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Search for Neutral Higgs Bosons of the Minimal Supersymmetric Extension of the Standard Model with SLD

by

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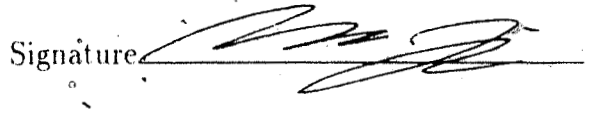
Signature 

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Abstract

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We searched for the light neutral scalar Higgs boson h° and the pseudoscalar Higgs boson A° of the Minimal Supersymmetric Extension of the Standard Model (MSSM) for the case $\tan\beta < 1$. The experiment was done with the SLD detector at the Stanford Linear Accelerator Center (SLAC). This analysis is based on the data set collected during the 1993 physics run which contained about 50,000 hadronic Z° events. (About 38,000 events have Central Drift Chamber (CDC) information recorded). After the event selection cuts for hadronic Z° decays with CDC information, we select 27,560 events. The Monte Carlo (MC) simulated event distributions agree very well with the data. Good agreement is achieved between MC and the data on the number of events passing each of the event selection cuts.

The invariant mass spectrum is generated from those events that pass the Higgs filter. A bin-by-bin comparison of the spectrum shows the data is consistent with the MC with no Higgs contribution. No evidence for the existence of the neutral Higgs bosons h° and A° is found. The results from this Higgs search show that MSSM tree level neutral Higgs with masses $m_{h^\circ} \leq 42.7\,GeV/c^2$ and $m_{A^\circ} \leq 42.7\,GeV/c^2$ for $\tan\beta < 1$ have been excluded at 95% confidence level.

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GLOSSARY

SLAC: Stanford Linear Accelerator Center at Stanford University.

SLC: the SLAC Linear Collider.

SLD: Stanford Large Detector.

MSSM: Minimal Supersymmetric Extension of the Standard Model.

IDA: SLD Interactive Data Analysis program.

VEV: Vacuum Expectation Value.

CERN: European Organization for Nuclear Research.

LEP: The Large Electron-Positron storage ring at CERN.

DELPHI, ALEPH, L3, OPAL: 4 detectors on LEP storage ring.

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