Oriol Bohigas

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Oril Bohigas (Oriol Bohigas i Martí in Catalan documents), born 22 December 1937 in Barcelona, Catalonia, died 22 October 2013 in Orsay, France, was an outstanding Catalan and French physicist. He obtained important results in the field of random matrix theory and its applications to the spectral properties of quantum systems. He is known for the Bohigas-Giannoni-Schmit conjecture which states that the statistical spectral fluctuations in systems of quantum chaos are described by the random matrix theory.

Life and Physics

Bohigas was born in 1937 in Barcelona in a Catalan family. He studied physics at the University of Barcelona, but soon in 1962 he moved with his wife Nuria Sales to Paris and Orsay, France, where he finished his studies with the 3eme Cycle de Physique Nucleaire. He became a member of the national research center (Centre National de la Recherche Scientifique - CNRS) at Orsay and started his scientific career there as Attaché de Recherche in 1966. Later, he became Chargé de Recherche (1971), Maitre de Recherche (1979), and Directeur de Recherche (from 1989 till retirement in 2004). He was the founding father of

Figure 1: Oriol Bohigas, July 17, 1998

the Laboratoire de Physique Théorique et Modèles Statistiques (LPTMS) at which he remained an emeritus Directeur de Recherche till last days. Bohigas had been also the head of the Theoretical Physics Division of the Institut de Physique Nucléaire. He is also considered as a grandfather of the Laboratoire de Physique Théorique (LPT) at Toulouse launched in 1991. Living practically all his scientific life in France, Bohigas became a French citizen in 1981. He is survived by his wife Nuria Sales, son and two daughters.
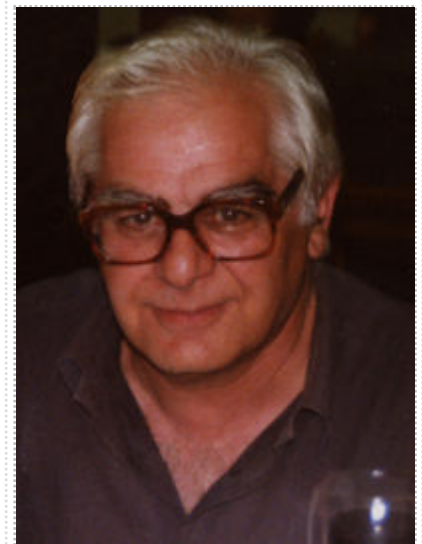
Bohigas worked as a theorist in the fields of nuclear physics, random matrix theory and quantum chaos with unexpected applications extending even to number theory. His colleagues at LPTMS and LPT remember his remarkable physical intuition that allowed him to make insights in complex and nontrivial physical problems. His scientific style and vision and a sense of humor - sometimes rather sharp and direct - were strongly appreciated by theoreticians, making him a leading figure of theoretical physics.

The seminal scientific results obtained by Bohigas include applicability of the Gaussian orthogonal ensemble for spectral fluctuations of two-body random Hamiltonians, sum rules for nuclear collective excitations, a fluid-dynamical Lagrangian approach to giant-resonances, theory of quantum chaotic tunneling, aspects of chaos and random matrix statistics in nuclear physics, statistical properties of roots of random polynomials. The Bohigas-Giannoni-Schmit conjecture became a fundamental result in the field of quantum chaos. It established applicability of the random matrix statistics for energy level fluctuations to spectra of chaotic billiards and other systems of quantum chaos. The conjecture was confirmed in experiments with microwave and superconducting chaotic billiards.

Bohigas obtained several prestigious international distinctions including the Gay-Lussac - von Humboldt prize (1991), the Holweck medal and the Holweck prize of the Physical Society of London and the Societé Francaise de Physique (1999) "for distinguished work in theoretical physics closely related to experiments", an Honorary Doctorate from Technische Universität Darmstadt (2001).

Chaotic Stories

* Workshop on Quantum chaos at Schloss Nordkirchen in summer 1990, after breakfast a group of young participants go through the park to listen the scientific morning talks, they cross Bohigas, smoking a cigarette and moving in the opposite direction. Bohigas asks a participant of the group "Do you know what is about the first morning talk? Probably there will be nothing interesting? Should I really go there?", a participant tells that he does not remember who gives the first talk, but that he assumes it will be interesting to listen. When the group comes to the lecture hall, they discover, with a great surprise, that the first talk is given by Oriol Bohigas. And it was a fascinating

talk.

✦ Program "Complex Systems and Quantum Chaos" at Institute for Nuclear Theory, University of Washington, Seattle in March 2000, during a break between talks a group of participants go to University cafeteria of get a cup of coffee staying in a line to pay for it, when a turn arrives to Bohigas a young girl at a cash box asks Bohigas "Are you a student?", he smiles and tells "Can you accept that I am?", she tells that of course, and he pays his student tariff with a small discount. In fact in 2000 he still has no PhD and keeps a spirit of a young student, being always ready to make a joke.

✦ From the letter of Boris Chirikov addressed to Achim Richter on Honorary Doctorate for Oriol Bohigas from Technische Universität Darmstadt: "the main distinction of Bohigas' approach to physical problems is a combination of a simple physical theory, not overloaded by sophisticated mathematical machinery, with skillful numerical experiments. This was especially important in his pioneering research of a deep relation between the already well developed theory of random matrices, a purely statistical one, and the underlying chaotic dynamics, the brand-new, that time, quantum chaos. This put the firm foundations of the contemporary statistical theory of complex quantum systems. ... The Honorary Doctorate would be a fair recognition of his [Bohigas] important contribution to physics in the last century, and a strong stimulus for farther research in the new millennium." (dated around 12-18 Jan 2001, Novosibirsk, from archive of Boris Chirikov).

Figure 2: Oriol Bohigas, July 17, 1998

Figure 3: Oriol Bohigas and Achim Richter at attribution of Honorary Doctorate, November, 2001

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❖ Hans-Jürgen Stöckmann (2010) Microwave billiards and quantum chaos Scholarpedia, 5(10):10243

External links and references

❖ Laboratoire de Physique Théorique et Modèles Statistiques (LPTMS) du CNRS (http://lptms.u-psud.fr/en/)

❖ Laboratoire de Physique Théorique de Toulouse (LPT) du CNRS (http://www.lpt.ups-tlse.fr/?lang=fr)

❖ A.Richter, "Honorary Doctorate for Oriol Bohigas", Nuclear Phys. News 12(2):30 (2002)

❖ F.Haake, "Quantum signatures of chaos", Springer, Berlin (2010)

❖ Archive of Boris Chirikov (http://www.quantware.ups-tlse.fr/chirikov/archive.html)

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