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Calculation of $\pi\mu$ atom decay rate as possible background for $K_L \rightarrow \pi_0\nu\bar{\nu}$ JIA XU, University of Michigan — Formation and decay of elementary particle bound states have importance both from theoretical point of view regarding quark sector structure and for rare decay experiment background. The KOTO experiment, dedicated to measuring branching ratio of rare decay $K_L \rightarrow \pi_0\nu\bar{\nu}$, whose SM prediction branching ratio is 2.4×10^{-11} , is consequently sensitive to background of $K_L \rightarrow (\pi^+\mu^-)_{atom}\bar{\nu}$, followed by muon capture in the $\pi\mu$ atom. The branching ratio of $\pi\mu$ atom formation has been calculated and measured to be order of 10^{-7} . The muon capture rate of $\pi\mu$ into $\pi^0\nu$ is calculated and reported for the first time and compared to competing decay modes.

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