

In the news

THE RIGHT SENSOR FOR THE JOB



Quantum sensors — devices that make precise measurements by taking advantage of quantum effects — are a growing business. In December, 200 researchers met in Paris for the International Conference on Quantum Metrology and Sensing, to discuss how to push the limits of what can be measured and keep moving quantum sensors towards practical applications.

The conference brought together researchers from different communities and covered topics including atomic clocks, sensors based on nitrogen–vacancy centres in diamond, devices based on optomechanical effects and quantum-based measurement standards for the new SI units.

An important theme throughout the week was the question of how to push measurements past quantum limits, that is, how to use tricks to overcome error sources such as vacuum fluctuations or measurement back action. For instance, Vladan Vuletić of MIT discussed new results on spin squeezing — exchanging uncertainty in one spin component for another — for atomic clocks.

In practice the best quantum sensor may not always be the most precise, and there are other ways to improve quantum sensors so that they find new industrial applications. The programme included talks on sensors such as gravimeters and magnetometers in challenging environments ranging from oil rigs to the human body. In these cases, the best sensor may be the one that remains useable at higher temperatures, for instance.

This point also came through in a roundtable session on industrial applications of quantum sensors. As was pointed out by Quan Li of the Chinese University of Hong Kong, “Every technology has different figures of merit that are relevant for different applications. For a new device to be promising, you need to have a problem it will solve.” The roundtable panellists agreed that continued interaction between researchers in all sectors was needed to uncover these problems and their solutions. They were also optimistic that links between academia and industry are only getting stronger.

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