# Macroscopic Quantum Tunneling of the Magnetic Moment

Eugene M Chudnovsky and Javier Tejada



# **Macroscopic Quantum Tunneling**

A. O. Caldeira

# **Macroscopic Quantum Tunneling:**

Macroscopic Quantum Tunneling Shin Takagi, 2002-08-15 A coherent and self contained account of macroscopic quantum phenomena for graduate students and researchers Macroscopic Quantum Tunneling of a Fluxon in a Long **Josephson Junction** Takeo Kato, Masatoshi Imada, 1996 Macroscopic Quantum Tunneling of the Magnetic Moment Eugene M. Chudnovsky, Javier Tejada, 1998-08-28 This is the first book to present a coherent theoretical and experimental treatment of the rapidly developing field of macroscopic quantum tunneling of the magnetic moment. The theory is based on the concept of the magnetic instanton and its renormalization by the dissipative environment The book includes discussions of the tunneling of magnetic moment in small ferromagnetic grains tunneling of the Ne el vector in antiferromagnetic grains quantum nucleation of magnetic domains and quantum depinning of domain walls The experimental part collects the majority of recent data that are or may be relevant to spin tunneling Among the topics described are low temperature magnetic relaxation and its interpretation in various systems experiments on single particles and mesoscopic wires and resonant spin tunneling in molecular magnets This study of an important new field in condensed matter physics by two leading contributors to the subject will be of interest to theorists and experimentalists **Macroscopic Quantum Tunneling in Long Josephson Junctions** Ludivica Baselgia-Stahel,1992 *Macroscopic Quantum Tunneling at Finite Temperatures* Peter Hänggi,1987 An Introduction to Macroscopic Quantum Phenomena and Quantum Dissipation A. O. Caldeira, 2014-03-20 Develops the basic material necessary to understand the quantum dynamics of macroscopic variables Ideal for graduate Macroscopic Quantum Tunneling in One Dimensional Superconductor Yongmin students and researchers Macroscopic Quantum Tunneling in Josephson Junctions Herbert P. Simanjuntak, 1990 Chang, 1994 **Macroscopic** Quantum Tunneling in High-Tc Superconductors After Current Injection Sebastian Probst, 2010 **Macroscopic** Quantum Tunneling in Bose-Einstein Condensates Torsten Schwidder, 2014 **Macroscopic Quantum Tunneling in Superconducting Nanowire Devices** Andrew Murphy, 2017 Enhanced Macroscopic Quantum Tunneling in Bi 1tn2Sr 1tn2CaCu 1tn2O 1tn8 1hn+ 1tn d63 [Bi 2 Sr 2 CaCu 2 O 8+delta] Intrinsic Josephson Junction Stacks Xiaoyue Jin,2007 Macroscopic Quantum Tunneling in Josephson Junctions Georg Wild, 2004 **Macroscopic Quantum** Tunneling and Quantum Many-body Dynamics in Bose-Einstein Condensates Diego A. Alcala, 2020 Macroscopic Quantum Tunneling in Josephson Tunnel Junctions and Coulomb Blockade in Single Small Tunnel Junctions, 1991 Experiments investigating the process of macroscopic quantum tunneling in a moderately damped resistively shunted Josephson junction are described followed by a discussion of experiments performed on very small capacitance normal metal tunnel junctions. The experiments on the resistively shunted Josephson junction were designed to investigate a quantum process that of the tunneling of the Josephson phase variable under a potential barrier in a system in which dissipation plays a major role in the dynamics of motion All the parameters of the junction were measured using the classical phenomena of

thermal activation and resonant activation Theoretical predictions are compared with the experimental results showing good agreement with no adjustable parameters the tunneling rate in the moderately damped Q almost equal to 1 junction is seen to be reduced by a factor of 300 from that predicted for an undamped junction The phase is seen to be a good quantum mechanical variable The experiments on small capacitance tunnel junctions extend the measurements on the larger area Josephson junctions from the region in which the phase variable has a fairly well defined value i e its wavefunction has a narrow width to the region where its value is almost completely unknown The charge on the junction becomes well defined and is predicted to quantize the current through the junction giving rise to the Coulomb blockade at low bias I present the first clear observation of the Coulomb blockade in single junctions The electrical environment of the tunnel junction however strongly affects the behavior of the junction higher resistance leads are observed to greatly sharpen the Coulomb blockade over that seen with lower resistance leads I present theoretical descriptions of how the environment influences the junctions comparisons with the experimental results are in reasonable agreement The Quantum Challenge George Greenstein, Arthur Zajonc, 2006 The Quantum Challenge Second Edition is an engaging and thorough treatment of the extraordinary phenomena of quantum mechanics and of the enormous challenge they present to our conception of the physical world Traditionally the thrill of grappling with such issues is reserved for practicing scientists while physical science mathematics and engineering students are often isolated from these inspiring questions. This book was written to remove this Enhanced Macroscopic Quantum Tunneling in Bi2Sr2CaCu2O8+ Intrinsic Josephson Junction Stacks isolation Xiaoyue Jin, 2007 Enhanced Macroscopic Quantum Tunneling in Bi2Sr2CaCu2O8+d [Bi 2 Sr 2 CaCu 2 O 8+delta] Intrinsic Josephson Junction Stacks Xiaovue Jin, 2007 Macroscopic Quantum Tunneling in Josephson Tunnel Junctions and Coulomb Blockade in Single Small Tunnel Junctions Andrew Nicholas Cleland, 1991 **Macroscopic Quantum Tunneling** in Magnets Xixiang Zhang, Universitat de Barcelona. Departament de Física Fonamental, 1992

Unveiling the Magic of Words: A Review of "Macroscopic Quantum Tunneling"

In a global defined by information and interconnectivity, the enchanting power of words has acquired unparalleled significance. Their power to kindle emotions, provoke contemplation, and ignite transformative change is really awe-inspiring. Enter the realm of "Macroscopic Quantum Tunneling," a mesmerizing literary masterpiece penned with a distinguished author, guiding readers on a profound journey to unravel the secrets and potential hidden within every word. In this critique, we shall delve to the book is central themes, examine its distinctive writing style, and assess its profound impact on the souls of its readers.

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