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Microwave cavity study for Anapole measurement in francium[1]
JONATHAN HOOD, DONG SHENG, LUIS OROZCO, Joint Quantum Institute, NIST and University of Maryland — We present a detailed study of the mode structure and diffraction loses of a microwave spherical resonator using analytical and numerical methods. The resonator is an essential part of the apparatus to measure the anapole moment in francium [1]. The sensitivity of the measurement to polarization, alignment, and mode purity requires a study beyond the well-established paraxial methods. Our studies have found regions of parameter space where it is possible to satisfy the experimental requirements. Investigations of the coupling mechanisms of the radiation into the cavity point towards quasi-optical methods that can suppress the existence of traveling waves to acceptable methods.

[1] E. Gomez, S. Aubin, G. D. Sprouse, L. A. Orozco, and D. P. DeMille, "Measurement method for the nuclear anapole moment of laser-trapped alkali-metal atoms," Phys. Rev. A **75**, 033418 (2007).

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