SCALAR CURRENTS IN $0^+ \rightarrow 0^+$ BETA DECAY AND THE $^8$B NEUTRINO SPECTRUM

Abstract

by

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Two experiments to understand the standard electro-weak model are presented. In one experiment scalar contributions to the weak interaction were searched for by determining with accuracy the $e - \nu$ correlation coefficient in a $0^+ \rightarrow 0^+$ decay. The correlation coefficient for the $0^+ \rightarrow 0^+$ $\beta$-decay of $^{32}$Ar was measured to be $\alpha = 0.9989 \pm 0.0052 \pm 0.0036$, for vanishing Fierz interference. This was used to put unprecedented limits on scalar contributions to the weak interaction.

In the second experiment the $\beta$-delayed $\alpha$ spectrum from $^8$B was measured. The experiment was designed to overcome systematic uncertainties that plagued previous measurements. This spectrum differs significantly from previous measurements. The measured $\alpha$ spectrum was used to deduce the $\nu$ spectrum. This will be used as a benchmark by experiments trying to detect distortions of the solar-$\nu$ spectrum in the search for physics beyond the standard model.