Queensland Micro- and Nanotechnology Centre

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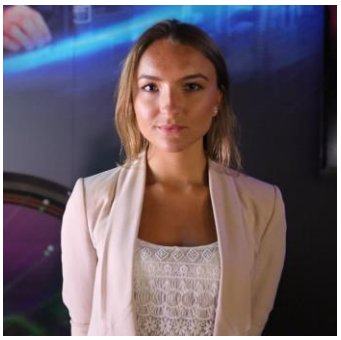
Speaker: **Dr Ceri Brenner**
2018 AIP Women in Physics Lecturer



Date: Thursday 16 August 2018

Time: 1.00 pm

Venue: Room 0.04 Science 2 (N34) Nathan Campus

Title: **Dream beams from micro targets: laser-driven accelerator technology for medical, nuclear and aerospace applications**

Abstract:

The most powerful lasers in the world can be used to drive super-strength, micro accelerators that give off bright pulsed beams of x-rays, electrons, ions and neutrons. In partnership with industry the community is developing this next generation technology for imaging and inspection applications in medicine, aerospace, and nuclear. Micro and nano target fabrication is one of the key enabling technologies for this innovation, as complex structures and techniques are necessary to optimise the extreme laser-matter interaction. Examples include low-density foams, sub-micron thickness electroplated metallic foils, < 1 um bond lines, and < 90 nm thick polymer foils. The Central Laser Facility's target fabrication group and spinoff company SciTech Precision combine expertise in micro-assembly, micro-engineering and laser machining with extensive insight into the physics behind high power laser science. With the recent delivery of 10 Hz repetition rate lasers at petawatt power, using these dream beams for societal impact and industrial solutions is just around the corner.

Brief Biography:

Ceri is developing an innovative approach to advanced imaging and through-barrier inspection using next-generation accelerator technology driven by high power lasers that is being championed in the UK by companies in aerospace, nuclear, advanced manufacturing, defence and healthcare sectors. High-power lasers can drive teravolt/metre accelerating gradients in micro-sized structures opening up a new generation of accelerator technology that is highly flexible, tunable and responsive in the particle or photon species it generates. The laser-driven approach to generating bright, highly-transmissive pulsed beams of x-rays and neutrons is in development for fast scan rate, high resolution 3D imaging of large dense objects. Conventional technology typically achieves either high resolution or penetrating power or fast scan rate, but only one of these figures of merit at a time. The laser-driven concept can even be used to generate complimentary beams for advanced inspection such as positrons for detecting atomic-scale defects in materials or neutrons for creating isotope and element maps active interrogation. Ceri is working collaboratively with the UK university community to demonstrate what these beams can do for industry and is developing the fundamental laser-matter interaction physics behind them so that they are optimised and fit for purpose. Her industrial collaborations include the UK's Defence Science Technology Laboratory, the UK's High Value Manufacturing Catapult centres, Nuclear Advanced Manufacturing Research Centre, Rolls-Royce and Sellafield Ltd.

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ALL WELCOME