



The Royal Society
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RSWA Monthly Talks

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Light: a spectrum of opportunities

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Monday 21st March 2016

7.00 pm Kings Park Administration Building, Fraser Ave

Light surrounds us in our daily life. On the most fundamental level, through photosynthesis, light is necessary to the existence of life itself. Light phenomena, like a sunset or a rainbow, are not only beautiful and breathtaking, they also enticed humans to discover the nature of light and harness its power by manipulating it in the field of optics and photonics. This pursuit gave rise to some of the most interesting and controversial theories in science, e.g. the wave/particle duality of light, and useful and widespread technologies, e.g. the laser, just to name a couple.

Optics and photonics have become key enabling technologies of the future. Their many applications have revolutionized society in various fields, such as healthcare, communications, environment, defence and security, manufacturing, energy, science, arts and entertainment. Photonics products and components can be found everywhere: in medical instruments, broadband internet networks, barcode scanners, DVD players, cameras, remote sensors, laser cutting, welding and machining systems, electronic circuit production, solar panels, microscopes, telescopes, lighting systems and laser scanners. Businesses in the field of photonics and light-based technologies work on providing solution to key challenges in our society. Photonic technologies have major impact on the world economy with a current global market of 180 billion AUD and projected market value of over 400 billion AUD in 2020.

This talk will introduce light in our everyday experience, and then zoom in into the physical nature of light. It will uncover the various steps through history that allowed mankind to make use and even create light, in some cases, as for the laser, as a solution in search of a problem. The breadth of applications that light-based technologies have found since will be shown in detail, also with references to the speakers' research activities. In conclusion, the effort to promote awareness and use of photonics technologies around the world by initiative, such as the UNESCO International Year of Light, will be presented, with a specific focus to the activities organized in Western Australia.

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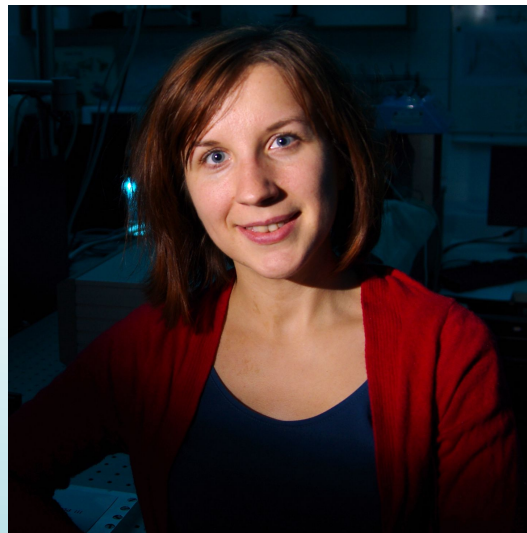
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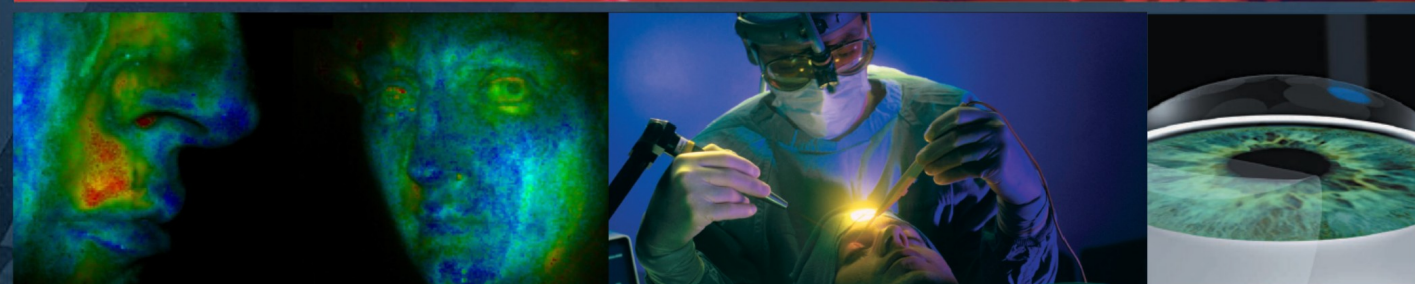
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Biography

Dr Danuta Bukowska



Danuta Bukowska graduated from the Nicolaus Copernicus University (NCU) in Torun, Poland with a PhD in biophysics in 2014. Dr Bukowska's PhD was undertaken in the Optical Biomedical Imaging Group led by a leading researcher in optical coherence tomography (OCT), Professor Maciej Wojtkowski. The aim of her thesis was to understand the influence of light-tissue interactions on blood flow measurement based on spectral-domain optical coherence tomography (SdOCT). Dr Bukowska has had a unique opportunity to participate in spectral-domain OCT technique development, working on the design and construction of a range of OCT setups and data processing schemes. Her research interests have focused on structural and functional imaging of the human retinal capillary network, blood flow in microfluidics devices, and brain vasculature imaging in mice. Since October 2014, she has been employed full time as a Research Associate in the Imaging & Informatics Group and the Lions Eye Institute (LEI) in Perth, Western Australia. The main objective of her present work is design and development of methodology for data visualisation and analysis. Since 2009, Dr Bukowska has been also strongly engaged in enhancing student involvement in optics. She has been involved in outreach projects aimed at raising general public interest in physics by organising various workshops, lectures and hands-on activities and demonstrations.





Biography

Andrea Curatolo



Andrea Curatolo is a PhD researcher in the Optical+Biomedical Engineering Laboratory at the University of Western Australia, led by Professor David Sampson. Andrea is currently working on an advanced 3D imaging technique, called optical coherence tomography (OCT). His work includes diagnostic imaging systems engineering design, technology development and supervision of endoscopic and interstitial OCT imaging system prototypes deployed in clinical settings, for pulmonary and oncology applications. His PhD thesis focuses on the design of tissue-simulating objects and on the analysis and use of different laser beams for improving OCT imaging in biological tissue and optical elastography. He is also active in the study of image formation in the context of coherent imaging modalities and intrinsic noise – the speckle phenomena, with a number of publications, including a book chapter.

His background is in photonics, having completed his MSc in 2006 in physics engineering at Politecnico di Milano, Italy, with a thesis on the development of a portable multispectral imaging system for works of art diagnostics. He attended the first year of his master's degree at the Institute of Technology (LTH) in Lund, Sweden. He is the current president of the UWA student chapter of the Optical Society, one of the major international professional associations of optical engineers and scientists.

