Contribution ID : **10** Type : **not specified**

# Search for the Rare Decay $B^0 \to \tau^+\tau^-$ at Belle

*Tuesday, 28 October 2014 17:10 (20)*

In the Standard Model the decay $B^0 \to \tau^+\tau^-$ is highly suppressed with a predicted branching ratio of $\mathcal{B}_{\mathrm{SM}}(B^0 \to \tau^+\tau^-) \approx 3 \times 10^{-8}$. The BaBar collaboration estimated an upper limit of $\mathcal{B} < 4.1 \times 10^{-3}$ at the 90\% confidence level using a data sample of $232 \times 10^6$ $B\bar{B}$ pairs.
The search presented in this talk is performed on data collected on the $\Upsilon(4S)$ resonance with the Belle detector at the KEKB asymmetric-energy $e^+e^-$ collider. The data sample contains $772 \times 10^6$ $B\bar{B}$ pairs, which is a factor three more than used in the BaBar analysis.
For the analysis one of the $B$ mesons is fully reconstructed in hadronic decay modes using a hierarchical NeuroBayes-based algorithm. Using a multivariate analysis method the background is reduced to reach higher sensitivity.
An expected upper limit on the branching ratio is estimated on simulated Monte Carlo events.

## Summary

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**Session Classification :** Young Investigator Talks