**Femtosecond optical parametric oscillators and frequency combs**

Since Burneika’s first demonstration in 1972 of a synchronously pumped optical parametric oscillator (OPO), this technology has evolved and matured considerably, opening applications in multiple areas of sensing and metrology. In this presentation I will begin by introducing the concepts underpinning femtosecond OPOs, describing various architectures operating from the near- to mid-infrared. Part of this discussion will include an introduction to modelling femtosecond OPOs using numerical simulations. I will then move on to describe the fundamental principles of phase control, on which the development of singly- and doubly-resonant OPO frequency combs is based, presenting examples of practical embodiments of such combs, and discussing in detail several applications, including spectroscopy, metrology, quantum computation and astrophotonics.