The motivation to measure the electron-capture (EC) branch of $^{100}\text{Tc}$ is two-fold: $^{100}\text{Mo}$ is a neutrinoless double-$\beta$ decay ($0\nu\beta\beta$) candidate \cite{1, 2} for which the $^{100}\text{Tc}$ EC branch is needed for matrix element calculations; and inverse EC on $^{100}\text{Mo}$ has been proposed \cite{2} as a potential detector for observing charged-current neutrinos from the pp chain. The main motivation at this time, however, is $0\nu\beta\beta$ because there is no concrete plans to develop $^{100}\text{Mo}$ as a neutrino detector due to the large mass ($\sim 3$ tons) which would be required. To date, only one measurement of the EC branching ratio has been published which has a 50% uncertainty on its value: $(1.8\pm 0.9) \times 10^{-5}$ \cite{3}.

A schematic diagram of the setup we used at the IGISOL facility in Jyväskylä, Finland is shown in Fig. 1. Using the Penning-trap system JYFLTRAP, contaminants in the beam (most notably $^{99}\text{Tc}$ and $^{100}\text{Ru}$) were removed. The purified $^{100}\text{Tc}$ beam was collimated before entering a cylindrical cavity bored into a cube of plastic scintillator to ensure all the activity was implanted onto a foil near the opposite end of the cube. Imposing a veto from signals in the scintillator allowed us to suppress the dominant ($\sim 99.999\%$) $\beta^-$ decay branch to $^{100}\text{Ru}$ by $>90\%$. A planar Ge detector observed the x-rays following the EC of $^{100}\text{Tc}$ with very little attenuating material between it and the activity (3 mm of scintillator and 120 $\mu$m of Be). A preliminary x-ray spectrum from the experiment is shown in Fig. 2. The dominant peak at 19.2 keV originates from $K_\alpha$ x-rays following the decay to $^{100}\text{Ru}$; without the $\beta$ veto, this peak would overwhelm the small $^{100}\text{Mo}$ x-ray peak at 17.4 keV. We calculate the EC branching ratio based on the ratio of the area of the small – but clearly resolved – peak to that of the 540 keV $\gamma$ ray which follows the $\beta^-$ decay. Although analysis of the data continues, preliminary results indicate a branch of $1 \times 10^{-5}$ with an uncertainty of $\pm 20\%$. The dominant sources of

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**Figure 1.** Schematic diagram of the detector setup at the end of the IGISOL/JYFLTRAP beamline.
Uncertainty are expected to be statistics in the $^{100}$Mo peak and our understanding of the relative efficiency of the Ge detector between 17 keV and 540 keV.

Figure 2. Simplified decay scheme (inset) and x-ray spectrum from $^{100}$Tc decay.