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Improved Axial Motion Detection for an Upgraded Electron and Positron Magnetic Moment Measurement[1] THOMAS MYERS, Center for Fundamental Physics, Northwestern University, XING FAN, Department of Physics, Harvard University, SAM FAYER, BENEDICT SUKRA, GERALD GABRIELSE, Center for Fundamental Physics, Northwestern University — The 0.28ppt measurement of the electron magnetic moment is the most precise test of the Standard Model [1], and it disagrees by 2.4σ with the theoretical prediction [2][3]. A new apparatus is now being tested with twin goals of significantly improving this measurement, and measuring the positron magnetic moment at this improved precision, a direct test of CPT symmetry. Detecting the axial motion of one such lepton, a necessary step for this measurement, relies on a 200 MHz LC circuit to present a high impedance to the particle. Advances necessary to load positrons [4] created new challenges due to harmful interactions with this circuit, causing the impedance to degrade. A series of improvements were made, collectively restoring the impedance to a value sufficient for detecting single particles for the next measurement. [1] D. Hanneke, S. Fogwell, and G. Gabrielse, Phys. Rev. Lett. 100 120801 (2008). [2] R. H. Parker, C. Yu, W. Zhong, B. Estey, and H. Mller, Science 360 191 (2018). [3] T. Aoyama, T. Kinoshita, and M. Nio, Atoms, 7 28 (2019). [4] S. Fogwell Hoogerheide, J. C. Dorr, E. Novitski, and G. Gabrielse, Rev. Sci. Instrum. 86 053301 (2015).

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