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Nested Trampoline Optomechanical Systems MATTHEW WEAVER, Univ of California - Santa Barbara , FRANK BUTERS, HEDWIG EERKENS, Leiden University, BRIAN PEPPER, Univ of California - Santa Barbara, GESA WELKER, KIER HEECK, SVEN DE MAN, Leiden University, DIRK BOUWMEESTER, Univ of California - Santa Barbara, Leiden University — Recently there has been much interest in isolating mechanical systems from the environment to increase coherence times in optomechanical systems. One technique is to use phononic crystals for isolation, but at low frequencies such crystals become prohibitively large. A nested resonator can produce 40 dB of isolation from the environment. We demonstrate such a nested resonator design with an extension of trampoline resonators. This design provides reliable quality factor, a critical parameter for testing quantum mechanics in large mass systems. Another challenge in optomechanics is controlling the amplitude of mechanical motion of an oscillator. By scanning the detuning of a laser with respect to an optomechanical cavity resonance, we access many states within an optomechanical attractor diagram. Our system passes through a point of bistability, which has been proposed as a sensitive force sensing technique.

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