The First Measurement of the Left-Right Cross Section Asymmetry in Z Boson Production*

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A Dissertation
Presented to the Faculty of the Graduate School
of
Yale University
in Candidacy for the Degree of
Doctor of Philosophy

By
Ram Jacob Ben-David
May 1994

ABSTRACT

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The first measurement of the left-right cross section asymmetry (A_{LR}) in Z° boson production has been made with the SLAC Large Detector (SLD) at the SLAC Linear Collider (SLC). The measurement was performed at a center-of-mass energy (E_{cm}) of 91.55 GeV with a longitudinally polarized electron beam. The average beam polarization was $(22.4 \pm 0.6)\%$. Using a sample of 10,224 Z° decays, A_{LR} is measured to be $0.102 \pm 0.044(\text{stat}) \pm 0.003(\text{syst})$, which determines the effective electroweak mixing angle to be $\sin^2 \theta_W^{eff} = 0.2375 \pm 0.0056(\text{stat}) \pm 0.0004(\text{syst})$.

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At this juncture in my life, I would like to take the opportunity to philosophize a bit (after all, I will soon be a *certified* philosopher) and to thank the people who have played active roles in helping me get to where I am today.

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