There and Back Again: Demonstration and Future of an Optical Atomic Clock Beyond the Laboratory

E. J. Ahern[a], J. W. Allison[a], C. Billington[a], J. Ginges[c], J. Gray[b], N. Bourbeau Hebert[a], R. Hamilton[b], G. Harris[b], A. P. Hilton[a], I. Hodgen[b], E. Klantsataya[a], C. Locke[a], A. N. Luiten[a,b], M. Nelligan[a], S. Ng[b], T.-L. Nguyen[b], M. O'Connor[b], R. F. Offer[a], C. Perrella[a], B. Roberts[c], J. Scarabel[b], **S. K. Scholten**[a], G. Sylvia[a] and B. White[a].

[a] *Institute for Photonics and Advanced Sensing, The University of Adelaide, Adelaide, SA 5005, Australia.*

[b] *QuantX Labs, Lot Fourteen, Adelaide, SA 5000, Australia.*

[c] *The University of Queensland, St Lucia, QLD 4072, Australia.*

**Authors presented alphabetically, presenting author in bold.*

Abstract: Optical atomic clocks combined with the proliferation of compact optical frequency combs, offer higher inherent timing stability versus their current microwave counterparts. We detail the development and demonstrations of our portable optical atomic clock technology with bespoke comb outside the laboratory under rugged conditions, and outline future directions.

Biography: Dr Sarah Scholten completed her PhD on high-resolution molecular spectroscopy with an optical frequency comb in 2019. Continuing to utilize combs for molecular spectroscopy for medical breath analysis, Sarah also began working at the Institute for Photonics and Advanced Sensing at the University of Adelaide on a dual-colour rubidium optical clock with integrated mini-comb. Sarah has been a key player in the development and performance improvements of this clock, transitioning it from a firmly lab-based device into a reliable, robust, and portable tool that has seen successful out-of-lab demonstrations at both national and international levels under challenging conditions.