

Detection of nuclear decays with levitated mechanical quantum sensors (40+10)

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The development of optomechanical systems—in which the motion of a massive object is controlled and measured using light—has revolutionized the detection of tiny forces over the past few decades. As such technologies reach, and even surpass, quantum measurement limits, they can enable the detection of tiny forces relevant in nuclear physics. I will present results from a recent proof-of-principle measurement that demonstrate that the force imparted by a single nuclear decay occurring within an optically levitated, dust-sized particle can be detected. Future applications of this work to nuclear safeguards and reconstruction of neutrinos emitted in beta decays will be described.

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