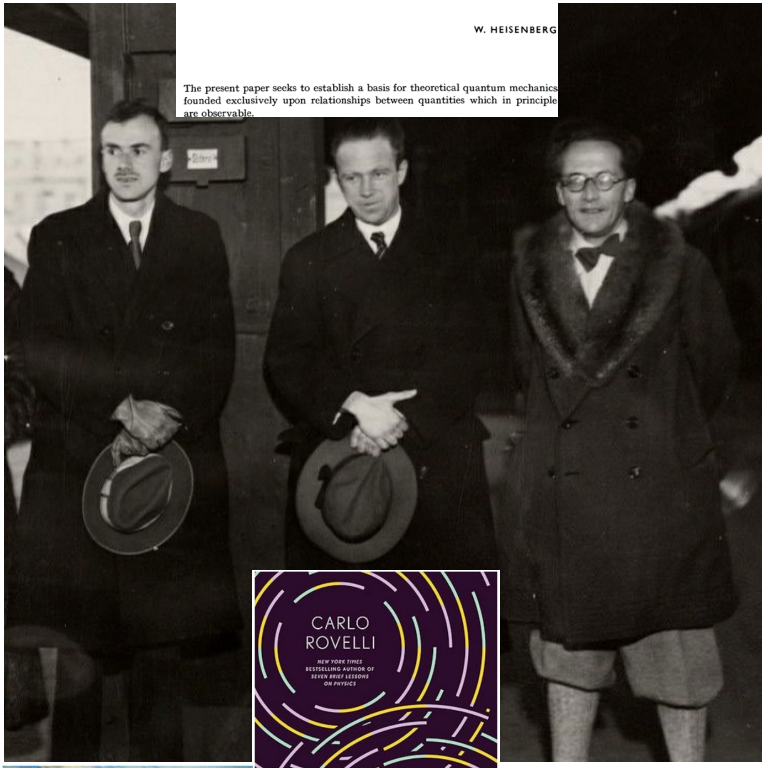
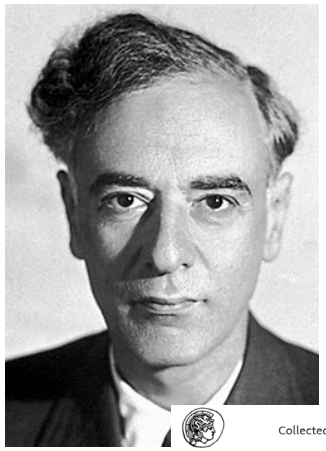
Introduction of Quantum Mechanics in 1925 vs. Quantum Statistical Mechanics in 1927

QUANTUM-THEORETICAL RE-INTERPRETATION OF KINEMATIC AND MECHANICAL RELATIONS

W. HEISENBERG

The present paper seeks to establish a basis for theoretical quantum mechanics founded exclusively upon relationships between quantities which in principle are observable.





von Neumann and Landau introduced density matrix for proper

$$\hat{\rho} = \sum_i w_i |\Psi_i\rangle\langle\Psi_i|$$

and improper mixed quantum states, respectively

$$\hat{\rho} = \mathrm{Tr}_{\mathrm{other}} |\Psi\rangle\langle\Psi|$$

Wahrscheinlichkeitstheoretischer Aufbau der Quantenmechanik

J. von Neumann

Nachrichten von der Gesellschaft der Wissenschaften zu Göttingen, Mathematisch-Physikalische Klasse (1927)

Collected Papers of L.D. Landau

1965, Pages 8-18

2 - THE DAMPING PROBLEM IN WAVE MECHANICS

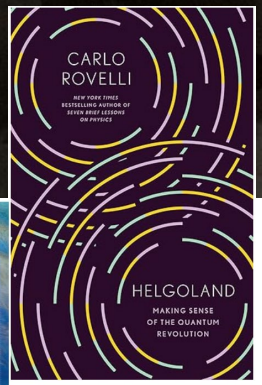
Show more

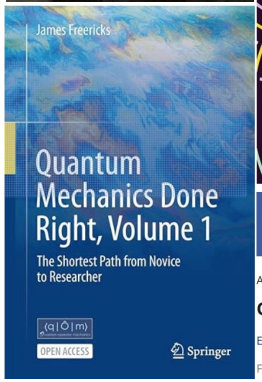
Add to Mendeley | Share | Cite

https://doi.org/10.1016/B978-0-08-010586-4.50007-9

Get rights and content

Wigner 1983: "Can an equation for time-change of the state of the apparently non-isolated system be proposed?"





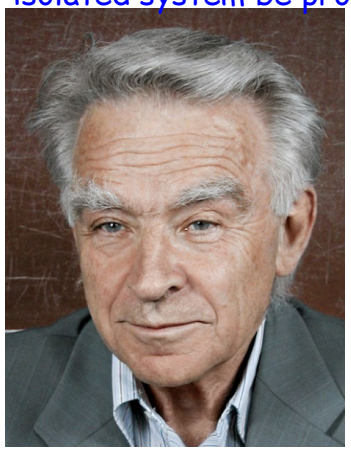
adp annalen der physik

Article | Free Access

Quantisierung als Eigenwertproblem

E. Schrödinger

First published: 1926 | https://doi.org/10.1002/andp.19263840404 | Citations: 1,191



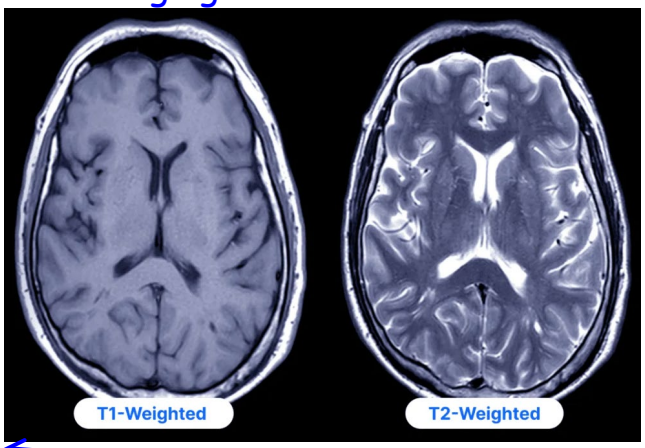
Lindblad superoperators from Wigner's phase space continuity equation

Cite as: AIP Advances 15, 015009 (2025) doi: 10.1063/5.0244814
Submitted: 24 October 2024 • Accepted: 24 December 2024 •
Published Online: 9 January 2025

Ole Steuernagel and Ray-Kuang Lee

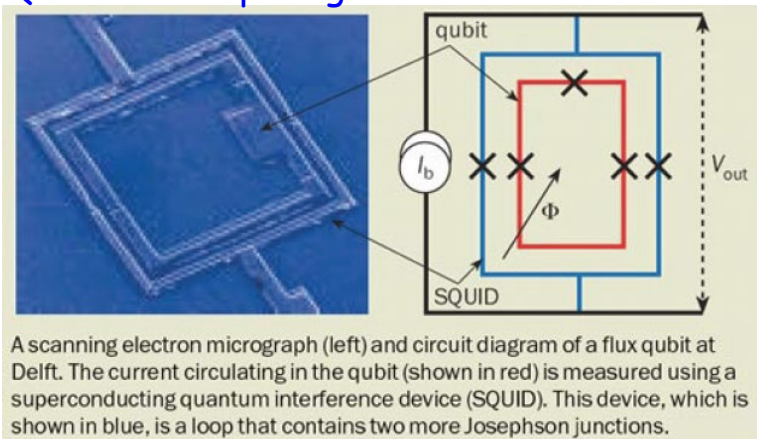
Density Matrix of Spin S=1/2 as a Matter of Life & Death

MRI imaging in medicine



T1 scans highlight fat and muscle, making them bright; T2 scans emphasize water and fluids, making them bright

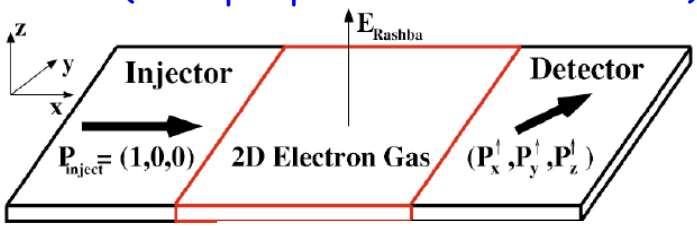
Quantum Computing



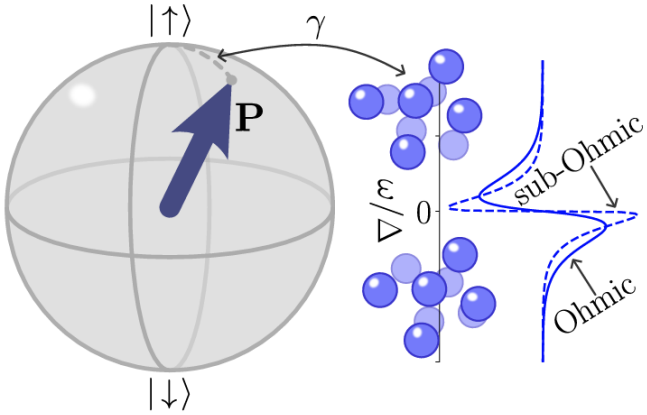
A scanning electron micrograph (left) and circuit diagram of a flux qubit at Delft. The current circulating in the qubit (shown in red) is measured using a superconducting quantum interference device (SQUID). This device, which is shown in blue, is a loop that contains two more Josephson junctions.

$$\hat{\rho}(t) = \frac{1}{2}\left(\hat{I} + \mathbf{P}\cdot\hat{\sigma}\right)$$

Spintronics (P is spin-polarization of current)



Dissipative quantum physics (decay of |P| signifies decoherence)



Dynamics of the dissipative two-state system

A. J. Leggett, S. Chakravarty, A. T. Dorsey, Matthew P. A. Fisher, Anupam Garg, and W. Zwerger

Show more

Rev. Mod. Phys. **59**, 1 – **Published 1 January, 1987** Erratum Rev. Mod. Phys. **67**, 725 (1995)

Rep. Prog. Phys. **89** (2026) 018002 https://doi.org/10.1088/1361-6633/ae2888

Reports on Progress in Physics

PAPER

Schwinger–Keldysh nonperturbative field theory of open quantum systems beyond the Markovian regime: application to spin-boson and spin-chain-boson models

Felipe Reyes-Osorio, Federico García-Gaitán, David J Strachan, Petr Plecháč, Stephen R Clark and Branislav K Nikolić

PRB 71, 195328 (2005)