Abstract Submitted
for the FWS17 Meeting of
The American Physical Society

Level repulsion of two coupled 3D microwave cavities for quantum electrodynamics ALESSANDRO CASTELLI, LUIS MARTINEZ, JACOB PATE, RAYMOND CHIAO, JAY SHARPING, University of California, Merced — Three-dimensional microwave cavities demonstrate excellent frequency selectivity and, as such, are known largely for their use in RF filters. However, this selectivity can be utilized to generate two or more narrowband signals whose frequency separation is controllable. Here, we investigate level repulsion in two quarter-wave stub microwave cavities while varying coupling parameters that dictate minimum separation of the signals in the avoided crossing. We observe a minimum separation of 20 MHz and maximum separation of 400 MHz at room temperature for antennas that are inserted approximately 2.5 mm and 4.8 mm into each cavity, respectively. We do not observe level repulsion below antenna length of 2.5 mm but we expect this will change upon re-testing at cryogenic temperatures and, therefore, higher quality factors. Three-dimensional SRF (Superconducting Radio Frequency) cavities with these capabilities have potential applications in quantum information science, precision displacement metrology, and quantum electrodynamics.

Alessandro Castelli
University of California, Merced

Date submitted: 29 Sep 2017 Electronic form version 1.4