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A future $K_L \rightarrow \pi^0 \nu \bar{\nu}$ experiment at J-PARC

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A next-generation experiment at J-PARC to measure the branching ratio of $K_L \rightarrow \pi^0 \nu \bar{\nu}$ is being considered. The currently-running experiment in the Hadron Experimental Facility (HEF) at J-PARC, the KOTO experiment, will reach a sensitivity level below 10^{-10} in 3-4 years but will take a much longer time toward the Standard Model (SM) sensitivity (3×10^{-11}). It is desirable to have a new experiment that can observe $O(100)$ SM events and measure the branching ratio of $K_L \rightarrow \pi^0 \nu \bar{\nu}$. Such an experiment, so-called KOTO step-2, is being discussed as a part of the HEF extension project, which is one of the proposed KEK/J-PARC future plans. A beam line with a smaller production angle and a larger detector, accommodated in the extended facility, will provide a higher kaon flux and a larger detection acceptance, and thus a better sensitivity. In this talk, the outline and status of the project will be introduced.

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