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# PROCEEDINGS
# OF THE
# SUMMER INSTITUTE ON PARTICLE PHYSICS

*August 4–15, 1997*

## The Physics of Leptons

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**David Burke**
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**Edited by Annemaria Breaux, Jennifer Chan, Lilian DePorcel, and Lance Dixon**

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*This year's Summer School marks a quarter century of service by Professor David Leith as a Director of the Institute. David has decided that it will be his last. His leadership was celebrated at the end of this year's School in a series of talks and readings of letters by many present and former colleagues. The SLAC Summer Institute is recognized world-wide as the best pedagogical school for young particle physicists and David's guidance of the program has made it so. A "poster-of-posters," replicated here, was presented to David by Laboratory Director Burton Richter as a reminder of the variety and richness provided by the Summer Institute during the years of David's tenure at its helm.*

# The SLAC Summer Institute 25 years


## *Thanks, David*

# TABLE OF CONTENTS

# PREFACE

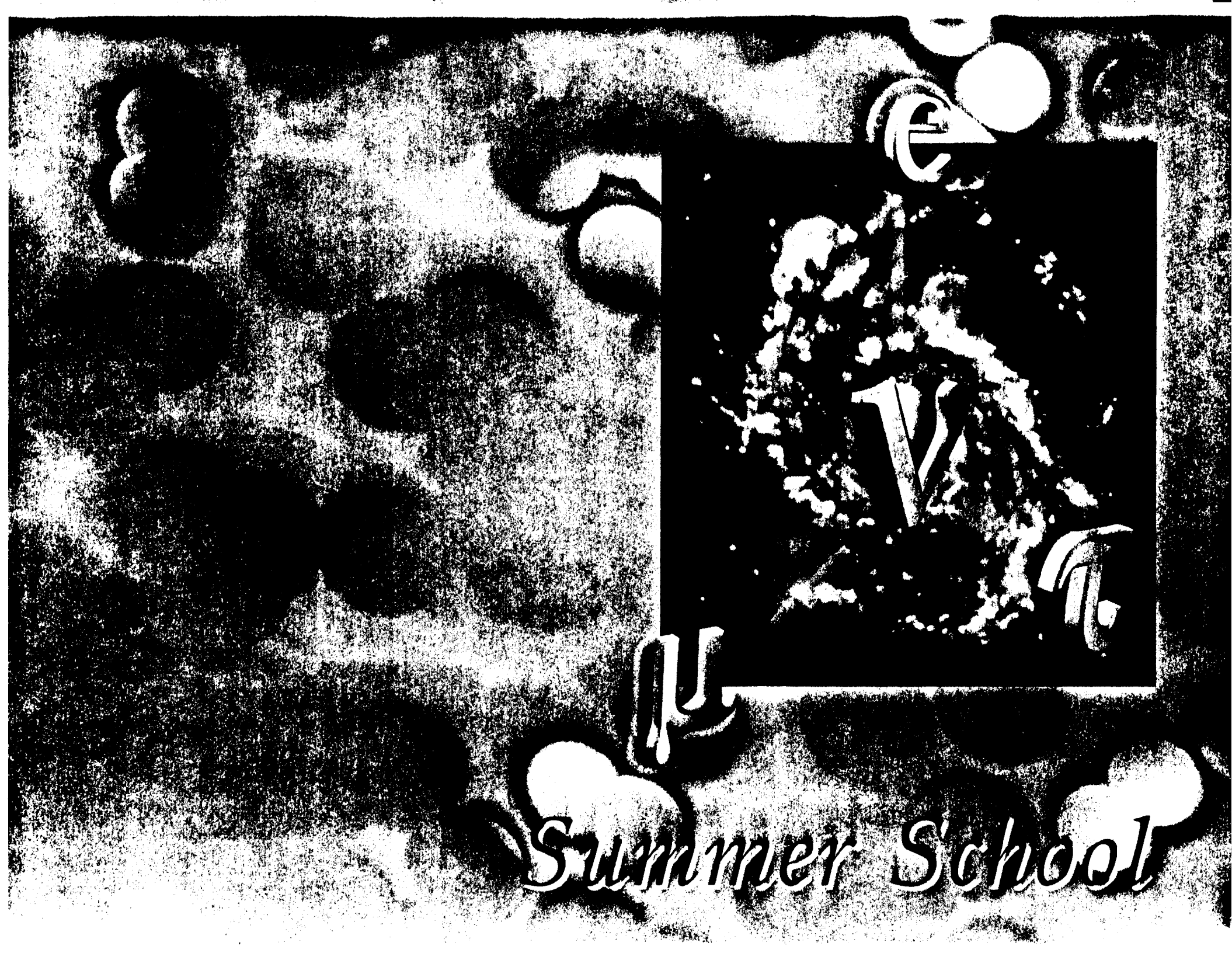
One hundred ninety-eight physicists from 16 countries gathered at SLAC from August 4 to 15, 1997 to attend the XXV SLAC Summer Institute on Particle Physics. The theme of the school was *The Physics of Leptons*, commemorating a century since the electron, the first lepton, was discovered. We heard about the electron's role as a probe of the structure of matter, as well as the beautifully precise tests of charged-lepton universality in $Z^0$ decays.

The focus of the school then shifted from the charged leptons to their weak partners, the neutrinos. Summer Institute attendees were not surprised in early 1998 by Super-Kamiokande's announcement of evidence for neutrino mass. After all, they had already seen the mounting evidence, both solar and atmospheric, the preceding August, in a comprehensive review of all nonaccelerator-based neutrino oscillation experiments, as well as a topical conference report from Super-Kamiokande. We also heard about the past, present, and future of reactor- and accelerator-based oscillation experiments, including the prospects for terrestrial tests of the atmospheric neutrino anomaly. Leptons in cosmology and as harbingers of physics beyond the Standard Model were the subject of two more lecture series.

The three-day topical conference concluding the Institute was highlighted by the Super-Kamiokande neutrino results, and Beppo-Sax's report on the cosmological origin of gamma-ray bursters. As for terrestrial accelerators, SLC, LEP, and the Tevatron put increasing pressure on the electroweak sector through precision measurements, but all direct searches for new phenomena still came up empty.

We thank all SSI speakers for making this school such an interesting and inspiring one, as well as the provocateurs for enlivening the afternoon discussion sessions. We thank Jochen Schwiening for his invaluable web support. The Institute could not have taken place at all without the efforts of Lilian DePorcel and Jennifer Chan, who also edited these Proceedings.

David Burke
Lance Dixon
David Leith


Summer School