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Precision Measurement of the β -energy Spectrum in ${}^6\text{He}$ 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 of 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 ${}^6\text{He}$ because the simplicity of its decay and other nuclear properties allow an accurate theoretical description of the spectrum shape.

At the National Superconducting Cyclotron Laboratory we have used a calorimetric technique for measuring the shape of the β -energy spectrum in ${}^6\text{He}$ 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 has never been measured in ${}^6\text{He}$ decay. The 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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