Precision Measurement of the β-energy Spectrum in ^{6}He Decay

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Precision measurements of the β-energy spectrum in nuclear and neutron decays have a great potential to find possible signatures of new physics beyond the standard electroweak model. Such signatures would produce a distortion to the β-energy spectrum relative to the Standard Model prediction. In Gamow-Teller transitions, these distortions would indicate the presence of the exotic tensor type interactions. An interesting candidate for this study is ^{6}He because the simplicity of its decay and other nuclear properties allow an accurate theoretical description of the spectral shape.

At the National Superconducting Cyclotron Laboratory we have used a calorimetric technique for measuring the shape of the β-energy spectrum in ^{6}He decay. The radioactive ions were implanted into the active volume of a detector; this eliminates the critical instrumental effect related to the backscattering of β particles. The first goal of the experiment is to determine the weak magnetism form factor which had never been measured in ^{6}He decay. This presentation reports the status of the data analysis, focusing on the study of the main systematic effects, as well as the projected sensitivity of the first measurement.

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