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Quantum sensing and timing: a sense of what is to come

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Abstract

The realisation of the ability to control atoms at the quantum limit has opened prospects from fundamental physics to practical applications. It has enabled a range of precision sensing capabilities for measurements including inertial effects such as gravity and rotation, electromagnetic fields and time. Over the last decade, major strides have been realised in bringing these capabilities from the laboratory to field applications. The UK Quantum Technology Hub in Sensors and Timing has driven translation of quantum devices to field-ready instruments that can demonstrate capability relevant to sectors including healthcare, infrastructure, transport, navigation and security. This talk will introduce the physics behind these quantum sensors and present an overview of our activities in moving this science into technology. It will include discussion on recent field trials, including in healthcare and civil engineering settings, and on mobile platforms such as trains and ships at sea - showing that a range of quantum sensor technologies are ready for near-term exploitation. The next step is addressing the critical barriers to adoption of quantum sensors at scale, which is the focal point of a new upcoming Quantum Hub. The talk will provide a short overview of the new hub, which aims to ensure quantum sensing, imaging and timing deliver their best for society.