Invited speaker

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Ultrafast science with sub-femtosecond X-rays

Abstract

X-rays with sub-femtosecond duration are a key tool for future ultrafast probes of matter. The challenge is not only to generate photon pulses of this ultrashort duration but also to develop measurement methodologies that enable the high temporal resolution even in condensed phase systems. X-ray spectroscopy is a promising route that we are investigating using both HHG based and XFEL based sources. I will discuss our recent work on using HHG driven by 800 nm and 1800 nm CEP stable few cycle sources to generate sub-femtosecond pulses from the VUV（20 eV）[1] to the SXR（600 eV）[2], and measurements that have so far been undertaken with these sources[3][4]. This will be compared with recent work at the LCLS that we have undertaken to develop ultrafast X-ray measurement methods[5][6].

References

[1] D.Fabris et al, Nature Photonics, 9, 383（2015）.

[2] A.S.Johnson et al. submitted（2017）.

[3] A.S.Johnson et al, Structural Dynamics, 3, 062603（2016）.

[4] T.Barrilot et al, Chemical Physics Letters, 683 38（2017）.

[5] C.E.Liekhaus-Schmaltz et al, Nature Communications, 6, 8199（2015）.

[6] A.Sanchez-Gonzalez et al, Nature Communications, 8, 15461（2017）.

About the Author

Jon Marangos has been the Lockyer Professor of Physics at Imperial College London since 2002. He is Director of the Blackett Laboratory Laser Consortium at Imperial College which is a research group investigating the science of extreme light: attoseconds, high fields, high intensity X-rays. From 2008-2010 he led the UK STFC New Light Source Project that developed a conceptual design for a high repetition rate X-ray FEL and since then he has been active in FEL science using facilities in the USA, Germany and Japan. From 1995-2000 he was an EPSRC Advanced Fellow that enabled him to develop research collaborations at NIST, Gaithersburg, where he was a Guest Researcher in 1991, and at KEK, Japan, where he was a Visiting Professor at the University of Tokyo applying lasers to muon science. He remains active in developing the next generation of methods for measuring ultrafast structural dynamics in matter with special current interest in polymer optoelectronics, gas and liquid phase photochemistry, attosecond processes in molecules and at surfaces.