

Project title: Automation of high repetition rate high-power lasers for industrial applications

Supervisor(s):

Academic supervisor: Prof. Gianluca Sarri

Industry supervisor: Dr. Antoine Corjaud, Amplitude Technologies

Email contact: g.sarri@qub.ac.uk

Helpful existing knowledge: 1st or 2:1 BSc or MSci degree in physics or related subjects

Funding status: final confirmation of funding expected by the end of November

Closing date: TBD

Project description: the studentship is 3.5 years in duration with an enhanced stipend of additional £ 5,000 per year, training support grant of £ 5,000 per year, and a bespoke training programme designed with the industrial partner. The expected starting date is the first of October 2026.

The School of Mathematics and Physics is building the first facility in the UK that will provide a high-power (10 TeraWatt) and high repetition rate (100 Hz) laser system to academic and private sector users. The facility, funded by the EPSRC, is designed to deliver a wide range of laser pulses and laser-driven secondary sources (e.g., electrons, x-rays, gamma-rays, positrons) with unique characteristics for several novel applications in healthcare, material science, manufacturing, and fundamental science. For example, they can provide high-resolution radiography and tomography of electronic components and biological samples, identification of nanometre-scale defects in advanced components, and a precise treatment and manipulation of advanced materials.

The laser, supplied by Amplitude Technologies, will be operational in January 2027. The successful candidate will join an interdisciplinary team of academics and industrial partners to develop these sources for applications and ensure full automation of the system using machine-learning techniques. The student will develop a set of highly transferrable skills directly applicable in both academic and industrial settings. These include a) expertise in AI methods for the automation and live characterisation of forefront technology for industrial applications, b) advanced expertise in optics, plasmas, and radiation, and c) first-hand experience in working closely with a large-scale industrial partner.