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Quantum control for improved metrology

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The success of quantum-enhanced sensors relies on precise control of the experimental system to protect them from undesired sources of noise. Unfortunately, simple application of known strategies to reduce decoherence does not necessarily translate into an improvement of phase measurements: the techniques –such as dynamical decoupling – that eliminate decoherence also eliminate the very signal that one wishes to measure. In this talk I will show how we can extend control techniques to achieve a better and more flexible compromise between sensitivity and noise protection. In addition I will present a novel approach to reconstruct the arbitrary profile of time-varying fields using coherent control of quantum sensors to simultaneously extract information about external fields and correct for unwanted noise sources.