Studies of Fundamental Interactions with Trapped $^8$Li and $^8$B Ions

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Measurements of the beta-neutrino angular correlation coefficient ($a_{\beta\nu}$) in $\beta$ decay provide information of the presence of possible exotic interactions beyond the Standard Model. The $^8$Li-$^8$B radioactive mirror nuclei represent a particularly attractive system for these studies due to their small masses, large $Q$-value, and a triple-correlation that enhances the sensitivity to detect so-called “New Physics.” Furthermore, it is possible to search for the existence of Standard Model-forbidden Second-Class Currents and to test the Conserved-Vector-Current hypothesis by comparing correlation measurements in $^8$Li and $^8$B. In this talk I will describe the experiments carried out at Argonne National Laboratory to measure with high precision $a_{\beta\nu}$ with trapped $^8$Li and $^8$B ions and present the latest results of our effort to test the Standard Model at low energies. I will also present future plans of our ion trapping program to test discrete symmetries like Parity and Time-reversal.