Combing for New Quantum Sensors
Professor Andre Luiten
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Date: 20th June 2018, Wednesday
Time: 11:00am to 12:00pm
Venue: Hilbert Space (SPMS-PAP-02-02)
Host: Asst Prof Lan Shau-Yu

Abstract
The subject of the 2005 Nobel Prize, the optical frequency comb, is driving a revolution in spectroscopy, optical frequency synthesis and optical frequency measurement. What was once very difficult has now become routine. We are using frequency combs to simultaneously obtain high-resolution spectral and temporal information in a single measurement. This is highly useful in providing a deep understanding of complex phenomena where such complete information can be indispensable. I will provide a few examples in which we have used a mode-locked laser comb to deliver measurements of molecular and atomic gases to obtain quantitative measurements of composition, or use it an accurate sensor of some other property of interest (temperature, magnetic field). We have also built combs based on electro-optical modulation of continuous-wave lasers and used heterodyne detection to measure the complex transmittance in atomic gases that are evolving in time. This allows us to see the complex dynamics of saturation spectroscopy and precession in magnetic fields of Rb gas.

Short Biography
Andre is Director of the Institute for Photonics and Advanced Sensing (IPAS) and Chair of Experimental Physics at the University of Adelaide. The institute consists of an inter-disciplinary team of 220 personnel that aims at using new sensing paradigms to deliver solutions for industry, health and defence. As head of IPAS, Andre has driven an increase in industry engagement and commercialisation - more than 40% of the income is now derived from industry-connected grants, while 3 of the institute’s spin-outs in the last 18 months have had sales or attracted multi-million dollar investment. Andre’s own research work aims at developing state-of-the-art instruments across many diverse fields of physics. Over his career he has authored over 115 journal papers, raised over $20M for research, and supervised 15 graduate students - two of whom won Fulbright and Rhodes scholarships. Andre is also the co-founder of a company, Cryoclock Pty Ltd, that is commercializing the high performance oscillators that he has developed in his research.