

# Irwin Sheer

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## Summary

Experienced professional with significant leadership experience, a very strong technical background, state of the art computing skills, extensive modeling and data analysis experience, and a personal commitment to excellence.

## Achievements

- Built financial models that are used to value and manage risks for over four and a half trillion dollars worth of assets.
- Primary architect of flexible analytical calculation engine which is used to perform approximately 350 million security valuations per month.
- Collaborated on and analyzed data from two high-energy physics experiments leading to 110 published articles, principal author of ten.

## Experience

July 1996 – present: Managing Director  
BlackRock Inc., New York, New York  
Financial Modeling Group

- Co-head of Financial Modeling Group and Analytical Development Group leader. Responsible for all fixed income security valuations and portfolio risk measures at BlackRock.
- Managed 24 professionals with a budget of over 8 million dollars. Responsible for supervision of Security Valuation, Term Structure Modeling, Quantitative Credit, and Portfolio Risk teams.
- Co-coordinator for firm wide market risk meeting which is a critical part of BlackRock's financial model validation process.
- Member of corporate governance MD committee which is responsible for preserving BlackRock's culture.
- Yield Curve models: exponential basis Treasury curve model, JGB bilinear curve model, dollar and non-dollar LIBOR curves, Agency reference and benchmark curves, basis curves (*e.g.* Fed. Funds, CP, Discount, CMT, T-Bill), credit curves, inflation, forward FX rates.
- Interest Rate models: constant volatility Ho-Lee and Black-Derman-Toy single factor short rate models, term structure of volatility Hull-White, Black-Karasinski, and Shifted Lognormal single factor short rate models, whole yield curve Libor Market Model multi-factor term structure model. Calibration of term structure models to market volatilities.
- Fixed Income Security Valuation models: Construction Loans, Mortgage Backed Securities, Corporate Bonds, Municipal Bonds, Swaps, Asset Swaps, Total Return Swaps, Index Linked Bonds, Credit Default Swaps, and Interest Rate Derivatives.
- Architect for primary valuation engine and other critical production applications.
- Coordinator for biweekly financial seminar series.

January 1993 – June 1996: Group Leader.  
Timber Hill Inc., Valhalla, New York.

- Object database architect. Advanced software technology group leader.
- Internal consultant, mentor and trouble shooter of last resort.
- Commercial software evaluation, acquisition and integration.
- Software Engineering Environment design, implementation and support.
- Maintenance and enhancement of proprietary stock and option trading model.

May 1992 - December 1993: Physicist.  
Superconducting Super Collider Laboratory, Dallas, Texas.  
GEM experiment.

- Computing subsystem framework group leader. Designed and implemented platform independent Software Engineering Environment for 500+ developer project.
- Object oriented pilot project leader. Taught 10 week C++ course.
- Created simple third generation language and corresponding code generator.
- Wrote distributed simulation application used to perform critical design studies.
- Performed significant pattern recognition study.

March 1988 - April 1992: Postgraduate Research Physicist.  
University of California, Physics Department, La Jolla, California.  
L3 Experiment, CERN, Geneva, Switzerland.

- Led 12 member project to analyze, design, implement and test distributed multi-tasking real-time control and monitoring application.
- Led 7 member project to calibrate a high precision detector.
- Analyzed, designed, implemented and tested client/server data acquisition system.
- Led team of 16 physicists in design and implementation of pattern recognition codes.
- System software support for Apollo computer network of ~100 nodes. Wrote socket based client/server tape staging application.
- Analyzed data leading to 61 published results, principal author of eight.

June 1983 - March 1988: Graduate Research Assistant.  
University of California, Department of Physics, Riverside, California.  
UA1 Experiment, CERN, Geneva, Switzerland.

- Participated in the design, construction, testing, installation and operation of a high-precision drift chamber.
- Analyzed, designed, implemented, and tested software to simulate chamber electrostatics, operate high voltage, calibrate and perform pattern recognition.

- Analyzed data leading to 31 published results, was principal author of two including Ph.D. dissertation "A study of  $K_s$  Production with a Microvertex Detector at the CERN Proton-Antiproton Collider".

August 1981 - June 1983: Graduate Teaching/Research Assistant.  
University of Arizona, Department of Physics, Tucson, Arizona.

- Instructed both majors and non-majors in general physics laboratories.
- Analyzed data from particle physics experiment E580 at Fermi National Accelerator Laboratory, in Batavia, Illinois.

September 1979 - August 1981: Process Engineer.  
Motorola, Inc., Mesa, Arizona.

- Maintained epitaxial reactors in a bipolar front end diffusion area.
- Characterized troublesome dichlorosilane silicon epitaxy process.

## Education

1988 Ph.D. in Physics, University of California, Riverside.

1982 M.S. in Physics, University of Arizona.

1981 B.S. in Physics, Arizona State University.

## Honors and Awards

Arizona State University, Regents Academic Scholarship (1977-1981)

Dougherty Foundation Scholarship (1978-1981)

Visto Melvin Silpher Foundation Scholarship (1981)

Atlantic Richfield's Academic Excellence Award (1981)

University of California, Riverside, Dean's Fellowship (1983-1984)

Listed in "Who's Who in the World" (1992-present)

Arizona State University College of Liberal Arts and Science Leader (1999)

## Skills

C++, Java, C, FORTRAN, Perl, HTML

Object Oriented Design

UNIX, NT, Windows, MacIntosh

Sybase, Versant

Numerical methods, Octave, Mathematica, Splus

## Publications

1. "Testing for rare male mating advantages among various *Drosophila melanogaster* Genotypes", with T.A.Markow *et al.*, Genet. Res. **35** (1980) 59-64.
2. "Experimental Observation of Events with Large Missing Transverse Energy Accompanied by a Jet or a Photon(s) in  $p\bar{p}$  Collisions at  $\sqrt{s} = 540$  GeV", with G.Arnison *et al.*, Phys. Lett. **B139** (1984) 115-125.

3. "D\* Production in Jets at the CERN SPS Collider", with G.Arnison *et al.*, Phys. Lett. **B147** (1984) 222-226.
4. "Observation of the Muonic Z<sup>0</sup>-Decay at the  $p\bar{p}$  Collider", with G.Arnison *et al.*, Phys. Lett. **B147** (1984) 241-248.
5. "Associated Production of an Isolated Large-Transverse-Momentum Lepton (Electron or Muon) and Two Jets at the CERN  $p\bar{p}$  Collider", with G.Arnison *et al.*, Phys. Lett. **B147** (1984) 493-508.
6. "Intermediate-Mass Dimuon Events at the CERN  $p\bar{p}$  Collider at  $\sqrt{s} = 540$  GeV", with G.Arnison *et al.*, Phys. Lett. **B155** (1985) 442-456.
7. "Comparison of Three-Jet and Two-Jet Cross Sections in  $p\bar{p}$  Collisions at the CERN SPS  $p\bar{p}$  Collider", with G.Arnison *et al.*, Phys. Lett. **B158** (1985) 494-504.
8. "W Production Properties at the CERN SPS Collider.", with G.Arnison *et al.*, Lettre al Nuovo Cimento **44** (1985) 1-16.
9. "Recent Results on Intermediate Vector Boson Properties at the CERN Super Proton Synchrotron Collider", with G.Arnison *et al.*, Phys. Lett. **B166** (1986) 484-490.
10. "A Micro Vertex Detector for Experiment UA1 at the CERN  $Sp\bar{p}S$  Collider", with P.Cennini *et al.*, IEEE Trans. NS **33** (1986) 163-166.
11. "Measurement of the Inclusive Jet Cross Section at the CERN  $p\bar{p}$  Collider", with G.Arnison *et al.*, Phys. Lett. **B172** (1986) 461-466.
12. "Angular Distributions for High-Mass Jet Pairs and a Limit on the Energy Scale of Compositeness for Quarks from the CERN  $p\bar{p}$  Collider", with G.Arnison *et al.*, Phys. Lett. **B177** (1986) 244-250.
13. "Analysis of the Fragmentation Properties of Quark and Gluon Jets at the CERN SPS  $p\bar{p}$  Collider", with G.Arnison *et al.*, Nucl. Phys. **B276** (1986) 253-271.
14. "Intermediate-Vector-Boson Properties at the CERN Super Proton Synchrotron Collider", with G.Arnison *et al.*, Europhys. Lett. **1** (1986) 327-345.
15. "Events with Large Missing Transverse Energy at the CERN Collider: I.  $W^{\pm}\tau\nu$  Decay and Test of  $\tau$ - $\mu$ -e Universality at  $Q^2 = m_w^2$ ", with C.Albajar *et al.*, Phys. Lett. **B185** (1987) 233-240.
16. "Events with Large Missing Transverse Energy at the CERN Collider: II. Search for the Decays of  $W^{\pm}$  into Heavy Leptons and of  $Z^0$  into Non-interacting Particles", with C.Albajar *et al.*, Phys. Lett. **B185** (1987) 241-248.
17. "Beauty Production at the CERN Proton-Antiproton Collider", with C.Albajar *et al.*, Phys. Lett. **B186** (1987) 237-246.
18. "Search for  $B^0\bar{B}^0$  Oscillations at the CERN Proton-Antiproton Collider", with C.Albajar *et al.*, Phys. Lett. **B186** (1987) 247-254.
19. "Production of W's with Large Transverse Momentum at the CERN Proton-Antiproton Collider", with C.Albajar *et al.*, Phys. Lett. **B193** (1987) 389-398.
20. "Events with Large Missing Transverse Energy at the CERN Collider: III. Mass Limits on Supersymmetric Particles", with C.Albajar *et al.*, Phys. Lett. **B198** (1987) 261-270.
21. "Intermediate Vector Boson Cross Sections at the CERN Super Proton Synchrotron Collider and the Number of Neutrino Types", with C.Albajar *et al.*, Phys. Lett. **B198** (1987) 271-280.

22. "Analysis of the Highest Transverse Energy Events Seen in the UA1 Detector at the  $Sp\bar{p}S$  Collider", with C.Albajar *et al.*, *Z.Phys.* **C36** (1987) 33-43.
23. "A Study of  $K_S$  Production with a Microvertex Detector at the CERN Proton-Antiproton Collider", Ph.D. Thesis, UC Riverside (1988) 1-174.
24. "High Transverse Momentum  $J/\psi$  Production at the CERN Proton-Antiproton Collider", with C.Albajar *et al.*, *Phys. Lett.* **B200** (1988) 380-390.
25. "Two-Jet Mass Distributions at the CERN Proton-Antiproton Collider", with C.Albajar *et al.*, *Phys. Lett.* **B209** (1988) 127-134.
26. "Direct Photon Production at the CERN Proton-Antiproton Collider", with C.Albajar *et al.*, *Phys. Lett.* **B209** (1988) 385-396.
27. "Low Mass Dimuon Production at the CERN Proton-Antiproton Collider", with C.Albajar *et al.*, *Phys. Lett.* **B209** (1988) 397-406.
28. "Measurement of the Bottom Quark Production Cross Section in Proton-Antiproton Collisions at  $\sqrt{s} = 0.63$  TeV", with C.Albajar *et al.*, *Phys. Lett.* **B213** (1988) 405-412.
29. "Production of Low Transverse Energy Clusters in  $p\bar{p}$  Collisions at  $\sqrt{s} = 0.2-0.9$  TeV and Their Interpretation in Terms of QCD Jets", with C.Albajar *et al.*, *Nucl. Phys.* **B309** (1988) 405-425.
30. "Study of Heavy Flavor Production in Events with a Muon Accompanied by Jet(s) at the CERN Proton-Antiproton Collider", with C.Albajar *et al.*, *Z.Phys.* **C37** (1988) 489-503.
31. "Search for New Heavy Quarks at the CERN Proton-Antiproton Collider", with C.Albajar *et al.*, *Z.Phys.* **C37** (1988) 505-525.
32. "Studies of Intermediate Vector Boson Production and Decay in UA1 at the CERN Proton-Antiproton Collider", with C.Albajar *et al.*, *Z.Phys.* **C44** (1989) 15-61.
33. "A determination of the Properties of the Neutral Intermediate Vector Boson  $Z^0$ ", with B.Adeva *et al.*, *Phys. Lett.* **B231** (1989) 509-518.
34. "Mass Limits for Scaler Muons, Scaler Electrons, and Winos from  $e^+e^-$  Collisions Near  $\sqrt{s} = 91$  GeV", with B.Adeva *et al.*, *Phys. Lett.* **B233** (1989) 530-537.
35. "Measurement of  $g_A$  and  $g_V$ , the Neutral Current Coupling Constants to Leptons", with B.Adeva *et al.*, *Phys. Lett.* **B236** (1990) 109-115.
36. "Measurement of  $Z^0$  decays to Hadrons, and a Precise Determination of the Number of Neutrino Species", with B.Adeva *et al.*, *Phys. Lett.* **B237** (1990) 136-146.
37. "A Measurement of the  $Z^0$  Leptonic Partial Widths and the Vector and Axial Vector Coupling Constants", with B.Adeva *et al.*, *Phys. Lett.* **B238** (1990) 122-130.
38. "The Construction of the L3 Experiment", with B.Adeva *et al.*, *NIM* **A289** (1990) 35.
39. "Measurement of  $Z^0 \rightarrow b\bar{b}$  Decay Properties", with B.Adeva *et al.*, *Phys. Lett.* **B241** (1990) 416-424.
40. "Mass Limits for Excited Electrons and Muons from  $Z^0$  Decay", with B.Adeva *et al.*, *Phys. Lett.* **B247** (1990) 177-184.
41. "A Determination of Electroweak Parameters from  $Z^0 \rightarrow \mu^+\mu^-(\gamma)$ ", with B.Adeva *et al.*, *Phys. Lett.* **B247** (1990) 473-480.
42. "Search for Neutral Higgs Boson in  $Z^0$  Decay", with B.Adeva *et al.*, *Phys. Lett.* **B248** (1990) 203-210.

43. "A Test of QCD based on 4-Jet Events from  $Z^0$  Decay", with B.Adeva *et al.*, Phys. Lett. **B248** (1990) 227-234.
44. "Determination of  $\alpha_s$  from Jet Multiplicities Measured on the  $Z^0$  Resonance", with B.Adeva *et al.*, Phys. Lett. **B248** (1990) 462-472.
45. "A Precision Measurement of the Number of Neutrino Species", with B.Adeva *et al.*, Phys. Lett. **B249** (1990) 341-352.
46. "A Determination of Electroweak Parameters from  $Z^0$  Decays into Charged Leptons", with B.Adeva *et al.*, Phys. Lett. **B250** (1990) 183-192.
47. "Test of QED in  $e^+e^- \rightarrow \gamma\gamma$  at LEP", with B.Adeva *et al.*, Phys. Lett. **B250** (1990) 199-204.
48. "Search for Excited Taus from  $Z^0$  Decays", with B.Adeva *et al.*, Phys. Lett. **B250** (1990) 205-211.
49. "Search for the Neutral Higgs Bosons of the Minimal Supersymmetric Standard Model from  $Z^0$  Decays", with B.Adeva *et al.*, Phys. Lett. **B251** (1990) 311-320.
50. "A Search for Heavy Charged and Neutral Leptons from  $Z^0$  Decays", with B.Adeva *et al.*, Phys. Lett. **B251** (1990) 321-330.
51. "Search for the Charged Higgs Boson in  $Z^0$  Decay", with B.Adeva *et al.*, Phys. Lett. **B252** (1990) 511-517.
52. "Search for a Low Mass Neutral Higgs Boson in  $Z^0$  Decay", with B.Adeva *et al.*, Phys. Lett. **B252** (1990) 518-524.
53. "Search for Excited Neutrinos from  $Z^0$  Decays", with B.Adeva *et al.*, Phys. Lett. **B252** (1990) 525-532.
54. "A Measurement of  $B^0\bar{B}^0$  Mixing in  $Z^0$  Decays", with B.Adeva *et al.*, Phys. Lett. **B252** (1990) 703-712.
55. "A Measurement of the  $Z^0 \rightarrow b\bar{b}$  Forward-Backward Asymmetry", with B.Adeva *et al.*, Phys. Lett. **B252** (1990) 713-721.
56. "Search for the Neutral Higgs Boson", with B.Adeva *et al.*, Phys. Lett. **B257** (1991) 450-458.
57. "Determination of  $\alpha_s$  from Energy-Energy Correlations Measured on the  $Z^0$  Resonance", with B.Adeva *et al.*, Phys. Lett. **B257** (1991) 469-478.
58. "Measurement of the Inclusive Production of Neutral Pions and Charged Particles on the  $Z^0$  Resonance", with B.Adeva *et al.*, Phys. Lett. **B259** (1991) 199-208.
59. "Search for Leptoquarks in  $Z^0$  Decays", with B.Adeva *et al.*, Phys. Lett. **B261** (1991) 169-176.
60. "Measurement of  $Z^0 \rightarrow b\bar{b}$  Decays and the Semileptonic Branching Ratio  $Br(b \rightarrow l + X)$ ", with B.Adeva *et al.*, Phys. Lett. **B261** (1991) 177-187.
61. "Measurement of Electroweak Parameters from Hadronic and Leptonic Decays of the  $Z^0$ ", with B.Adeva *et al.*, Z.Phys. **C51** (1991) 179-204.
62. "Search for Narrow High-Mass Resonances in Radiative Decays of the  $Z^0$ ", with B.Adeva *et al.*, Phys. Lett. **B262** (1991) 155-162.
63. "A Test of QCD based on 3-Jet Events from  $Z^0$  Decays", with B.Adeva *et al.*, Phys. Lett. **B263** (1991) 551-562.

64. "Decay Properties of Tau Leptons Measured at the  $Z^0$  Resonance", with B.Adeva *et al.*, Phys. Lett. **B265** (1991) 451-461.
65. "Measurement of the Lifetime of  $B$ -Hadrons and a Determination of  $|V_{cb}|$ ", with B.Adeva *et al.*, Phys. Lett. **B270** (1991) 111-122.
66. "Search for Lepton Flavor Violation in  $Z^0$  Decays", with B.Adeva *et al.*, Phys. Lett. **B271** (1991) 453-460.
67. "Measurement of the Strong Coupling Constant  $\alpha_s$  for Bottom Quarks at the  $Z^0$  Resonance" with B.Adeva *et al.*, Phys. Lett. **B271** (1991) 461-467.
68. "New Particle Searches at LEP", The Vancouver Meeting, Particles and Fields '91, Volume I, eds. D.Axen *et al.*, World Scientific (1992) Singapore, 332-342.
69. "A direct determination of the number of light neutrino families from  $e^+e^- \rightarrow \bar{\nu}(\gamma)$  at LEP", with B.Adeva *et al.*, Phys. Lett. **B275** (1992) 209-221.
70. "Electroweak Parameters of the  $Z^0$  Resonance and the Standard Model", with D.Decamp *et al.*, Phys. Lett. **B276** (1992) 247-253.
71. "Studies of Hadronic Event Structure and Comparisons with QCD Models at the  $Z^0$  Resonance", with B.Adeva *et al.*, Z.Phys. **C55** (1992) 39-62.
72. "Search for the neutral Higgs Boson at LEP", with B.Adeva *et al.*, Phys. Lett. **B283** (1992) 454-464.
73. "Determination of  $\alpha_s$  from Hadronic Event Shapes Measured on the  $Z^0$  Resonance", with O.Adriani *et al.*, Phys. Lett. **B284** (1992) 471-481.
74. "Measurement of Inclusive Eta Production in Hadronic Decays of the  $Z^0$ ", with O.Adriani *et al.*, Phys. Lett. **B286** (1992) 403-412.
75. "An Improved Measurement of  $B^0\bar{B}^0$  Mixing in  $Z^0$  Decays", with O.Adriani *et al.*, Phys. Lett. **B288** (1992) 395-403.
76. "A Test of Quantum Electrodynamics in the Reaction  $e^+e^- \rightarrow \gamma\gamma(\gamma)$ ", with O.Adriani *et al.*, Phys. Lett. **B288** (1992) 404-411.
77. "Inclusive J production in  $Z^0$  Decays", with O.Adriani *et al.*, Phys. Lett. **B288** (1992) 412-420.
78. "Search for Isosinglet Neutral Heavy Leptons in  $Z^0$  Decays", with O.Adriani *et al.*, Phys. Lett. **B292** (1992) 371-382.
79. "A Measurement of Tau Polarization in  $Z^0$  Decays", with O.Adriani *et al.*, Phys. Lett. **B294** (1992) 466-478.
80. "Determination of the Number of Light Neutrino Species", with O.Adriani *et al.*, Phys. Lett. **B292** (1992) 463-471.
81. "Isolated Hard Photon Emission in Hadronic  $Z^0$  Decays", with O.Adriani *et al.*, Phys. Lett. **B292** (1992) 472-484.
82. "Searches for Nonminimal Higgs Bosons in  $Z^0$  Decays", with O.Adriani *et al.*, Phys. Lett. **B294** (1992) 457-465.
83. "High Mass Photon Pairs in  $t^+t^-\gamma\gamma$  Events at LEP", with O.Adriani *et al.*, Phys. Lett. **B295** (1992) 337-346.

84. "Measurement of the  $e^+e^- \rightarrow b\bar{b}$  and  $e^+e^- \rightarrow c\bar{c}$  Forward Backwards Asymmetries at the  $Z^0$  Resonance", with O.Adriani *et al.*, Phys. Lett. **B295** (1992) 454-462.
85. "Search of anomalous production of single photon events in annihilations at the Z resonance", with O.Adriani, *et al.*, Phys. Lett **B297** (1992) 469-476.
86. "Determination of quark electroweak couplings from direct photon production in hadronic Z decays", with O.Adriani, *et al.*, Phys. Lett **B301** (1993) 136-144.
87. "Results from the L3 experiment at LEP", with O.Adriani, *et al.*, Phys. Rept. **236** (1993) 1-146.
88. "A Search for the Neutral Higgs Boson at LEP", with O.Adriani, *et al.*, Phys. Lett. **B303** (1993) 391-399.
89. "Search for narrow vector resonances in the  $Z^0$  mass range", with O.Adriani, *et.al.*, Phys. Lett. **B313** (1993) 326-332.
90. "Search for a  $Z'$  at the Z resonance", with O.Adriani, *et al.*, Phys. Lett. **B306** (1993) 187-196.
91. "Measurement of  $\Gamma_{b\bar{b}} / \Gamma_{had}$  from hadronic decays of the  $Z^0$ ", with O.Adriani, *et.al.*, Phys. Lett. **B307** (1993) 237-246.
92. "Determination of the effective electron Electroweak mixing angle from  $Z^0$  decay", with O.Adriani, *et al.*, Phys. Lett. **B309** (1993) 451-462.
93. "Inclusive search for the charmless radiative decay of the b quark ( $b \rightarrow s\gamma$ )", with O.Adriani, *et al.*, Phys. Lett. **B317** (1993) 637-646.
94. "An S matrix analysis of the Z resonance", with O.Adriani, *et al.*, Phys. Lett. **B315** (1993) 494-502.
95. "Measurement of the average lifetime of B hadrons", with O.Adriani, *et al.*, Phys. Lett. **B317** (1993) 474-484.
96. " $\chi_c$  production in hadronic Z decays", with O.Adriani, *et al.*, Phys. Lett. **B317** (1993) 467-473.
97. "Measurement of  $\eta_c$  production in untagged two photon collisions a LEP", with O.Adriani, *et al.*, Phys. Lett. **B318** (1993) 575-582.
98. "Study of four fermion processes at LEP", with A.Adam, *et al.*, Phys. Lett. **B321** (1994) 283-294.
99. "Measurement of cross-sections and leptonic forward-backward asymmetries at the Z pole and determination of Electroweak parameters", with M.Acciarri, *et al.*, Z. Phys. **C62** (1994) 551-576.
100. "Measurement of inclusive production of neutral hadrons from Z decays", with M.Acciarri, *et al.*, Phys. Lett. **B328** (1994) 223-233.
101. "Measurement of the Inclusive  $b \rightarrow \tau\nu X$  Branching Ratio", with M.Acciarri, *et al.*, Phys. Lett. **B332** (1994) 201-208.
102. "Measurement of the  $B^0\bar{B}^0$  Mixing Parameter and the  $Z \rightarrow b\bar{b}$  Forward-Backward Asymmetry", with M.Acciarri, *et al.*, Phys. Lett. **B335** (1994) 542-553.
103. "A Measurement of  $\tau$  Polarization at LEP", with M.Acciarri, *et al.*, Phys. Lett. **B341** (1994) 245-256.
104. "Energy and Particle Flow in Three Jet and Radiative Two Jet Events from Hadronic Z Decays", with M.Acciarri, *et al.*, Phys. Lett. **B345** (1995) 74-84.

105. "Measurement of Exclusive Branching Fractions of Hadronic One-Prong Tau Decays", with M.Acciarri, *et al.*, Phys. Lett. **B345** (1995) 93-102.
106. "B\* Production in Z Decays at LEP", with M.Acciarri, *et al.*, Phys. Lett. **B345** (1995) 589-597.
107. "Search for Anomalous  $Z \rightarrow \gamma\gamma$  Events at LEP", with M.Acciarri, *et al.*, Phys. Lett. **B345** (1995) 609-616.
108. "Measurement of Energetic Single Photon Production at LEP", with M.Acciarri, *et al.*, **B346** (1995) 190-198.
109. "Search for Neutralinos in Z Decays", with M.Acciarri, *et al.*, Phys. Lett. **B350** (1995) 109-119.
110. "Measurement of the Weak Charged Current Structure in Semileptonic B Hadron Decays at the Z Peak", with M.Acciarri, *et al.*, **B351** (1995) 375-386.

### Presented Papers

"New Particle Searches at LEP", Particles & Fields 91: Meeting of the Division of Particles & Fields of the APS, Vancouver, Canada, 18-22 Aug. 1991.

### Other Reports and Technical Notes (Unpublished)

1. "ZFITTER: An Analytical Program for Fermion Pair Production in  $e^+e^-$  Annihilation", CERN-TH-6443-92, May 1992, 75pp.
2. "GEM Technical Design Report", with W.C.Lefmann, *et al.*, GEM-TN-93-262, Apr. 1993, 628pp.
3. "E823 (D0 Upgrade): Magnetic Tracking", with B.Gomez, *et al.*, FERMILAB-D0-UPGRADE-E-823, Oct 1993, 40pp.
4. "Expression of Interest to the Superconducting Super Collider Laboratory by the L\* Collaboration", with S.C.C.Ting, *et al.*, SSCL-SR-1165, May 1990, 89pp.
5. "Letter of Intent to the Superconducting Super Collider Laboratory by the L\* Collaboration", with S.C.C.Ting, *et al.*, SSCL-SR-1154, Nov. 1990, 89pp.
6. "Coding Recommendations", with C.Hallac and F.Deutschmann, BlackRock, May 1997, 8pp.
7. "BK Calibration Process", with P.Wadhwa and A.Wizon, BlackRock, May 1997, 2pp.
8. "The Modified Black Model and BK Calibration", with F.Schmidt, BlackRock Nov. 1997, 4pp.
9. "Changes in BlackRock's Treasury Yield Curve Model", with L.Tilman, BlackRock, Sep. 1998, 6pp.
10. "Calibrating the BK Model with Yield Curve Shocks and Computing Volatility Duration", with A.Wizon, BlackRock, Oct. 1998, 9pp.
11. "New Constant Maturity Treasury (CMT) Basis Model", BlackRock, Oct. 1998, 3pp.
12. "Trinomial Implementation of Black-Karasinski Interest Rate Model – Improving Volatility Curve Calibration", BlackRock, Mar. 1999, 17pp.
13. "Significant Computational Improvements Calculating CMT Rates using An Arrow-Debreu Bootstrap", BlackRock, Mar. 1999, 4pp.
14. "Exponential Basis Treasury Curve Model", with W.DeLeon, BlackRock, Oct. 1999, 19pp.
15. "Bootstrapping the LIBOR Curve and Improving Forward Rate Interpolation", BlackRock, Feb. 2000, 3pp.

16. "New Agency Reference Curve", with M.Paltrowitz and G.Lambrinides, BlackRock, Feb 2000, 3pp
17. "New Implied Forward FX Rate Model", with W.DeLeon, BlackRock, Apr. 2001, 5pp.
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## **References**

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**Miscellaneous**

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