

Laudatio for Feza Gürsey on the occasion of the
award of the Wigner Medal, October 22, 1986

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It is a very pleasant duty indeed to participate in this ceremony honouring Feza Gürsey. Let me begin with a few words marking the stations in the education and professional life of our laureate. He was born in Istanbul, Turkey, studied at the University of Istanbul, graduating with a B.Sc. degree in 1944. For his graduate work he went to England, obtained a Ph.D. from the Imperial College in London in 1950 and subsequently spent a year as a post doctoral fellow at Cambridge University. Returning to his native country he served as an assistant and lecturer from 1951 to 1956 at Istanbul University. This was followed by a period of 5 years in the USA where he worked as a visiting scientist at Brookhaven National Lab, at the Institute for Advanced Study in Princeton and at Columbia University. He had then become internationally recognized as one of the brilliant young theorists in elementary particle physics. From '61 to '68 he was professor of physics at the Middle East University in Ankara. Then in 1968 he accepted a professorship at Yale University. As a token of the high appreciation of his achievements in research and in creating a stimulating atmosphere for students Yale University chose him for the J. Willard Gibbs professorship in 1977.

In the work of Feza Gürsey one theme is dominant: the search for

higher symmetries, exact or approximate, visible or hidden by spontaneous symmetry breaking. In 1953 he began studying the extension of space-time symmetry from the Poincare group to the conformal group, an idealization where only the causal structure, not the length scale, is fixed i.e. where the rest masses of particles are considered as a secondary, symmetry breaking effect. The idea that physical theory should attain conformal invariance in an asymptotic region has been fruitful in many subsequent developments. One of them is the realization that in quantum field theory with only one space dimension or, alternatively, in equilibrium statistical mechanics of 2-dimensional surfaces conformal symmetry reduces the problem to the representation theory of an infinite parametric Lie group and thereby allows the construction of explicit, non trivial solutions. A pioneer paper for this latter development is due to Gürsey and Orfanides in 1973.

Gürsey was one of the driving forces in the search for "internal" symmetries in elementary particle interactions leading from the isotopic spin invariance of strong interactions known in 1950 to present day schemes of "grand unification" of all interactions. He was the first to introduce exceptional Lie groups in the context proposing universal gauge theories based on E_6 and E_7 in 1976. It is too early to judge the ultimate merits of these proposals but they have certainly produced an enormous resonance in the literature and provided essential stimulus.

A third direction concerns the unification of space-time-symmetries and "internal" symmetries. Here the work of Gürsey and Radicati in 1964 marks a beginning. It correctly assigned all low lying baryon states to the 56-dimensional representation of $SU(6)$. On the one hand this brought the statistics puzzle into sharp focus which led to the interpretation of quarks as being para fermions of order three and, ultimately, to the introduction of the colour- $SU(3)$ local gauge group. On the other hand it generated a large scale effort to unite kinematical and dynamical features in a group theoretical setting, a subject very much alive to-day.

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It is not easy to assess the impact which the work of Feza Gürsey had on the development of elementary particle phenomenology. He has been often ahead of his time, composing music of the future. So in his beautiful work on quaternionic quantum theory or the use of non-associative algebras based on octonians. But, as I heard it expressed by several of his friends: in all his writing one recognizes a rare sense of elegance and beauty. The faith in the relevance of beauty for the discovery of fundamental laws allows us to wish that those compositions of Feza Gürsey which did not yet have a strong resonance will be played by large orchestras in the future.

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