

TWIST: measuring the space-time structure of muon decay

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This past year, TWIST completed improved measurements of ρ and δ based on the analysis of data that were recorded during 2004. We find $\rho = 0.75014 \pm 0.00017(\text{stat.}) \pm 0.00044(\text{syst.}) \pm 0.00011(\eta)$ and $\delta = 0.75067 \pm 0.00030(\text{stat.}) \pm 0.00067(\text{syst.})$. Both results are consistent with the Standard Model expectations of $\frac{3}{4}$, and represent a factor of ~ 2 improvement in precision compared to the original TWIST measurements [1,2]. When these new results are included in a global analysis of muon decay measurements [3], they lead to improved limits on right-hand muon couplings. The results are currently being written up for publication. Dr. Robert MacDonald of the University of Alberta performed the analysis as part of his Ph.D. research. One of us (CAG) assisted Dick Mischke and Art Olin of TRIUMF in advising Dr. MacDonald during his analysis.

TWIST completed its data taking in Summer, 2007, and the TWIST spectrometer has subsequently been disassembled. We anticipate the final precisions for the Michel parameters ρ and δ will be approximately ± 0.0003 . The final precision for $P_{\mu\xi}$ should be ± 0.001 or better.

- [1] J. R. Musser *et al.* (TWIST Collaboration), Phys. Rev. Lett. **94**, 101805 (2005).
- [2] A. Gaponenko *et al.* (TWIST Collaboration), Phys. Rev. D **71**, 071101R (2005).
- [3] C. A. Gagliardi, R. E. Tribble, and N. J. Williams, Phys. Rev. D **72**, 073002 (2005).