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Evading Quantum Noise in Macroscopic Systems

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Any sensing device will –if it is sufficiently perfected with regard to reducing technical noise –eventually face the obstacle of quantum noise, which can be seen as a ubiquitous consequence of Heisenberg's Uncertainty Principle. Today, a surprising variety of systems have reached this quantum-limited regime, prompting the question of how to improve the sensitivity further. Here, I will describe how quantum noise can and has been evaded in the macroscopic, quantum-limited atomic-spin and mechanical systems investigated in the Quantop lab, with current work pointing towards applications in gravitational wave detection. Turning the focus to magnetic field sensing, I will detail the potential of our atomic vapour magnetometers for biomedical application

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