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Measurement scheme for a ground-state parity non-conserving (PNC) measurement in a cesium atomic beam via two-pathway coherent control. JUNGU CHOI, DAN ELLIOTT, Purdue Univ, ELLIOTT'S LAB TEAM — We present a detailed analysis of an experimental setup for parity non-conserving (PNC) measurements in a cesium atomic beam. We employ a parallel-plate transmission line (PPTL) structure and highly reflective cylindrical mirrors to form a microwave cavity resonator to excite the PNC transitions in the cesium hyperfine ground states. In addition, a variable external dc field is applied to observe the Stark-induced transition, which would interfere with the PNC transition as the dc field amplitude changes. Finally, strong Raman lasers are used to excite the ground hyperfine transition. The Raman fields interfere with the weak transitions, and by varying the phase difference between the Raman fields and the microwave fields, we would infer the weak transition amplitudes from the signal modulation. The experimental setup requires maintaining coherent phase relations between all fields, well-characterized dc and rf field patterns, the two co-propagating Raman lasers, and suppression of the magnetic dipole contribution. Our analysis of the field modes supported by the PPTL structure indicates that with a moderate rf power and a few tens of seconds of data collection time, the PNC measurement of less than 3% uncertainty would be feasible.

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