ELI-NP SCIENTIFIC SEMINAR

06/12/2022, 11:00 a.m.

ELI-NP Big Conference Room

Plasma photonics using high power lasers as a basis for new technologies

Professor Dino Anthony Jaroszynski - University of Strathclyde, Glasgow, United Kingdom

Abstract

In this talk we will present interesting new experimental and theoretical work on creating one, two and three dimensional plasma structures using the regular structures of high fields produced by colliding laser beams in gas and plasma. These volume Bragg structures have many interesting properties, which include spatially and time dependent birefringence and time boundaries. They can be formed into very robust time dependent optical elements such as wave-plates, lenses, mirrors, amplifiers and diffraction gratings. The talk will focus on recent experimental and theoretic studies by the Strathclyde group and collaborators, which show great promise in contributing to the development of next generation lasers, accelerators and radiation sources.

A brief biography of Professor Dino Anthony Jaroszynski

Professor Dino Anthony Jaroszynski was born in Helsinki Finland and grew up in South Africa before settling in the UK to complete his studies and commence his academic career. He was awarded BSc Honours and PhD degrees in physics by the University of Manchester. He then worked at Heriot-Watt University and a number of well-known European laboratories on free-electron lasers (FELs) before taking up a permanent position at the University of Strathclyde. Over this period he established an international reputation and made several significant advances in the field of collective radiation-matter interactions and FELs, a theme that still dominates his current activities. He is passionate about applying new technologies derived from advances in physics and set up the Scottish Centre for the Application of Plasma-based Accelerators (SCAPA), which promotes a two-way engagement between scientific ideas arising from research and their commercial output. He sees no contradiction between “blue skies” research and the application of scientific knowledge for the benefit of society. SCAPA is a new user facility comprising several lasers and shielded “bunkers” with beamlines. SCAPA provides state-of-the-art research tools including a 40 TW at 10 Hz, 350 TW at 5 Hz and 0.1 TW at 1 kHz laser beams for the study of high-field, ultra-short pulse radiation-matter interactions. He set up and leads a project, Advanced Laser Plasma High-energy Accelerators towards X-rays (ALPHA-X), to investigate laser-plasma acceleration and applications as a compact light sources. ALPHA-X made several pioneering advances: e.g. controlled particle acceleration using laser-driven plasma waves and a compact synchrotron source based on a laser-plasma accelerator, which could revolutionise the way science is done. He was first to propose using laser-plasma accelerators for ultra-compact FELs. He has broadened his research interests to investigate the creation of regular plasma structures and study their optical properties and their potential as ultra-compact radiation sources.

He is also interested in the interface between art and science – and promoting the public engagement with science. He set up a project engaging physicists and artists, a poet and a photographer, to reflect the world of the scientists through the eyes and language of artists.