

The quantum limits on magnetic resonance searches for axion-like dark matter

Wednesday 10 August 2022 12:10 (20 minutes)

Magnetic resonance is a versatile tool for searching for axion-like dark matter. CASPEr is one example of this approach. I will focus on the quantum limits on the sensitivity of magnetic-resonance-based searches, emphasizing the importance of evading back action on the spin ensemble from the sensor used to detect its dynamics [1]. I will also discuss schemes that have potential for achieving sensitivity beyond the spin projection noise limit, and their experimental feasibility.

[1] Aybas, D., Bekker, H., Blanchard, J., Budker, D., Centers, G., Figueroa, N., Gramolin, A., Kimball, D. F., Wickenbrock, A., Sushkov, A. O., “Quantum Sensitivity Limits of Nuclear Magnetic Resonance Experiments Searching for New Fundamental Physics.” *Quantum Science and Technology* 6(3), 034007 (2021).

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Session Classification: Contributed talks