PURDUE UNIVERSITY

Purdue Quantum Science and Engineering Institute

Dr. Ben Sparkes

The University of Adelaide

Ben Sparkes obtained his PhD in Physics from the Australian National University in 2013, where he developed techniques to store and manipulate optical quantum information. In 2013 he moved to the University of Melbourne to work on the development of a cold atom electron/ion source, aiming to create ultra-short ultra-bright bunches of electrons for single-shot diffraction imaging of biological samples, as well as focused ion beams for sub-nanometre resolution fabrication. He was awarded a McKenzie Fellowship from the University of Melbourne from 2014-2016, which allowed him to investigate novel methods to improve the source performance.

In 2017, Ben Sparkes was awarded an Australian Research Council DECRA Fellow to join the Precision Measurement Group at the Institute for Photonics and Advanced Sensing, University of Adelaide working towards realising a fibre-based optical quantum information network for absolutely secure communications and next-generation computing. He is excited to be spending 3 months with the Gaeta group at Columbia University of a Fulbright Future Scholarship.

"Towards Quantum Information Processing with Atom-Filled Hollow-Core Fibres"

Thursday, September 12, 2019
10:00 – 11:30 a.m.; BRK 1001

Quantum information networks will deliver the capability for long-distance, provably-secure communications via quantum key distribution, as well as optical quantum computing. Our work aims to provide components for these quantum networks: our specific design makes use of hollow-core photonic crystal fibres (HCPCFs) filled with rubidium atoms. The tight transverse confinement (diameter of tens of microns) and extended interaction lengths (centimetres) of the HCPCFs provides an extremely optically dense medium, ideal for efficient quantum information storage and for achieving strong atom-mediated photon-photon interactions.

I will present results from our experiments aiming for efficient, coherent and noiseless storage of high-bandwidth optical pulses in warm rubidium-filled HCPCFs using the off-resonance cascade absorption (ORCA) technique. We have also recently demonstrated the ability to load a record number of laser-cooled atoms into a hollow-core optical fibre and I will present our latest results towards achieving high efficiency, long-lived storage.

Host: Mahdi Hosseini (mh@purdue.edu)

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