The French and German Physical Societies together awarded the 2000 Gentner Kastler Prize to **Michel Broyer** in appreciation of his pioneering contributions to the analysis of molecular Rydberg states and to the femtosecond spectroscopy of clusters. Broyer is the director of the ion and molecular spectroscopy laboratory at the Claude Bernard University (University of Lyon I) in France.

The UK's Institute of Physics and the German Physical Society jointly presented this year's Max Born Prize to **Rolf Felst** of the University of Hamburg in January. He was cited "for his outstanding contribution to elementary particle physics, his leading role in the investigation of e^+-e^- collisions with the JADE detector, which led to many important discoveries in the area of strong and weak interaction, and his continuous support of British scientists in their work at the DESY laboratory."

The Rudolf Kaiser Prize was presented to **Lutz Schweikhard** of the University of Mainz for his groundbreaking contributions to the physics of clusters in ion traps.

Also at the Regensburg meeting, the Gaede Foundation of the German Vacuum Society awarded this year's Gaede Prize to **Thomas Michely** of RWTH–Aachen. He was recognized for his pioneering experiments on particle–surface interactions and nucleation processes in the growth of thin layers on the atomic scale.

Obituaries

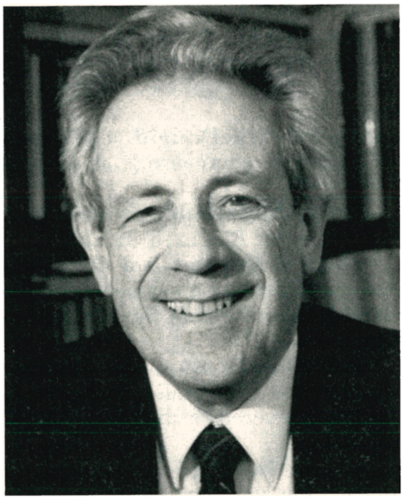
Louis Michel

The eminent French theoretical and mathematical physicist Louis Michel died suddenly of an embolism in Bures near Paris on 30 December 1999.

Michel was born on 4 May 1923 in Roanne, France, into a family of modest circumstances. He received his higher education at the selective Ecole Polytechnique in Paris, from which he graduated in 1946.

After working briefly in experimental cosmic-ray research, Michel decided to study theoretical physics. In the years immediately following World War II, theoretical physics enjoyed an enormous rebirth in the US, the UK, and in Italy, but in France it remained in a "disaster area." (Subsequently, as this obituary will recount, Michel played a distinguished role in the reconstruction of French theoretical physics.) Recognizing this state of affairs, Michel went abroad—first to Manchester (1948–50), next to Copenhagen, and then to Princeton. During this exile, he occasionally went back to France, but in 1954 he returned to his native country for good. He occupied various posts in the French academic system until he became, in 1962, a professor at the newly founded private Institut des Hautes Etudes Scientifiques, where he worked until his death.

Michel's very first paper (1949), on the electron spectrum from the decay of a muon into an electron and two neutrinos, brought him immediate international recognition. In that paper, he showed that the spectrum is characterized—for the most general (parity conserving) 4-fermion coupling—by a single parameter, ρ, which



A. BOUBAT, AGENCE TOP

Louis Michel

is now universally known as the Michel parameter. Michel's formalism (with its extension to parity violation, done with Claude Bouchiat in 1957) found a brilliant new application after the discovery of the tau lepton in 1975.

Michel was the first to realize, in a 1952 review paper on the coupling of elementary particles, that a coupling could be represented mathematically as the superposition of scalar and pseudoscalar parts. Such a breaking of mirror invariance, he showed, would manifest itself physically through a pseudoscalar combination of the kinematical observables—a remarkable insight.

In a fundamental paper on charge conjugation (1953), he introduced a new quantum number, isotopic parity, which has since been universally accepted under the name G-parity attached to it by Tsao-Dang Lee and Chen-Ning Yang. Michel's masterful doctoral thesis (1953) on the universal Fermi interaction revealed the essential features of much of his research: concern for utmost generality, appeal to the most suitable mathematical tools, and, at the same time, a strong desire not to lose touch with experiment.

The polarization of particles was long a favorite topic of Michel's. Together with Arthur Wightman, he proposed, in 1955, the covariant Dirac projection operator for polarization, which is now standard textbook fare. Equally popular is the Bargmann-Michel-Telegdi (BMT) equation. First introduced in 1958, BMT describes the precession of the polarization of a particle moving in a (weakly and slowly variable) electromagnetic field. BMT has found wide applications in many precision experiments and in accelerator design.

Michel was, at least in Western Europe, the first to realize that parity violation would manifest itself through the longitudinal polarization of β particles. He and his student Bouchiat proposed various ways to detect that effect.

Michel focused next on phenomena that occur when internal symmetries are broken spontaneously. He applied this approach not only to elementary particles, but also to the field of condensed matter, where he developed group-theoretical methods for the topological classification of defects. For the past twenty years, he devoted himself to renewing, by means of the most recent mathematical tools, the description of crystals and pseudocrystals and to specifying, in collaboration with Joshua Zak, the properties of the energy bands that arise from crystal symmetries. His last researches were to form the content of two books, which he nearly finished before he died.

This succinct account of Michel's scientific work affords but an incomplete glimpse of his professional activities. Although, from its impressive scope, his enthusiasm for research can be inferred, it does not reveal his missionary zeal, his optimism devoid of naïveté. Michel attracted students and postdocs from all over the world, who learned from the Master what research could and should be. An irrepressible traveler, he went abroad at least once a year, invited as a visiting professor, lecturing at summer schools, or attending conferences. Through his travels and his early training, he became the most cosmopolitan of French physicists and the most French among the scientists in his chosen field.

Michel's contributions to the

rebirth of theoretical physics in France after the war were decisive. Among these, we mention his leading role in the creation of the Center for Theoretical Physics at the Ecole Polytechnique, his training of French students, and his presidency of the committees on theoretical physics of the French National Science Foundation (CNRS).

Michel received many distinctions—most notably, perhaps, the Eugene Wigner Medal (awarded for his group-theoretical contributions), and the Lee Page Prize lectureship at Yale.

Turning from Michel the scientist to Michel the man, it should be mentioned that he was a devout Christian and an exemplary family head to his wife Thérèse and their six children.

Raymond Stora
LAPP, Annecy-le-Vieux
France
Valentine Telegdi
California Institute of Technology
Pasadena, California

Jan Peter van der Ziel

Jan Peter van der Ziel, who was well known for his contributions to the field of semiconductor lasers, died on 9 September 1999 in Plano, Texas after a 21-month battle with cancer.

Jan was born in the Dutch city of Eindhoven on 17 August 1937. In 1950, he emigrated with his family, first to Canada and then to the US. He earned his BS degree at the University of Minnesota and his master's and PhD degrees in applied physics at Harvard University. His thesis, entitled "Investigation of Optical Second Harmonic Generation in KH_2P0_4 Ferroelectrics," was completed in 1964.

In 1965, Jan joined Bell Labs in Murray Hill, New Jersey. In his early years, he carried out optical spectroscopy and stimulated emission studies of transition metal and rare earth ions. In the 1970s, after the semiconductor laser emerged as a practical light source for optical communications, he focused on semiconductor laser materials and devices. Optical communications came of age during Jan's time at Bell Labs.

Jan was one of the first to investigate the potential of layered semiconductors made by the newly developed method of molecular beam epitaxy. In 1975, he showed that multiple layers of GaAs and AlGaAs could be used to make very high-quality mirrors that could be built right into a laser structure. These mirrors are now routinely used in vertical cavity lasers, where they form the high reflecting ends of optical cavities only a few micro-