

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

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SLAC-Report-687  
May 1994

Prepared for the Department of Energy  
under contract number DE-AC03-76SF00515

Printed in the United States of America. Available from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161.

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\* Ph.D. thesis, Yale University, New Haven, CT 06511

THE FIRST MEASUREMENT OF THE  
LEFT-RIGHT CROSS SECTION ASYMMETRY IN  
Z BOSON PRODUCTION

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

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## ABSTRACT

### THE FIRST MEASUREMENT OF THE LEFT-RIGHT CROSS SECTION ASYMMETRY IN $Z$ BOSON PRODUCTION

Ram Jacob Ben-David

Yale University

May 1994

The first measurement of the left-right cross section asymmetry ( $A_{LR}$ ) in  $Z^0$  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  $Z^0$  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  $\sin^2 \theta_W^{eff} = 0.2375 \pm 0.0056(\text{stat}) \pm 0.0004(\text{syst})$ .

# Acknowledgements

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.

First, I would like to thank the members of my thesis committee: Professors Charlie Baltay, Kurt Gibble, Dimitri Kusnezov, Jack Sandweiss and Michael Schmidt, whose critiques of the initial draft of this thesis have led to a final version that is clearer and more concise. In addition, I'd like to thank my outside reader, Dr. Michael Murtagh, for being a good sport and taking the time to read my thesis.

I would especially like to thank my advisor, Charlie Baltay, for all his advice and encouragement. It was truly a pleasure learning the tricks of the trade from a master craftsman.

I would like to thank Steve Manly who superbly played the roles of advisor, colleague, and most importantly, friend. I would also like to thank Jack Sandweiss for the many insightful discussions about physics and life in general.

Many thanks to my SLD buddies: Phil Burrows, Richard Dubois, Scott Geary, Saul González, Sarah Hedges, Andrea Higashi and John Yamartino, for making my countless trips to SLAC so much fun. I would like to thank Peter Rowson, Morris Swartz, Hwanbae Park (my scanning buddy), Rob Elia, Mike Fero, Bruce Schumm and the rest of the Electroweak study group for all their help in the many aspects of this measurement. A special thanks goes to Peter, who not only seemed to never tire from my incessant questions: "Wait a minute, what about ...?", but would always have some witty response. To the rest of my SLD collaborators, those I had the privilege of working with and those I never met, I thank for making this experiment

possible through their hard work.

To my good friends Karen Ohl, Frank Rotondo and George Triantaphyllou, your friendship through the formative years of my becoming a particle physicist has meant a lot to me. Thanks to my office mate, Jeff Snyder, my comrade in the struggle to figure out the SLD software, only to have it change on us the following day.

I would like to thank Peter Martin and his supporting cast: Mary Kraus, Jean Ahern, Melissa Wiegand, Carole Devore and Brenda Alexy-Kuhn, who not only made my dealings with the Yale management and the outside world as painless as possible, but did it with a smile! I would also like to thank Will Emmet, Rochelle Lauer and John Sinnott for their excellent technical support. My deepest gratitude goes to Sara Batter and Jean Belfonti who have kept the best interests of the graduate students their number one priority.

A very special thanks goes to Aurel Faibis, Dani and Mina Ben-David, Norman Gelfand, Drasko Jovanovic and Dan Prober, whose presence at what in retrospect turned out to be the proverbial “fork(s) in the road” of my academic career, helped steer me down the path I eventually took.

To Arie Beck, my good friend from Tel Aviv University. I’ve always felt somewhat responsible for leading you down the path to high energy physics and then abandoning you to struggle on your own. I hope that in spite of that, you will find a niche where you will be happy.

I am truly indebted to my parents for making me what I am today. You have always tried to instill in me the principle that through hard work and determination I can achieve any goal I set for myself. I will be eternally grateful for your loving guidance throughout the years. I would also like to thank my family for all the love, support and patience you’ve had for me.

To Roni, my wife, your love, help, encouragement and ability to give so unselfishly of yourself over the years has played an essential role in my ability to achieve this goal. If it were not for your help in making many of the figures, typing in sections of text and proofreading this thesis, it would have taken me even longer to complete it. For all these reasons, I dedicate this thesis to you. I hope that someday, I will be able to return the favor.

This work has been funded, in part, by generous contributions from the RBD Fellowship Fund for Aspiring Husbands, contract K-061787.

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