

# Lasers: Making Light Work

## 2023 AIP Einstein Lecture



MACQUARIE  
University

### Speaker

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#### David Coutts



Professor David Coutts is Deputy Dean Research & Innovation in the Faculty of Science and Engineering, Professor in the School of Mathematical and Physical Sciences, and Co-founder of Redback Systems. David was Director of the MQ Photonics Research Centre from 2016-2018 and Head of the Department of Physics and Astronomy from 2009 to 2012. His research expertise includes building new types of laser and developing technologies to change the colours and properties of lasers, using one laser to make another laser work. Applications he has investigated include drilling tiny holes in metals, measuring complex fluid flows to calibrating instruments used to detect planets orbiting other stars.

### Abstract

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Lasers are a ubiquitous technology that were once seen by some as curiosity - a proverbial solution in search of a problem. Built upon concepts first proposed by Einstein 107 years ago and realised by Maiman 44 years later who built the first ever laser, today lasers come in a bewildering variety of types and are used everywhere from the medical centre to the machine shop. There seems to be no end of problems they can solve.

Lasers enable light to be produced and manipulated in extraordinary ways – they produce the shortest events that we can control (less than a millionth of a billionth of a second). They enable the most precise measurements (such as measuring distances to better than one thousandth the width of a proton). When focused to a small spot, they can deliver enormous powers into a tiny volume that can tear apart atoms. They enable us to communicate effortlessly across the globe by encoding voice and data on pulses of light travelling in glass fibres as thin as a strand of hair.

In this talk, illustrated by multiple practical demonstrations we will explore how lasers work and explore some of the amazing things that can be done with them.