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The BeEST: A Search for keV-Scale Neutrinos in the EC Decay of 7Be with Superconducting Quantum Sensors

The search for heavy neutrino mass-states is among the brightest possibilities in our quest for the microscopic nature of dark matter. One of the most powerful methods for such searches is momentum reconstruction in electron-capture (EC) nuclear decay, where the final state only contains the neutrino and the recoiling daughter atom. This approach is advantageous since it relies only on the existence of a heavy neutrino admixture to the active neutrinos, and not on the model-dependent details of their interactions. Here, we report the first measurements in the Beryllium EC STJ (BeEST) experimental program, which uses the decay-momentum reconstruction technique to precisely measure the ^{7}Be$\rightarrow^{7}$Li recoil spectrum via ^{7}Be ions implanted into sensitive superconducting tunnel junction (STJ) radiation detectors.

Mini-abstract

The BeEST: Searching for keV-scale neutrinos using superconducting quantum sensors

Experiment/Collaboration

The BeEST Collaboration

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