

# **Quantum Mechanical Tunneling In Chemical Physics**

## **By Hiroki Nakamura**

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Research: Theory of Foundation of Quantum Mechanics -Connection between ``Macroscopic quantum tunneling in multigap superconducting Josephson States in Liquid-state Nuclear Magnetic Resonance with the Chemical Shift", J. Phys. arXiv:1004.0044; Noriyuki Nakai, Hiroki Nakamura, Yukihiro Ota, Yuki Nagai,

### **Nonadiabatic transition and chemical dynamics:**

HIROKI NAKAMURA, J. Theor. Tunneling and nonadiabatic transition are the most important quantum mechanical effects in chemical dynamics. The Zhu Nakamura (ZN) theory can be combined with the quasi-classical trajectory method and with the IVR(Initial Value Physical Chemistry Chemical Physics 14, 11546.

### **Landau-zener tunnelling in a nonlinear three-level**

Jul 14, 2006 1Institute of Applied Physics and Computational Mathematics, P.O. Box 8009 (28) , 100088 Beijing, China. 2Institute of It is a basic model in quantum mechanics and has versatile applications in quantum chemistry [2], col- lision theory [19] Valentine N Ostrovsky and Hiroki Nakamura, J. Phys. A: Math.

### **Quantum tunnelling - wikipedia, the free**

Quantum tunnelling or tunneling (see spelling differences) The Physics of Quantum Mechanics: An Introduction (3rd ed.). Cappella Archive.

### **Dynamics of nonadiabatic chemical reactions - the**

Aug 22, 2006 Hiroki Nakamura To take into account another quantum mechanical effect, namely, the tunneling effect, to detect caustics from which tunneling trajectories emanate is proposed. Chemical Physics 2015 459 (), 45-53

### **Quantum mechanical effect of electron tunneling**

Wave and particle properties of electrons according to quantum mechanics. Electrons tunnel through thin barriers. Tunneling is a quantum mechanical effect.

### **Lab 5: quantum mechanical tunneling | lab videos**

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### **Tunneling splitting in polyatomic molecules:**

Jul 1, 2003 Hiroki Nakamura. Department most important quantum mechanical effects from the dawn of quantum JOURNAL OF CHEMICAL PHYSICS.

### **Uga researcher leads discovery of a new driving**

UGA researcher leads discovery of a new driving force for chemical reactions. June 9 being controlled by a process called quantum mechanical tunneling," said

### **Understanding quantum tunnelling | jon butterworth**

Understanding quantum chemical reactions and the fate of The big question Is it a wave or a particle? was answered by quantum mechanics,

### **Quantum mechanical tunneling in nmr: effects of a**

Quantum mechanical tunneling in NMR: The Journal of Chemical Physics The Apaydin and Clough model of quantum tunneling rotation for a methyl group in a

## **Wentzel--kramers--brillouin theory of**

Shoji Takada and Hiroki Nakamura Quantum mechanical tunneling is a very interdisciplinary. 1,2,3-31  
In chemical physics, for instance, bimolecular.

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Chapter 28. Quantum Mechanical Tunneling of Hydrogen Atoms in Some Simple Chemical Systems

## **Quantum mechanical tunneling and finite elements**

Quantum mechanical tunneling and finite elements Access full text Article 1994 American Institute of Physics DOI:

## **Hyperspherical coordinate approach to atom-diatom**

Ohsaki, Akihiko; Nakamura, Hiroki Physics Reports, Volume 187, Issue 1, p. trajectory calculations clearly reveals quantum mechanical tunneling effects.

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Quantum Mechanics; Quantum Optics; that chemical receptors last decade or so is that smell receptors rely in part on quantum tunneling to identify

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## **Quantum tunneling allows impossible chemical**

Chemical reactions get slower as temperatures decrease, as there is less energy to get over the reaction barrier. But quantum mechanics tells us that it is

## **Apparent tunneling in chemical reactions**

1. Introduction. Quantum mechanical tunneling in multi-dimensional systems is not a simple issue. For some problems it is found that reduced dimensionality treatments

## **Quasiclassical studies of chemical reaction**

WITH INCLUSION OF TUNNELING AND NONADIABATIC. TRANSITION Thesis supervisor: Professor Hiroki Nakamura tutor of Mathematics and Physics, amongst his many other roles. He has even . 3.4.3 Quantum Mechanical Result .

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Jun 30, 2013 take place in cold gasses due to quantum mechanical chemical reaction favors the quantum tunneling allows reactions that

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Quantum mechanical tunneling plays important roles in a wide range of natural sciences, from nuclear and solid-state physics to proton transfer and chemical reactions

## **Calculation of the quantum- mechanical tunneling**

The quantum-mechanical tunneling is often important in low-energy reactions, because of its routine use in tunneling calculations for chemical systems.

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Jun 24, 2009 1866) in classical mechanics[1]. In 1928, Fritz London applied adiabatic process in chemical kinetics. Concerning the quantum physics, in 1911-1916 Paul Ehrenfest, Zener-Demkov, Nikitin, Zhu-Nakamura models or in the .. [3] Hiroki Nakamura. . known as suppression of the tunneling, coherent destruction.

### **Quantum-mechanical tunneling of water in heme**

Kriegel, J., Kastens, K. and Nienhaus, G. U. (2000), Quantum-mechanical tunneling of to investigate chemical and where the tunneling of entire

### **Control of photodissociation branching using the**

HIROSHI FUJISAKI, YOSHIAKI TERANISHI, and HIROKI NAKAMURA, J. Theor. Comput. Quantum Mechanical Tunneling in Chemical Physics, 205-212.

### **Chemical physics letters | vol 306, iss 5 6, pgs**

The tunneling dynamics of OC H<sub>2</sub>O probed by infrared laser spectroscopy . Exact quantum mechanical kinetic energy operator in valence coordinates for Hidetoshi Kono, Nobuyuki Nakajima, Hiroki Shirai, Haruki Nakamura, Akinori Sarai.

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Quantum mechanical tunneling is a consequence of the fact that an energy barrier does not necessarily restrict a quantum mechanical system to a certain region

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