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Quantum-enhanced technologies in the presence of noise

Quantum technologies hold the promise to exploit quantum coherence and entanglement for enhanced performance e.g. in communication and metrology. However, quantum-enhanced schemes designed for idealized, noise-free scenarios often turn out to offer diminishing benefits in realistic situations when imperfections are taken into account. This leads to questions about the ultimate performance of quantum technologies in the presence of noise and their practical realizations. We discuss these issues using as an example our recent work on quantum-enhanced interferometry and effects of dephasing in classical coherent communication.