Run Scenarios for the Linear Collider

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Scenarios are developed for runs at a Linear Collider, in the case that there is a rich program of new physics.

I. INTRODUCTION

The physics program of the linear e^+e^- collider LC is potentially very extensive, particularly in the case that a Higgs boson with mass below 300 GeV is found and relatively low energy scale supersymmetry (SUSY) exists. For such a case, we have examined a possible run plan for the LC to explore the new states and their masses, and estimated the precision on measured parameters that can be attained in a reasonable time span.

For this study, we have examined a scenario with a light SM-like Higgs boson of mass 120 GeV and two minimal supergravity (mSUGRA) models with many low mass sparticles. This scenario is conservative; with many particles to study there are many desired operational conditions for the collider (different energies and beam polarizations). We have not assumed that positron polarization is available, again a conservative assumption from the point of view of the running time required.

We have taken the total time for the runs to be that required to accumulate 1 ab^{-1} (1000 fb^{-1}) at 500 GeV. Based on estimates [1] of the luminosity that could be delivered by the LC summarized in Table I, we estimate that this represents a program for the first 6 – 7 years of LC operation. Such an estimate is only qualitative and depends more upon the ultimate luminosity of the accelerator than upon the details of early low luminosity during commissioning.

We have chosen two SUSY benchmarks shown in Table II: the TESLA TDR RR1 [2] and the Snowmass E3 working group [3] point, also known as benchmark SPS1. They provide a rich spectrum of sparticles at

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