A new look at the β-decay of ^{11}Li

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The β-decay of halo nucleus ^{11}Li was investigated at ISAC-TRIUMF with the 8π spectrometer, an array of 20 Compton-suppressed high-purity Germanium detectors. In August 2002, a beam of about a thousand ^{11}Li atoms per second was delivered and implanted at the center of the 8π. The gamma spectrum resulting from the β-decay of ^{11}Li shows remarkable features, namely Doppler-broadened line shapes arising from the decay of the excited states of ^{10}Be, populated by β-delayed one-neutron emission. A Monte-Carlo simulation was developed to analyze these complex line shapes, from which it was possible to extract the lifetime of these excited states in ^{10}Be and some information about the neutron emitting states in ^{11}Be [1]. Following the development of a more intense ^{11}Li beam at ISAC, the experiment was repeated recently with an enhanced experimental setup, comprising the 8π and Sceptar, a plastic scintillator array located in the inner volume of the 8π. The higher ^{11}Li yield and the capability of taking data in β-γ coincidences lead to higher quality line shapes, as seen in the figure below. Results from this new experiment will be presented.

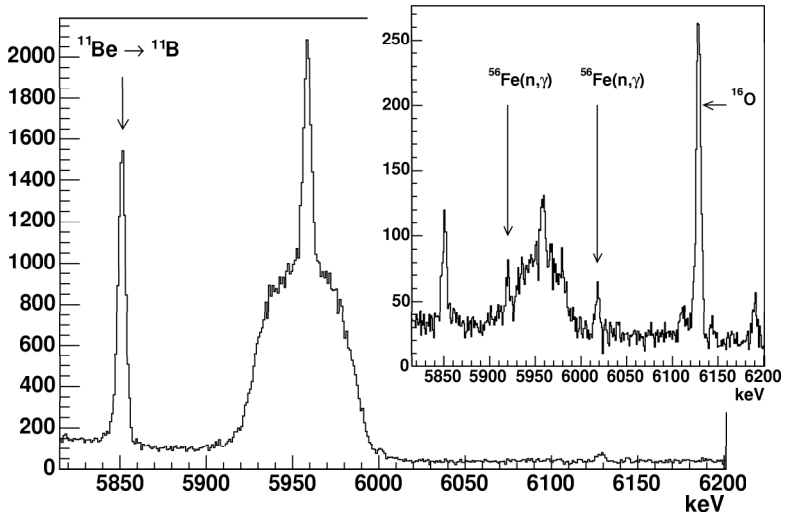

Figure 1: *Line shape of the ∼5958keV transition as observed in the recent experiment compared to the first one (inset). The overall lineshape quality is improved both by the higher statistics obtained and by the removal of transitions uncorrelated with the beam implantation using β-γ coincidences.*

[1] F. Sarazin et al., Phys. Rev. C 70 (2004) 031302R