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The KOTO Experiment at J-PARC

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The KOTO experiment is a neutral Kaon rare decay experiment at J-PARC. It is designed with major upgrades from the pilot experiment E391a at KEK-PS. The primary goal is to measure the branching ratio of the decay KL$\rightarrow \pi 0\nu\bar{\nu}$. The decay KL$\rightarrow \pi 0\nu\bar{\nu}$ is of particular interest because it is a pure direct CP violating process and its branching ratio has been calculated with less than one percent of theoretical uncertainty. It is very sensitive to the new physics, particularly the CP violation in the quark sector. A precision measurement will pin the CP-phase of the CKM matrix and test the Standard Model and beyond. The SM prediction is 2.4 $\times 10^{-11}$. A vast new physics parameter phase space is still viable with the current KL$\rightarrow \pi 0\nu\bar{\nu}$ branching ratio direct limit $<$2.6 $\times 10^{-8}$ set by E391a. I will report the challenge, approach and status of the experiment.

[1]One behalf on the KOTO collaboration