# Further search for T-violation in the decay $K^+ \to \pi^0 \mu^+ \nu$

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We present the new measurements of a T-violating tranverse muon polarization ($P_T$) in the decay $K^+ \to \pi^0 \mu^+ \nu$ ($K_{\mu 3}$). This measurable is sensitive to new phases of CP-violation in Higgs sector, thus an observation of a non-zero value of $P_T$ would be a signal of new physics beyond the Standard Model. The details of E246 experiment and the first result based on data accumulated in 1996-97 have been reported in Ref. [1].
The main features of this experiment are the usage of stopped positive kaons, the rotational symmetry of the detector and separation of good $K_{\mu 3}$ events into two classes by tagging the $\pi^0$'s in forward and backward directions relative to the kaon beam. These two classes of events have the opposite signs of $P_T$, and application of such double ratio essentially reduces the systematic errors.
New result is based on the combined analysis of the 1996-97 sample and a new data of comparable sensitivity. For the entire 1996-00 data sample, the statistical sensitivity to $P_T$ of about $2 \times 10^{-3}$ was achieved. A detailed study showed that the value of the systematic uncertainty $\leq 10^{-3}$, i.e. less than the statistical error. At this level of sensitivity obtained in E246, no evidence for T-violation was found in the $K_{\mu 3}$ decay.

**References**

[1]M. Abe et al., Phys. Rev. Lett. **83** (1999) 4253.