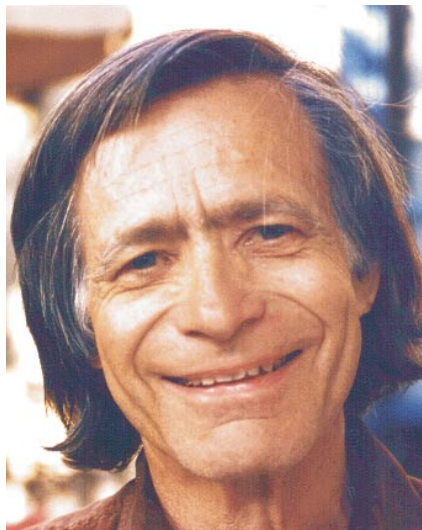


## Dirac Medal Honors Work in Turbulence

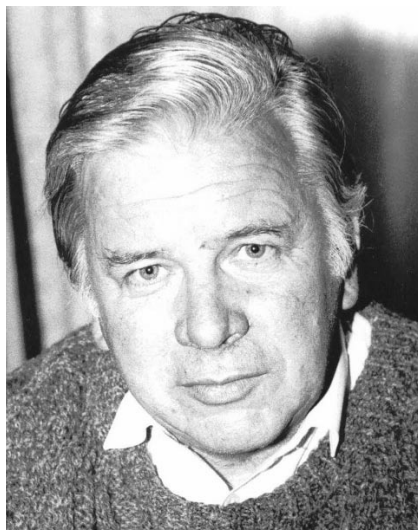
To mark the occasion of P.A.M. Dirac's birthday on 8 August, the Abdus Salam International Centre for Theoretical Physics in Trieste, Italy, awards the Dirac Medal annually on that date to recognize contributions to theoretical physics and mathematics. This year, the ICTP honored **Robert H. Kraichnan** and **Vladimir E. Zakharov**. The pair share the prize for their "distinct contributions to the theory of turbulence, particularly the exact results and the prediction of inverse cascades, and for identifying classes of turbulence problems for which in-depth understanding has been achieved," says the ICTP.

Kraichnan, who has been a research agency grantee and a consultant to a variety of organizations since 1962, has done "pioneering research on field-theoretic approaches to turbulence and other non-equilibrium systems," according to the ICTP. In par-



Kraichnan

ticular, he has predicted the inverse energy cascade and forward enstrophy cascade in two-dimensional turbulence. He developed soluble, self-consistent dynamical models that shared invariances and conservation properties with the Navier–Stokes equation and gave quantitatively good predictions of low-order turbulence statistics. Central to this work is the direct-interaction approximation model. Kraichnan also introduced the "rapid change" model of advection of a scalar field by a random velocity field. For



Zakharov

the first time in a turbulence-related problem, the model exhibited anomalous scaling that could be demonstrated analytically.

Zakharov, who directed the Russian Federation's Landau Institute for Theoretical Physics in Moscow until this past June, has contributed to a deeper understanding of weak turbulence, which has broad physical applications to the theory of wind-driven waves in the ocean, to wave turbulence in the solar corona, and to the kinetics of Bose–Einstein condensation. His achievements include "putting the theory of wave turbulence on a firm mathematical ground by finding turbulence spectra as exact solutions and solving the stability problem, and in introducing the notion of inverse and dual cascades in wave turbulence," says the ICTP. Zakharov is a professor of mathematics at the University of Arizona, Tucson.

The two medalists each received a \$5000 cash prize.

## EPS Recognizes Efforts in Particle Physics

The high-energy particle physics division of the European Physical Society honored several people in July at the International Europhysics Conference on High Energy Physics in Aachen, Germany.

**David Gross**, **David Politzer**, and **Frank Wilczek** shared the 2003 High Energy and Particle Physics Prize for their "fundamental contributions to quantum chromodynamics,

the theory of the strong interactions." The citation went on to say, "By demonstrating that the theory is asymptotically free, that the couplings become weak at large momentum transfers, they paved the way for showing that the theory is correct." Gross is the Frederick W. Gluck Professor of Theoretical Physics and director of the Kavli Institute for Theoretical Physics at the University of California, Santa Barbara. Politzer is a professor of theoretical physics at Caltech and Wilczek is the Herman Feshbach Professor of Physics at MIT.

**Guillaume Unal**, a researcher at Laboratoire de l'Accélérateur Linéaire (LAL) in Orsay, France, received the Young Physicist Prize for his "contribution to the analysis of NA48 data [from the CERN Super Proton Synchrotron], whereby direct *CP* violation in *K* decays was established."

The Gribov Medal went to **Nima Arkani-Hamed** for his "original approaches to hierarchy problems in the theories of fundamental interactions. In particular, [he considered] the possibility of large extra dimensions where only gravity can propagate and [explored] its broad phenomenological implications." Arkani-Hamed is a professor of physics at Harvard University.

The Outreach Prize was awarded to **Rolf Landua** and **Nicholas D. Tracas**. According to the EPS, Landua, a research physicist at CERN, "has very efficiently collaborated, on a voluntary basis, in most of the education activities of the Education and Technology Transfer division (ETT) at CERN." Tracas was cited in part for "promoting the public image of physics in Greece, in particular through programs for high school teachers." He is an associate professor of physics in the School of Applied Sciences of the National Technical University in Athens, Greece.

## Recipients of Highest US Civilian Honor Include Teller

President Bush awarded the Presidential Medal of Freedom to 11 individuals, among them physicist **Edward Teller**, who was honored for his lifetime achievements. Medals were bestowed during a ceremony on 23 July at the White House.