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Yang–Mills theory - Wikipedia
QUANTUM YANG–MILLS THEORY ARTHUR JAFFE AND EDWARD WITTEN 1. The Physics of Gauge Theory Since the early part of the 20th century, it has been understood that the descrip-tion of nature at the subatomic scale requires quantum mechanics. In quantum me-chanics, the position and velocity of a particle are noncommuting operators acting

QUANTUM YANG–MILLS THEORY The Physics of Gauge Theory
Yang-Mills theory, in physics, a generalization of Scottish physicist James Clerk Maxwell 's unified theory of electromagnetism, also known as Maxwell's equations, used to describe the weak force and the strong force in subatomic particles in terms of a geometric structure, or quantum field theory. The Yang-Mills theory relies on a quantum mechanical property called the " mass gap.".

Yang-Mills theory | physics | Britannica
Yang-Mills is a strongly coupled quantum ?eld theory, whose low-energy dynamics looks nothing at all like the classical theory. Our understanding of quantum Yang-Mills is far from complete, but we will describe some of the key ideas from Section 2.4 onwards. A common theme in physics is that Nature enjoys the rich and subtle: the most

2. Yang-Mills Theory - University of Cambridge
By the 1950's, when Yang-Mills theory was discovered, it was already known that the quantum version of Maxwell theory—known as Quantum Electrodynamics or QED—gives an extremely accurate account of electromagnetic ?elds and forces.

Quantum Yang-Mills Theory - Arthur Jaffe
Mass in Quantum Yang-Mills Theory. (Comment on a Clay Millenium Problem) L. D. Faddeev St. Petersburg Department of Steklov Mathematical Institute. Among seven problems, proposed for XXI century by Clay Mathemat- ical Institute [1], there are two stemming from physics. One of them is called "Yang-Mills Existence and Mass Gap".

Mass in Quantum Yang-Mills Theory - arXiv
Quantum Yang-Mills theory See also: Yang–Mills theory To establish the existence of the Yang-Mills theory and a mass gap is one of the seven Millennium Prize Problems of the Clay Mathematics Institute. A positive estimate from below of the mass gap in the spectrum of quantum Yang-Mills Hamiltonian has been already established.

Quantum gauge theory - Wikipedia
Quantum Yang-Mills theory is now the foundation of most of elementary particle theory, and its predictions have been tested at many experimental laboratories, but its mathematical foundation is still

unclear. The successful use of Yang-Mills theory to describe the strong interactions of elementary particles depends on a subtle quantum mechanical property called the "mass gap": the quantum particles have positive masses, even though the classical waves travel at the speed of light.

Yang-Mills and Mass Gap | Clay Mathematics Institute
In Yang-Mills theory, the Faraday tensor is generalized to the curvature, F. Math- ematically, the curvature is derived from the connection essentially by taking commu- tators of certain di?erential operators related to the connection.

5 An introduction to Yang-Mills theory - Michael Nielsen
In mathematical physics, the Yang-Mills existence and mass gap problem is an unsolved problem and one of the seven Millennium Prize Problems defined by the Clay Mathematics Institute, which has offered a prize of US$1,000,000 for its solution. The problem is phrased as follows: Yang-Mills Existence and Mass Gap. Prove that for any compact simple gauge group G, a non-trivial quantum Yang-Mills theory exists on R 4 {\displaystyle \mathbb {R} ^{4}} and has a mass gap ? > 0. Existence ...

Yang-Mills existence and mass gap - Wikipedia
Research video based on the papers arxiv:1508.06305, arxiv:1601.04726, arxiv:1607.07463. Part One (general introduction): 0:26 - two paradigms for understand...

Quantum Yang-Mills Theory in Two Dimensions - YouTube
The Yang-Mills theory is, specifically, what is known as a gauge theory based on Special Unitary Group (of degree N). Its main goal is to describe the behavior of elementary particles and is the central explanation between the electromagnetic force and the weak nuclear force.

What is an intuitive explanation of Yang-Mills theory? - Quora
Sheldon Lee Glashow. Physics / Critical Essay / Vol. 5, No. 2. G auge theories are relevant to contemporary physics because the standard theory of particle physics is based on a generalization of the Yang-Mills model, the first non-abelian gauge theory dealing with particle symmetries. Furthermore, gauge interactions have a natural origin in the context of superstring theory. 1 The symmetries of physics may be exact, approximate, or alleged.

The Yang-Mills Model | Articles | Inference: International ...
By the 1950s, when Yang-Mills theory was discovered, it was already known that the quantum version of Maxwell theory – known as Quantum Electrodynamics or QED – gives an extremely accurate account of electromagnetic fields and forces.

Yang-Mills theory in nLab
Moreover, a derivation of the temperature-redshift relation of the CMB in deconfining SU (2) Yang-Mills thermodynamics and its application to explaining an apparent early re-ionization of the Universe are given. Finally, a mechanism of mass generation for cosmic neutrinos is proposed.

The Thermodynamics of Quantum Yang-Mills Theory
This caused Jaffe and Witten, in 2000, to propose including Quantum Yang-Mills Theory as one of the seven millenium prize questions, in which they indicated that QCD indeed shall be a consistent...

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Quantum Yang-Mills field theory - CORE
For quantum Yang-Mills theory with gauge group U(N)the Yang-Mills measure is a probability measure specified formally by the expression d?g(A)=1Zge?12g2?FA?L22[DA],where FA=dA+A?Ais the curvature of a connection form A, gis a parameter that may be viewed as a 'coupling constant', and [DA]is formal Lebesgue measure on Ao.