# Determination of Transition Polarisability for Atomic Parity Violation in Cesium

Jayden Hasted, Carter Fairhall, Benjamin Roberts, and Jacinda Ginges

*School of Mathematics and Physics, The University of Queensland, Brisbane QLD 4072, Australia.*

Atomic parity violation studies provide some of the most sensitive probes of new physics beyond the Standard Model. Knowledge of the vector transition polarisability forms an integral part of the interpretation of the atomic parity violation measurement in cesium [1]. This work presents new, all-orders ab initio calculations for the determination of the cesium vector transition polarisability. We compute: (i) the scalar polarisability, in combination with the measurement of the ratio of the scalar to vector transition polarisabilities; (ii) the magnetic dipole hyperfine-induced amplitude, in combination with the measurement of this quantity relative to the vector transition polarisability; and (iii) the vector transition polarisability directly. Implications for the interpretation of the atomic parity violation measurement in cesium are discussed.

[1] C.S. Wood, S.C. Bennett, D. Cho, B.P. Masterson, J.L. Roberts, C.E. Tanner, C.E. Wieman, *Science* **275**, 1759 (1997)