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Beam polarizaton eects on top anti-top pair production at ILC

The Standard Model is a very beautiful model yet there are still some remain questions which we are curious about. The Large Hadron Collider (LHC) may or may not provide some of the answers to some some of these questions. The future international electron-positron collide (ILC) with 200-500 GeV (extendable to 1 TeV) center of mass high luminosity may provide a window into some of the mysteries that we are hoping to solve. Which state that our Universe lies in is one of the most crucial and interesting topic for physicists, thus the precise measurement of the top quark properties is important and necessary. In this thesis, we would like to discuss this process: e+e⎯ ! tt. Using GRACE system with polarization, we present the dierence between the total cross section as the function of CM energy of tt pair production with the left-handed electron and right-handed positron initial polarization in both tree level and full electroweak correction. The cross section with e⎯

Le+

R polarization is larger than the cross section with e⎯

Re+

L polarization. Nevertheless, the radiative

correction of e⎯

Le+

R polarization is smaller than the radiative correction of e⎯

Re+

L polarization. The angular

distributions also conrm this behavior due to the eects of the polarization. For the top quark, since the forward-backward asymmetry AFB of the top quark is considerable among unpolarized case, left-right and right left polarization, it should be taken into account at ILC. We also show the property of top quark decay t ! b + + + included the nal polarization. We conclude that by using GRACE system with the eect of polarization, we can distinguish the left-right and right-left for the total cross section, angular distribution, forward-backward asymmetry at tree level and full electroweak correction. Especially for the top quark, we are

able to calculate with both initial and nal polarization. In conclusion, polarization eects are essential to gure out the properties of fermions especially the top quark at the future ILC. With GRACE system, total cross section, angular distribution, energy distribution can be calculated with beam initial and nal polarization for both tree level and full electroweak correction.

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Summary

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