

## A search for $KL \rightarrow \pi^0 \nu \bar{\nu}$ at KEK-PS E391a experiment

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The rare decay  $KL \rightarrow \pi^0 \nu \bar{\nu}$  is a Flavor Changing Neutral Current process from strange to down quarks and its observation is new evidence for direct CP violation. Its irreducible theoretical uncertainty is very small and the decay is considered an ideal place to test the Standard Model and explore signs of new physics in quark flavor physics.

KEK-PS E391a, performed at the KEK 12GeV proton synchrotron, is the first dedicated experiment to measure the branching fraction of this decay mode. The beam line is very narrow to set the constraints on the  $\pi^0$  kinematics. The detector hermetically covers the decay region to reduce backgrounds from other decay modes with extra particles.

We will report results of recent data analysis mainly for the second data set (Run-II). It was carried out from February to April in 2005 with several crucial upgrades in the detector. Background reductions and improvements to the sensitivity for  $KL \rightarrow \pi^0 \nu \bar{\nu}$  due to those upgrades of the detector are discussed.

**Primary author:** Mr SUMIDA, Toshi (Dept. of Physics, Kyoto University)

**Presenter:** Mr SUMIDA, Toshi (Dept. of Physics, Kyoto University)

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