



Klaus von Klitzing



Data di nascita: 28 giugno 1943

Luogo: Schroda (Germania)

Nomina: 22 maggio 2007

Disciplina: Fisica

Titolo: Professore, Premio Nobel in Fisica, 1985

Principali premi, riconoscimenti e accademie

Premi: Premio Schottky (1981); Premio Hewlett Packard (1982); Premio Nobel in Fisica (1985); Medaglia Dirac (1988); Premio Philip Morris (1990); Medaglia Eötvös (1994); Premio per una carriera nelle scienze, Birla Science Center (1999); Bayerischer Maximiliansorden für Wissenschaft und Kunst; Carl Friedrich Gauß-Medaille (2005); Österreichisches Ehrenzeichen für Wissenschaft und Kunst (2009), TUM Distinguished Affiliated Professor (2011), Orden Pour le mérite für Wissenschaft und Künste (2019). Dottorati onorari dalle Università di 13 paesi. *Accademie:* US National Academy of Sciences; Accademia delle scienze russa; Royal Society of London; Accademia delle Scienze cinese; Ehrenmitglied Deutsche Physikalische Gesellschaft; Accademia meteorologica russa; Bayerische Akademie der Wissenschaften; Heidelberg Akademie der Wissenschaften; Deutsche Akademie der Naturforscher Leopoldina; Academia Europea; Accademia delle scienze austriaca; American Physical Society; Accademia delle scienze e della tecnologia, Corea del Sud; Istituto di Fisica, Regno Unito; Istituto di Fisica, Singapore; NTT Basic Research Laboratory Advisory Board; Scientific Committee International Solvay Institutes; Kuratorium Physikalisch-Technische Bundesanstalt Braunschweig; Kuratorium Deutsches Museum München; EURAMET Research Council; Scientific Advisory Council Graphene Flagship; Academia Paraense de Ciencias (APC), Sec#o de Ciencias Físicas; Hall-of-Fame der deutschen Forschung; Honorary Research Fellow del Korean Research Institute of Standards and Science; IAS Senior Fellow, City University of Hong Kong; WPI Program Committee; Membro distinto del KAIST Presidential Advisory Council.

Riassunto dell'attività scientifica

Prof. Klitzing ha vinto il Premio Nobel per la Fisica nel 1985 per la sua scoperta dell'effetto Hall quantistico. Il Prof. Klitzing ha dimostrato che la resistenza elettrica avviene in unità molto precise utilizzando l'effetto Hall. L'effetto Hall denota il voltaggio che si sviluppa tra i bordi di un nastro che trasporta corrente, posto tra i poli di un magnete. Il rapporto tra questo voltaggio e la corrente viene denominato resistenza di Hall. Quando il campo magnetico è molto forte e la temperatura è molto bassa, la resistenza di Hall varia tramite i salti distinti osservati per la prima volta da von Klitzing. Il valore della resistenza quantizzata fondamentale, estremamente preciso, è internazionalmente noto come costante di von Klitzing. Il significato della scoperta di von Klitzing, fatta nel 1980, fu immediatamente riconosciuto e innescò l'introduzione di un nuovo sistema internazionale di unità basato sulle costanti della natura. L'effetto Hall quantistico ha connessioni con quasi tutte le aree della fisica, a partire dai quark nella fisica delle alte energie ai buchi neri nell'astrofisica ed è considerato il primo isolante topologico. In generale, la ricerca di von Klitzing include misurazioni ottiche e di trasporto su strutture quantistiche di semiconduttori.

Main publications

Series Editor of *Nanoscience and Technology* (Springer); Series Editor of *Springer Series in Solid-State Sciences*; Editor of *Physics and Applications of Quantum Wells and Superlattices* (Plenum Press); Editorial Board, *Superlattices and Microstructures* (Academic Press); Executive Board, *Encyclopedia of Physical Science & Technology* (Academic Press); over 500 publications in scientific journals and conference proceedings, of which the main ones are: von Klitzing, K., Dorda, G., Pepper, M., New Method for High-

Accuracy Determination of the Fine Structure Constant Based on Quantized Hall Resistance, *Physical Review Letters* 1980, 45, (6), 494-7; Stein, D., von Klitzing, K., Weimann, G., Electron-Spin Resonance on GaAs-AlGa_{1-x}As Heterostructures, *Physical Review Letters* 1983, 51, (2), 130-3; von Klitzing, K., The Quantized Hall-Effect, *Reviews of Modern Physics* 1986, 58, (3), 519-31; Dobers, M., von Klitzing, K., Weimann, G., Electron-Spin Resonance in the Two-Dimensional Electron Gas of GaAs-AlGa_{1-x}As Heterostructures, *Physical Review B* 1988, 38, (8), 5453-6; Weiss, D., von Klitzing, K., Ploog, K., Weimann, G., Magnetoresistance Oscillations in a Two-Dimensional Electron-Gas Induced by a Submicrometer Periodic Potential, *Europhysics Letters* 1989, 8, (2), 179-84; Blick, R.H., Pfannkuche, D., Haug, R.J., von Klitzing, K., Eberl, K., Formation of a coherent mode in a double quantum dot, *Physical Review Letters* 1998, 80, (18), 4032-5; Mani, R.G., Smet, J.H., von Klitzing, K., Narayanamurti, V., Johnson, W.B., Umansky, V., Zeroresistance states induced by electromagnetic-wave excitation in GaAs/AlGaAs heterostructures, *Nature* 2002, 420, (6916), 646-50; Kukushkin, I.V., Smet, J.H., von Klitzing, K., Wegscheider, W., Cyclotron resonance of composite fermions. *Nature* 2002, 415, (6870), 409-12; Kukushkin, I.V., Akimov, M.Y., Smet, J.H., Mikhailov, S.A., von Klitzing, K., Aleiner, I.L., Falko, V.I., New type of B-periodic magneto-oscillations in a two-dimensional electron system induced by microwave irradiation. *Physical Review Letters* 2004, 92, (23); von Klitzing, K. (2005), '25 years of quantum hall effect (QHE) a personal view on the discovery, physics and applications of this quantum effect', *Quantum Hall Effect: Poincare Seminar* 2004 45, 1-21; Kukushkin, I.V., Smet, J.H., Abergel, D.S.L., Fal'ko, V.I., Wegscheider, W., von Klitzing, K., Detection of the electron spin resonance of two-dimensional electrons at large wave vectors. *Physical Review Letters* 2006, 96, (12); Hubel, A., Held, K., Weis, J., Von Klitzing, K. (2008), Correlated Electron Tunneling through Two Separate Quantum Dot Systems with Strong Capacitive Interdot Coupling, *Physical Review Letters* 101(18), 186804; Martin, J., Akerman, N., Ulbricht, G., Lohmann, T., Smet, J.H., Von Klitzing, K., Yacoby, A. (2008), Observation of electron-hole puddles in graphene using a scanning single-electron transistor, *Nature Physics* 4(2), 144-8; Kukushkin, I.V., Smet, J.H., Scarola, V.W., Umansky, V., von Klitzing, K. (2009), Dispersion of the Excitations of Fractional Quantum Hall States, *Science* 324(5930), 1044-7; Lohmann, T., von Klitzing, K., Smet, J.H. (2009), Four-Terminal Magneto-Transport in Graphene p-n Junctions Created by Spatially Selective Doping, *Nano Letters* 9(5), 1973-9; Yoon, Y., Tiemann, L., Schmult, S., Dietsche, W., von Klitzing, K., Wegscheider, W. (2010), Interlayer Tunneling in Counterflow Experiments on the Excitonic Condensate in Quantum Hall Bilayers, *Physical Review Letters* 104(11), 116802; Weis, J., von Klitzing, K. (2011), Metrology and microscopic picture of the integer quantum Hall effect, *Philosophical Transactions of the Royal Society A-mathematical Physical and Engineering Sciences* 369(1953), 3954-74; K. Panos, R.R. Gerhardt, J. Weis, and K. von Klitzing, Current distribution and Hall potential landscape towards breakdown of the quantum Hall effect: a scanning force microscopy investigation, *Physical Review Letters* 2014, 113, 076804. B. Friess, V. Umansky, L. Tiemann, K. von Klitzing, and J. Smet, Probing the Microscopic Structure of the Stripe Phase at Filling Factor 5/2, *Physical Review Letters* 2014, 113, 076803. S. Dorozhkin, V. Umansky, L. Pfeiffer, K. West, K. Baldwin, K. von Klitzing, and J. Smet, Random Flips of Electric Field in Microwave-Induced States with Spontaneously Broken Symmetry, *Physical Review Letters* 2015, 114, 176808. D. Zhang, W. Dietsche, and K. von Klitzing, Anomalous Interlayer Transport of Quantum Hall Bilayers in the Strongly Josephson-Coupled Regime, *Physical Review Letters* 2016, 116, 186801. K. von Klitzing, Quantum Hall Effect: Discovery and Application, *Annual Review of Condensed Matter Physics* 2017, 8, 13-30. K. von Klitzing, Metrology in 2019, *Nature Physics* 2017, Vol 13, 198. B. Friess, V. Umansky, K. von Klitzing, and J.H. Smet, Current Flow in the Bubble and Stripe Phases, *Physical Review Letters* 2018, 120, 137603 1-6. Joseph Falson, Daniela Tabrea, Ding Zhang, Inti Sodemann, Yusuke Kozuka, Atsushi Tsukazaki, Masashi Kawasaki, Klaus von Klitzing, and Jurgen H. Smet, A cascade of phase transitions in an orbitally mixed half-filled Landau level, *Science Advances* 2018, Vol. 4, no. 9, eaat8742. Klaus von Klitzing, Quantum Hall Effect and the New International System of Units, *Phys. Rev. Lett.* 2019, 122, 200001.