

David Ruelle Biography

June 20, 2021. Patrick Charbonneau

David Pierre Ruelle (August 20, 1935-) was born in Ghent, Belgium, the son of Pierre Ruelle, a French teacher and later academic linguist and philologist, and Marguerite Ruelle (née De Jonge). He spent his youth in Mons, Belgium.

Ruelle first studied Civil Engineering, obtaining the diploma of *Candidat Ingénieur Civil* at the *Faculté Polytechnique* of *Université de Mons* in 1955. That year he also passed complementary examinations for the diplomas of *Candidat en Sciences Mathématiques* and *Candidat en Sciences Physiques* at *Université libre de Bruxelles*, from which he graduated (1957) and obtained his PhD (1959). Although the latter was under the mentorship of Jules Géhéniau, his thesis entitled “*Contribution à l'étude axiomatique de la théorie quantique des champs*” was actually prepared under the supervision of Res Jost, during his extended stay at *Eidgenössische Technische Hochschule (ETH)* in Zurich. After one year of military service in the Belgian infantry (1959-1960), Ruelle returned to ETH. There, he spent two years, first as Research Assistant and then as Privatdozent, after being granted the habilitation for a thesis entitled “*On the asymptotic condition in quantum field theory*”. He was then a member of the Institute for Advanced Study in Princeton, NJ, USA (1962-1964), before taking a professorship position at the *Institut des Hautes Etudes Scientifiques* in Bures-sur-Yvette, France, where is an honorary member since 2000.

Ruelle has made fundamental contributions to various aspects of mathematical physics. In quantum field theory, he rigorously formulated scattering processes based on Wightman's axiomatic theory. Later, he helped create a rigorous theory of equilibrium statistical mechanics, including the study of the thermodynamic limit, the equivalence of ensembles, and the definition of Gibbs states. He also worked on dynamical systems, notably on turbulence. From his post in Bures-sur-Yvette, he became acquainted with spin glass models by interacting with the nearby theoretical physics group of the CEA (now, *Institut de Physique théorique*). He also regularly visited Rutgers, where he has long been a Distinguished Visiting Professor.

Ruelle has received numerous awards, including the Dannie Heineman Prize for Mathematical Physics (1985) “for his systematic pursuit of the mathematical basis needed for broadened physical insight in the areas of quantum field theory, statistical mechanics and turbulence,” the Boltzmann Medal (1986), the Henri Poincaré Prize “for his outstanding contributions to quantum field theory, to both classical and quantum statistical mechanics, and to dynamical systems theory,” and the Max Planck Medal (2014) “*Für seine grundlegenden Beiträge zur relativistischen Quantenfeldtheorie, statistischen Mechanik und Theorie der dynamischen Systeme mit Anwendungen auf das Problem des Einsetzens von Turbulenz*” [for his fundamental contributions to the relativistic quantum field theory, statistical mechanics and theory of dynamic systems

with applications to the problem of the onset of turbulence]. He is also a member of the French Académie des Sciences (1985), the American Academy of Arts and Sciences (1992), Academia Europaea (1993), the United States National Academy of Sciences (2002), and the Accademia Nazionale dei Lincei (2003). His treatise *Statistical Mechanics* (1969) has become a classic of the field. He has also written popular science books, notably *Chance and Chaos* (1991) and *The Mathematician's Brain* (2007), both since broadly translated.