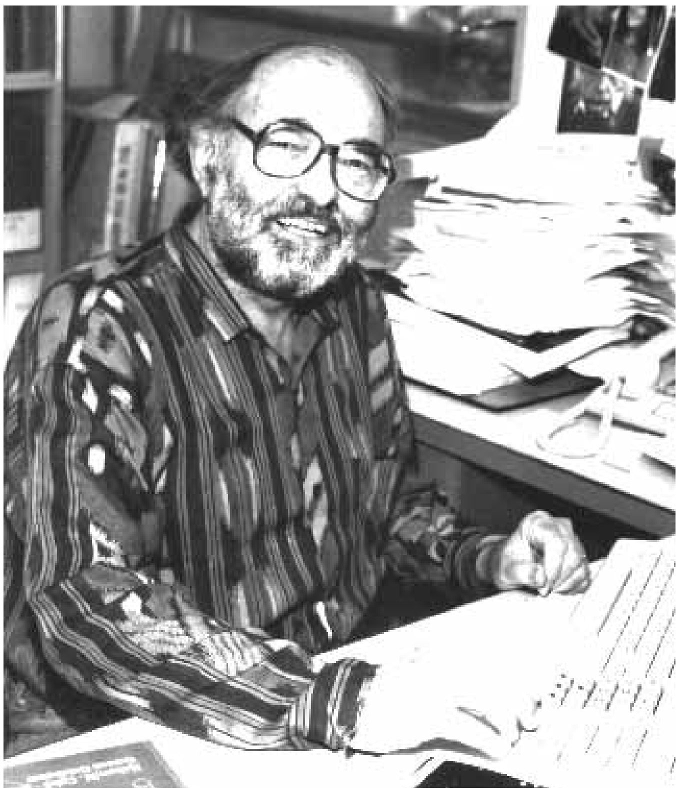
GUEST EDITORIAL



LBL Photographic Services

Gerson Goldhaber is now Professor in the Graduate School, University of California at Berkeley and Faculty Staff Scientist emeritus at the Lawrence Berkeley Laboratory (LBL). He was co-group leader with George Trilling at LBL when they joined Willie Chinowsky of LBL and Martin Perl and Burton Richter's groups at the Stanford Linear Accelerator Center to build the SPEAR solenoidal detector. This collaboration lasted from 1971 to 1990 moving from SPEAR to PEP, and then to the SLC. For the discovery of charmed mesons he received the 1977 California scientist of the year award and in 1991 the Panofsky Prize of the American Physical Society (shared wtih Francois Pierre). Since 1990 he has been working with Saul Perlmutter at LBL in a search of the most distant supernovae. The Supernova Cosmology Project has by now observed 27 supernovae, mostly type Ia that can be used as standard candles. The aim of the experiment is to measure the deceleration parameter of the Universe (but this is a topic for a future Beam Line *article).*

THE LEAD ARTICLE in this issue of the *Beam Line* is Martin Perl's description of the discovery of the tau lepton. The story goes back to the mid-1970s, at a time when the SPEAR electron-positron storage ring at SLAC had recently come into operation, and a joint SLAC/LBL collaboration was using its pioneering solenoidal detector and track reconstruction algorithms in the early experimental program. The two-mile-long linear accelerator came into being largely through the efforts of Pief Panofsky, SLAC's first Director; Burt Richter, SLAC's present Director, was largely responsible for SPEAR.

Martin Perl was one of very few team members who approached our experiment at SPEAR with a definite goal—to find a heavy lepton. Other approaches were more in the bubble chamber tradition of analyzing the data and following the clues revealed by the analyses. As circumstance would have it, both approaches met with remarkable success.

During the brief period that the original SLAC/LBL solenoidal magnetic detector (Mark I) was operational, from 1973 to 1977, our experiment was arguably one of the most productive in the history of particle physics. We discovered the psi, the psi-prime and their quantum numbers, the decays of psi-prime to psi, the radiative decays of the psi, the chi states (the first one observed at DESY) and general psion spectroscopy, the evidence for quark jets, beam polarization leading to spin 1/2 quarks, the anomalous electron-muon events that became the tau lepton as described in the following article, and the *D* mesons that proved what some theorists had suspected all along—that the *J*/psi was a bound state of charmed quarks.

It was in mid-1975, in the wake of the psion spectroscopy, beam polarization, quark jets—one thrill a week—that Martin came to Berkeley to tell our half of the collaboration about his observations. He told us about his 24 electron-muon events, sometimes known as "Perl's pearls," and about his meticulous study of backgrounds and why he thought these events represented the decay of a pair of new particles. The initial reaction of the collaboration was interest blended with skepticism. As soon as I had a few hours to spare from all the other exciting projects, I studied these events using my own criteria, and I convinced myself that they were indeed real and that Martin had observed "anomalous lepton" production. What was more difficult to believe was that these electron-muon events were actually the decay products of new particles and in particular the heavy leptons that Martin had set out to find, rather than simply some phenomenon related to the *J*/psi system that was then under study in precisely the same energy region.

With Gary Feldman's active participation, Martin persisted, and together they found the corresponding "anomalous" muon pairs. With the discovery of the *D* mesons in May 1976 it became clear that whatever it was that Martin had found had nothing to do with the long-sought charmed meson.

It is amusing that when the muon was discovered it was at first confused with the then-predicted Yukawa meson, the pion, and indeed the masses are rather close. This situation again repeated itself with the tau lepton and the *D* meson.

As shown in the following article, Martin was indeed correct, and those who at first doubted his interpretation have long since become believers. Among the believers are the members of the Nobel selection committee, who have chosen Martin Perl to share the 1995 Nobel Prize in physics for his discovery of the tau lepton—a fascinating story. Read on.

—Gerson Goldhaber