhood of $10^{15}$ W.

In parallel with these foremost developments we note the use of subpicosecond sources in an increasing number of laboratories, some tens in the world today. This has already resulted in the apparition of new research methods and centres of interest, such as real time measurement of low frequency molecular vibrations, study of femtosecond processes without the help of ultrashort pulses, ultrahigh field irradiation...

This special issue of invited papers contains recent results and reviews illustrating some present-day topics. It begins with papers on characterization and shaping of ultrashort pulses and the study and development of lasers and amplifiers for ultrashort pulses. Then follow papers concerning the study of ultrafast phenomena. The excellent response to invitations shows that this non-specialized Journal can continue to play its chosen part as an international forum for the exchange of information on the study and production of ultrafast events and their applications in various domains.

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