Nuclear $\beta$ decay has a long-standing history of shaping and testing the standard model of particle physics, and it continues to this day with elegant, ultra-precise low-energy nuclear measurements. Experiments observing the angular correlations between the electron, neutrino and recoil momenta following the $\beta$ decay of (un)polarized nuclei can be used to search for exotic currents contributing to the dominant $V−A$ structure of the weak interaction. Precision measurements of the correlation parameters to < 0.1% would be sensitive to (or meaningfully constrain) new physics, complementing other searches at large-scale facilities like the LHC.

Ion and atom traps provide an ideal source of very cold, short-lived radioactive nuclei in an extremely clean and open environment. As such, they are invaluable tools for precision measurements of $\beta$-decay parameters. This talk will focus on two such efforts. The TAMUTRAP facility at the Cyclotron Institute, Texas A&M University, will utilize an upgrade to the recently commissioned cylindrical Penning trap – already the world's largest with an inner diameter of 90 mm – to search for scalar currents via the $\beta-\nu$ correlation in the $\beta$-delayed proton decay of $T = 2$ nuclei. The other effort, based at TRIUMF in Vancouver, Canada, utilizes neutral atom-trapping techniques with optical pumping methods to highly polarize (> 99%) $^{37}$K atoms. Recently, we determined the $\beta$ asymmetry parameter, $A_\beta$, to 0.3% precision, which is comparable to or better than any other nuclear measurement, including the neutron.