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ILC prospects for bottom quark mass measurements from three-jet rates

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The Standard Model(SM) can not explain why measured quark masses have different values and why the mass disparity between them. However, we can consider the energy dependence of quark mass, and these values change from measured values at a higher energy scale. Furthermore, some new particles such as SUSY contribute, this energy dependence will deviate from the SM's expectation. Based on this idea, some models such as GUTs predict mass unification of third-generation particles(b, tau) at the GUT scale, and they are candidates that can approach problems of mass. Therefore, the verification of the b quark mass's energy dependence at a higher energy scale provides a QCD theory test. Additionally, it can be a probe of new physics.
The b mass at Z-pole measured at LEP and SLD. They were in good agreement with SM, but there was no indication of new physics. As a next challenge, this study simulated b quark pair production events at 250GeV ILC and estimated b mass measurement accuracy at the 250GeV energy scale.
It turns out that the precision of b mass measurement at 250GeV is 1GeV. Additionally, it turns out that the current Monte Carlo sample of quark pair production has some problems, and they affect the center value of the observable which this study uses and its statistical error. It is updating now. Moreover, Giga-Z ILC can meausre b quark mass at Z-pole at a better precision than LEP and SLD.

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Primary authors: TAIRAFUNE, Seidai (Tohoku University); FUSTER VERDÚ, Juan (IFIC-Valencia (ES)); VOS, Marcel (IFIC Valencia (ES)); IRLES, Adrian (IFIC CSIC/UV); RODRIGO, German (IFIC CSIC-UV); YAMAMOTO, Hitoshi (University of Tokyo); YONAMINE, Ryo (Tohoku University)

Presenter: TAIRAFUNE, Seidai (Tohoku University)

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