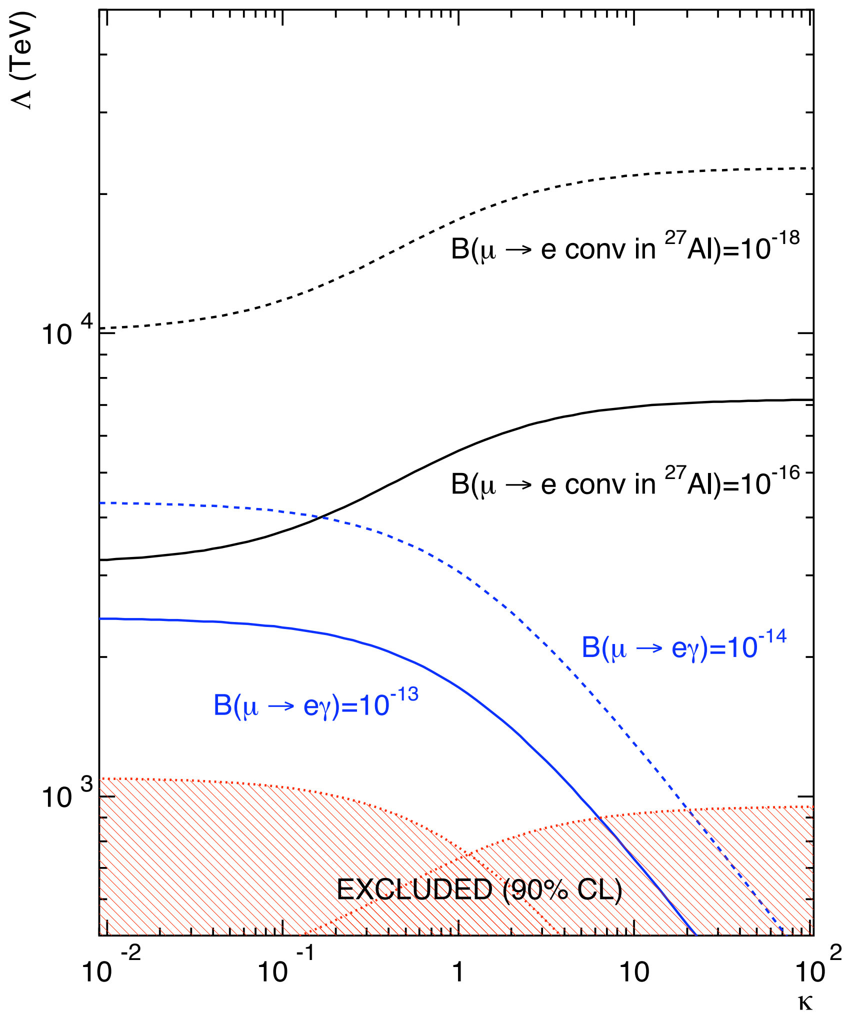

Figure 2: Sensitivity of a $\mu \to e$ conversion in ^{27}Al experiment that can probe a normalized capture rate of 10^{-16} and 10^{-18}, and of a $\mu \to e\gamma$ search that is sensitive to a branching ratio of 10^{-13} and 10^{-14}, to the new physics scale Λ as a function of κ, as defined in Eq. (2). Also depicted is the currently excluded region of this parameter space.

A model independent comparison between the reach of $\mu \to eee$ and $\mu \to e$ conversion in nuclei is a lot less straight forward. If the new physics is such that the dipole-type operator is dominant ($\kappa \ll 1$ in Figures 2 and 3), it is easy to see that near-future prospects for $\mu \to e$ conversion searches are comparable to those for $\mu \to eee$, assuming both can reach the 10^{-16} level. $\mu \to e$ conversion searches will ultimately dominate, assuming these can reach beyond 10^{-17}, and assuming $\mu \to eee$ searches "saturate" at the 10^{-16} level. Under all other theoretical circumstances, keeping in mind that κ and Λ in Eqs. (2,3) are *not* the same, it is impossible to unambiguously compare the two CLFV probes.

The discussions above also serve to illustrate another "feature" of searches for CLFV violation. In the case of a positive signal, the amount of information regarding the new physics is limited. For example, a positive signal in a $\mu \to e$ conversion experiment does not allow one to measure either Λ or κ but only a function of the two. In order to learn more about the new physics, one needs to combine information involving the rate of a particular CLFV process with other observables. These include other CLFV observables (*e.g.*, a positive signal in $\mu \to e\gamma$ and $\mu \to eee$ would allow one to measure both