Celebrando una trayectoria en la física

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UNAM

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Masas y anchuras de partículas inestables

PHYSICAL REVIEW D VOLUME 56, NUMBER 9 1 NOVEMBER 1997

Further remarks on isospin breaking in charmless semileptonic *B* decays

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Received 28 May 1997; revised manuscript received 4 August 1997

We consider the isospin-breaking corrections to charmless semileptonic decays of *B* mesons. Both the recently measured branching ratios of exclusive decays by the CLEO Collaboration and the end-point region of the inclusive lepton spectrum in form factor models can be affected by these corrections. Isospin corrections can affect the determination of $|V_{ub}|$ from exclusive semileptonic *B* decays at a level comparable to present statistical uncertainties. S0556-2821 97 06821-5

PHYSICAL REVIEW D VOLUME 56, NUMBER 7 1 OCTOBER 1997

Effects of the magnetic dipole moment of charged vector mesons in their radiative decay distribution

Trabajo de maestría

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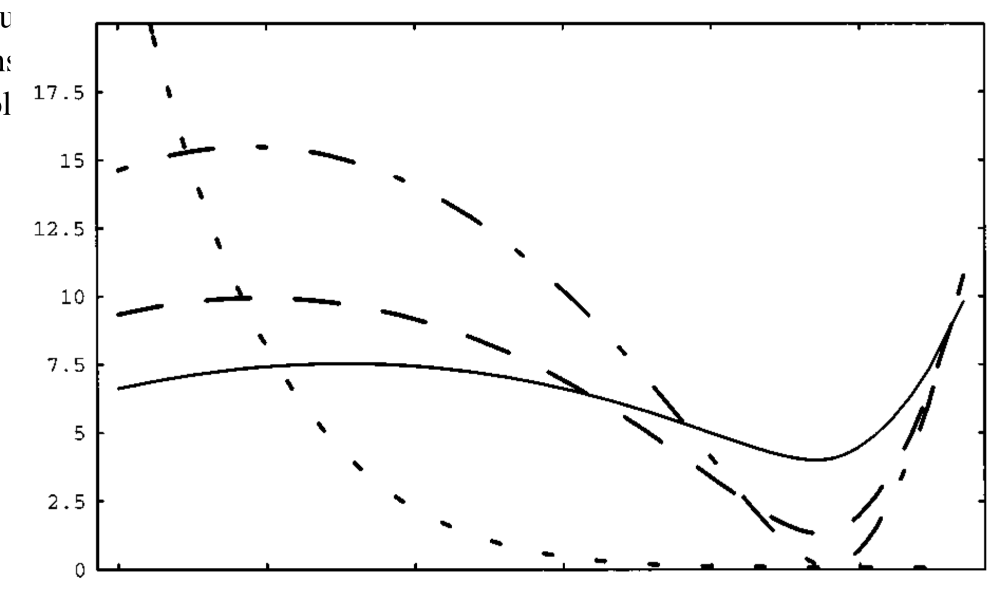
(Received 14 May 1997)

We consider the effects of anomalous magnetic dipole moments of vector mesons in the decay distribution of photons emitted in two-pseudoscalar decays of charged vector mesons. By choosing a kinematical configu ration appropriate to isolate these effects from model-dependent and dominant bremsstrahlung contributions we show that this method can provide a valid alternative for a measurement of the unknown magnetic dipol moments of charged vector mesons. [S0556-2821(97)01119-3]



Trabajo de doctorado

PHYSICAL REVIEW D, VOLUME 60, 053004

Vector-meson magnetic dipole moment effects in radiative τ decays

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(Received 12 January 1999; revised manuscript received 9 March 1999; published 27 July 1999)

We study the possibility that the magnetic dipole moment of light charged vector mesons could be measured from their effects in $\tau^- \to V^- \nu_\tau \gamma$ decays. We conclude that the energy spectrum and angular distribution of photons emitted at small angles with respect to vector mesons is sensitive to the effects of the magnetic dipole moment. Model-dependent contributions and photon radiation off other electromagnetic multipoles are small in this region. We also compute the effects of the magnetic dipole moment on the integrated rates and photon energy spectrum of these τ lepton decays. [S0556-2821(99)04315-5]

INSTITUTE OF PHYSICS PUBLISHING | JOURNAL OF PHYSICS G: NUCLEAR AND PARTICLE PHYSICS

J. Phys. G: Nucl. Part. Phys. **27** (2001) 2203–2210 | PII: S0954-3899(01)23622-6

Beyond the soft photon approximation in radiative production and decay of charged vector mesons

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Teorema de Low

Teorema de Burnett-Kroll

PHYSICAL REVIEW D, VOLUME 61, 033007

Gauge invariance and finite width effects in radiative two-pion τ lepton decay

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(Received 9 September 1999; published 6 January 2000)

The contribution of the $\rho^{\pm}$ vector meson to the $\tau \to \pi\pi\nu\gamma$ decay is considered as a potential source for the determination of the magnetic dipole moment of this light vector meson. In order to keep the gauge invariance of the whole decay amplitude, a procedure similar to the fermion-loop scheme for charged gauge bosons is implemented to incorporate the finite width effects of the $\rho^{\pm}$ vector meson. The absorptive pieces of the one-loop corrections to the propagators and electromagnetic vertices of the $\rho^{\pm}$ meson and $W^{\pm}$ gauge boson have identical forms in the limit of massless particles in the loops, suggesting this to be a universal feature of spin-one unstable particles. Model-dependent contributions to the $\tau \to \pi\pi\nu\gamma$ decay are suppressed by fixing the two-pion invariant mass distribution at the rho meson mass value. The resulting photon energy and angular distribution is relatively sensitive to the effects of the ρ magnetic dipole moment.

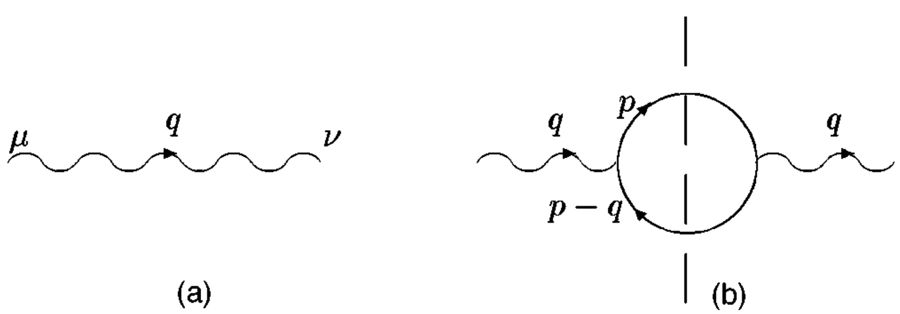
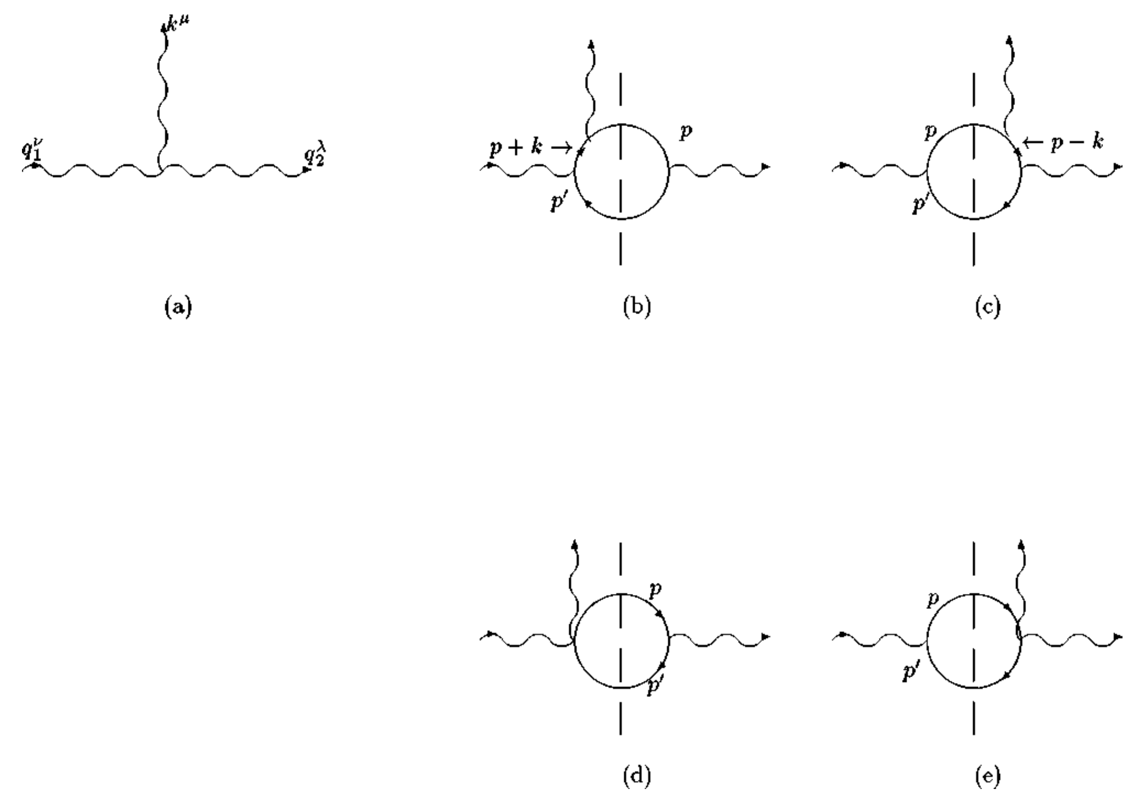


FIG. 1. Propagator of the ρ^{+} meson: (a) tree level; (b) one-loop $\pi^{+}\pi^{0}$ absorptive correction.



$$D_{\mu\nu}(q) = -\frac{iT^{\mu\nu}(q)}{q^2 - m^2 + i\,\mathrm{Im}\,\Pi^{T}(q^2)} + \frac{iL^{\mu\nu}(q)}{m^2 - i\,\mathrm{Im}\,\Pi^{L}(q^2)}$$

$$e\Gamma^{\mu\nu\lambda} = e(\Gamma_0^{\mu\nu\lambda} + \Gamma_1^{\mu\nu\lambda}), \qquad k_\mu \Gamma_1^{\mu\nu\lambda} = i\,\mathrm{Im}\,\Pi^{\nu\lambda}(q_1) - i\,\mathrm{Im}\,\Pi^{\nu\lambda}(q_2).$$

Reglas de Feynman para mesones vectoriales inestables

Estados polarizados
Vale Burnett-Kroll?

PHYSICAL REVIEW D **66**, 097301 (2002)

Structure of radiative interferences and $g=2$ for vector mesons

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The result of Burnett and Kroll (BK) states that for radiative decays, the interference of $O(\omega^{-1})$ in the photon energy ω vanishes after the sum over polarizations of the involved particles. Using radiative decays of vector mesons, we show that if the vector meson is polarized, the $O(\omega^{-1})$ terms are null only for the canonical value of the magnetic dipole moment of the vector meson, namely, $\mathbf{g}=2$ in Bohr magneton units. A subtle cancellation of all $O(\omega^{-1})$ terms happens when summing over all polarizations to recover the Burnett-Kroll result. We also show the source of these terms and the corresponding cancellation for the unpolarized case and exhibit a global structure that can make them individually vanish in a particular kinematical region.

$$|\mathcal{M}^{(1)}|^2=\left(e g_{\rho\pi\pi}\frac{p\cdot\epsilon^*}{p\cdot k}\right)^2\left[2m_\rho^2\frac{p\cdot k}{q\cdot k}\left(1+\frac{\Delta^2}{m_\rho^2}-\frac{p\cdot k}{q\cdot k}\right)\right.$$
$$\left.-2m_\pi^2-2p\cdot k\left(1-\frac{\mathbf{g}}{2}\right)\left(1+\frac{\Delta^2}{m_\rho^2}-2\frac{p\cdot k}{q\cdot k}\right)\right],$$
$$-\frac{(e g_{\rho\pi\pi})^2}{2}\epsilon^*\cdot\epsilon\left[\mathbf{g}\frac{p\cdot k}{q\cdot k}-2+\left(1+\frac{\Delta^2}{m_\rho^2}\right)\left(1-\frac{\mathbf{g}}{2}\right)\right]^2,$$

$$|\mathcal{M}^{(2)}|^2=|\mathcal{M}^{(1)}|^2,$$

$$|\mathcal{M}^{(3)}|^2=\left(e g_{\rho\pi\pi}\frac{p\cdot\epsilon^*}{p\cdot k}\right)^2\left[m_\rho^2\left(1+\frac{\Delta^2}{m_\rho^2}-2\frac{p\cdot k}{q\cdot k}\right)^2\right.$$
$$+4\left(\frac{p\cdot k}{m_\rho}\right)^2\left(1-\frac{\mathbf{g}}{2}\right)^2+4p\cdot k\left(1-\frac{\mathbf{g}}{2}\right)$$
$$\left.\times\left(1+\frac{\Delta^2}{m_\rho^2}-2\frac{p\cdot k}{q\cdot k}\right)\right]. \qquad (6)$$

Estados Inestables (is it back?)

EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH (CERN)

CERN-EP-2021-272
2022/02/15

CMS-HIG-21-013

First evidence for off-shell production of the Higgs boson and measurement of its width

The CMS Collaboration*

Abstract

The first evidence for off-shell Higgs boson production is reported in the final state with two Z bosons decaying into either four charged leptons (muons or electrons), or two charged leptons and two neutrinos, and a measurement of the Higgs boson width is performed. Results are based on data from the CMS experiment at the LHC at a center-of-mass energy of 13 TeV, corresponding to an integrated luminosity of up to 140 fb^{-1}. The total rate of off-shell Higgs boson production beyond the Z boson pair production threshold, relative to its standard model expectation, is constrained to the interval [0.0061, 2.0] at 95% confidence level. The scenario with no off-shell production is excluded at 99.97% confidence level (3.6 standard deviations). The width of the Higgs boson is extracted as $\Gamma_{\mathrm{H}} = 3.2^{+2.4}_{-1.7}$ MeV, in agreement with the standard model expectation of 4.1 MeV. The data are also used to set new constraints on anomalous Higgs boson couplings to W and Z boson pairs.

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TTP08-39
September 26, 2021

Two-Loop Threshold Singularities, Unstable Particles and Complex Masses ‡‡

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INFN, Sezione di Torino, Italy

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The effect of threshold singularities induced by unstable particles on two-loop observables is investigated and it is shown how to cure them working in the complex-mass scheme. The impact on radiative corrections around thresholds is thoroughly analyzed and shown to be relevant for two selected LHC and ILC applications: Higgs production via gluon fusion and decay into two photons at two loops in the Standard Model. Concerning Higgs production, it is essential to understand possible sources of large corrections in addition to the well-known QCD effects. It is shown that NLO electroweak corrections can incongruently reach a 10 % level around the WW vector-boson threshold without a complete implementation of the complex-mass scheme in the two-loop calculation.

Keywords: Feynman diagrams, Multi-loop calculations, Higgs physics

PACS classification: 11.15.Bt, 12.38.Bx, 13.85.Lg, 14.80.Bn, 14.80.Cp

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MADPH-01-1205

July 2001

Finite-Width Effects in Top Quark Production at Hadron Colliders

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Abstract

Production cross sections for $t\bar{t}$ and $t\bar{t}j$ events at hadron colliders are calculated, including finite width effects and off resonance contributions for the entire decay chain, $t \to bW \to b\ell\nu$, for both top quarks. Resulting background rates to Higgs search at the CERN LHC are updated for inclusive $H \to WW$ studies and for $H \to \tau\tau$ and $H \to WW$ decays in weak boson fusion events. Finite width effects are large, increasing $t\bar{t}(j)$ rates by 20% or more, after typical cuts which are employed for top-background rejection.

I. INTRODUCTION

$t\bar{t}$ production [1] is a copious source of W-pairs and, hence, of isolated leptons at the Tevatron and the LHC. Top quark production will be intensely studied as a signal at these colliders. In addition, it constitutes an important background for many new particle searches. Examples include the leptonic signals for cascade decays of supersymmetric particles [2] or searches for $H \to W^+W^-$ [3–8] and $H \to \tau\tau$ [5,9,10] decays.

Usually, $t\bar{t}$ production is considered in the narrow-width approximation (NWA), which effectively decouples top production and decay (see Fig. 1(a)). Whenever resonant top production

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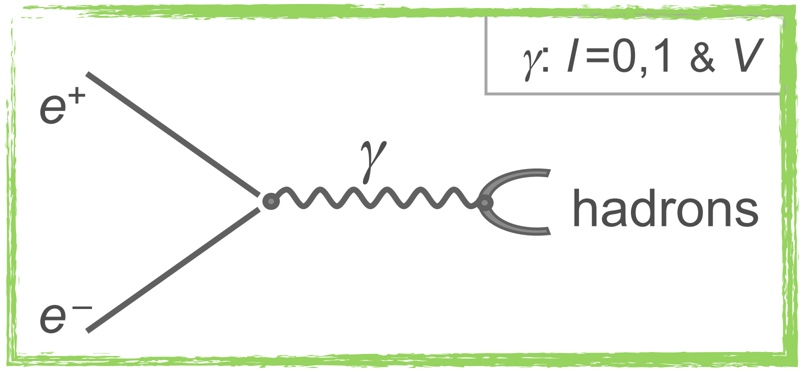
Determinación del Momento Dipolar Magnético de mesones de espín-1

Determinamos el MDM a partir de producción de hadrones ? BABAR (SLAC)



International Journal of Modern Physics A
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DOI: 10.1142/S0217751X15501146

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Determination of the magnetic dipole moment of the rho meson using four-pion electroproduction data

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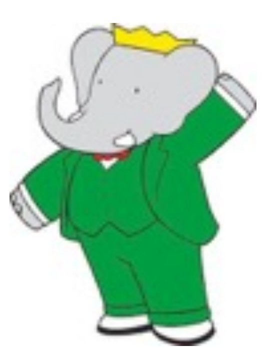
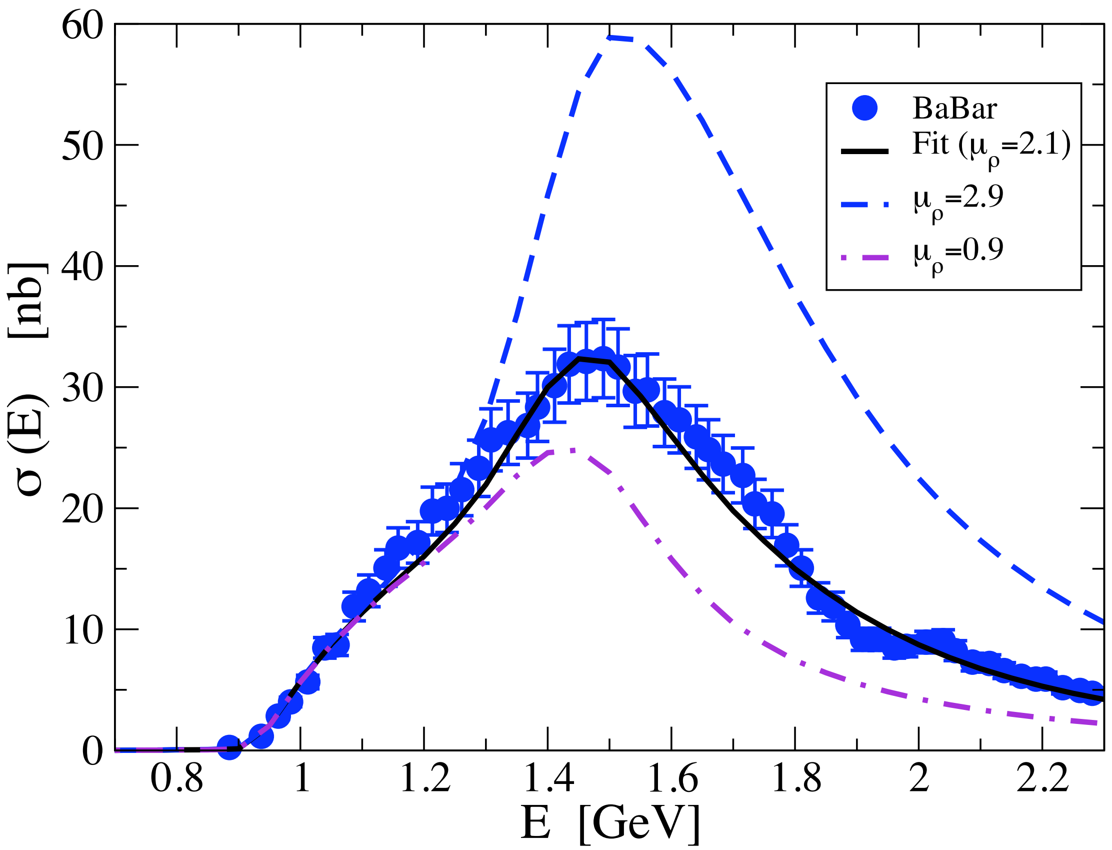
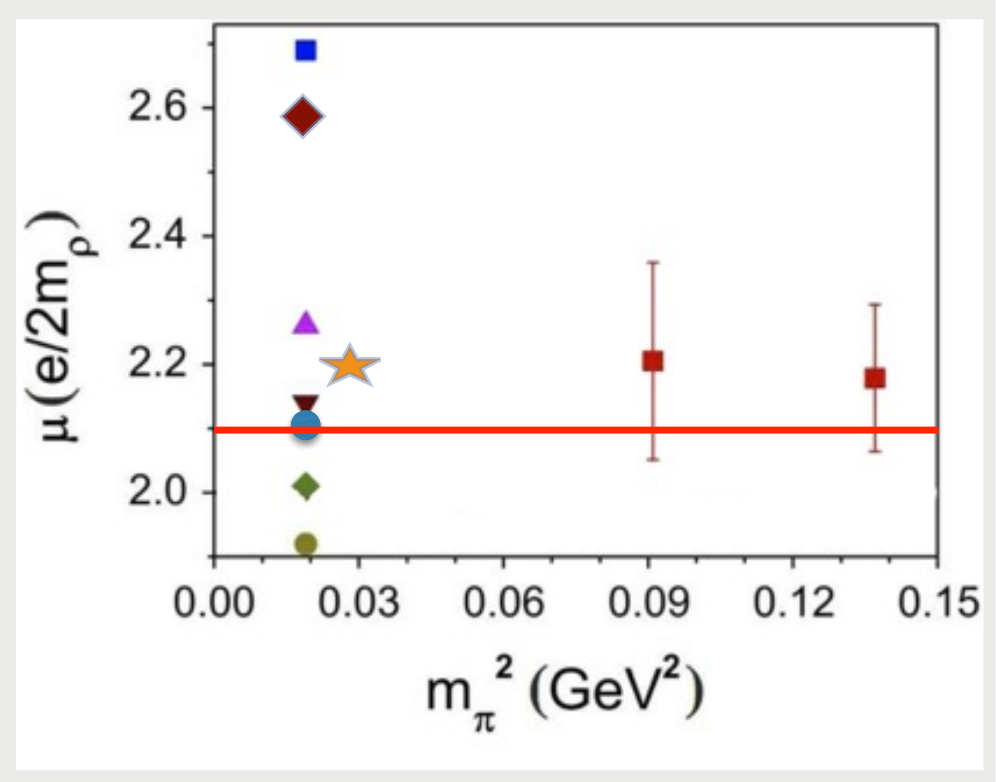
Published 3 July 2015

We determine the magnetic dipole moment of the rho meson using preliminary data from the BaBar Collaboration for the $e^+e^- \to \pi^+\pi^-2\pi^0$ process, in the center of mass energy range from 0.9 to 2.2 GeV. We describe the $\gamma^* \to 4\pi$ vertex using a vector meson dominance model, including the intermediate resonance contributions relevant at these energies. We find that $\mu_\rho = 2.1 \pm 0.5$ in $e/2m_\rho$ units.







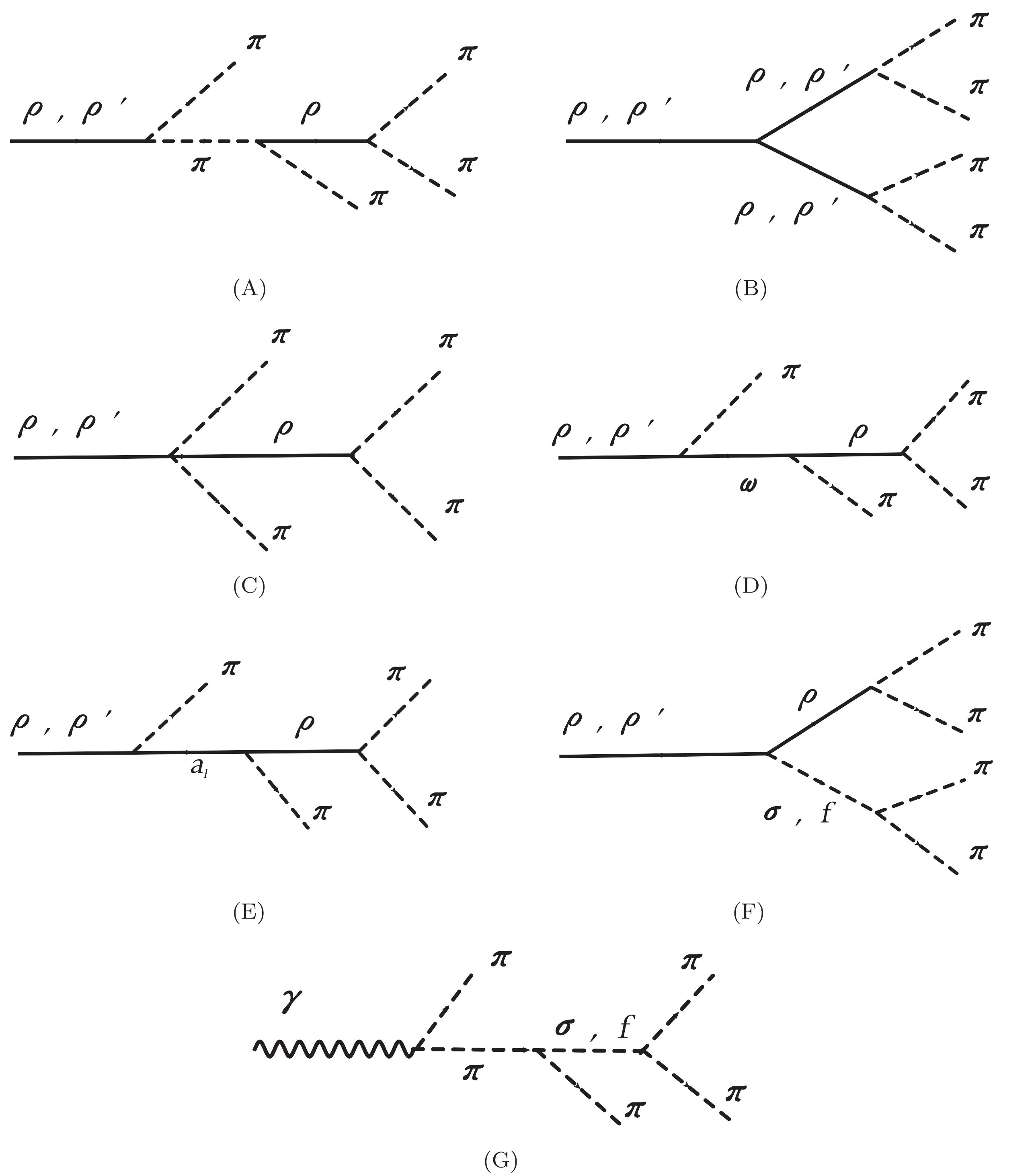


Fig. 1. Generic channels relevant for the description of the $e^+e^- \to \pi^+\pi^-2\pi^0$ process. The total diagrams are obtained by applying Bose symmetry and Charge conjugation.

Ajuste a datos ⇒ $\mu_\rho = 2.1 \pm 0.5\,[\frac{e}{2m_\rho}]$

En el camino del tau

PHYSICAL REVIEW D **76,** 096010 (2007)

Width difference of ρ vector mesons

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(Received 27 August 2007; published 29 November 2007)

PHYSICAL REVIEW D **72,** 113003 (2005)

Radiative two-pion decay of the tau lepton

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(Received 15 November 2005; published 28 December 2005)

PHYSICAL REVIEW D **74,** 071301(R) (2006)

Long distance radiative corrections to the decay $\tau^- \rightarrow \pi^-\pi^0\nu_\tau$

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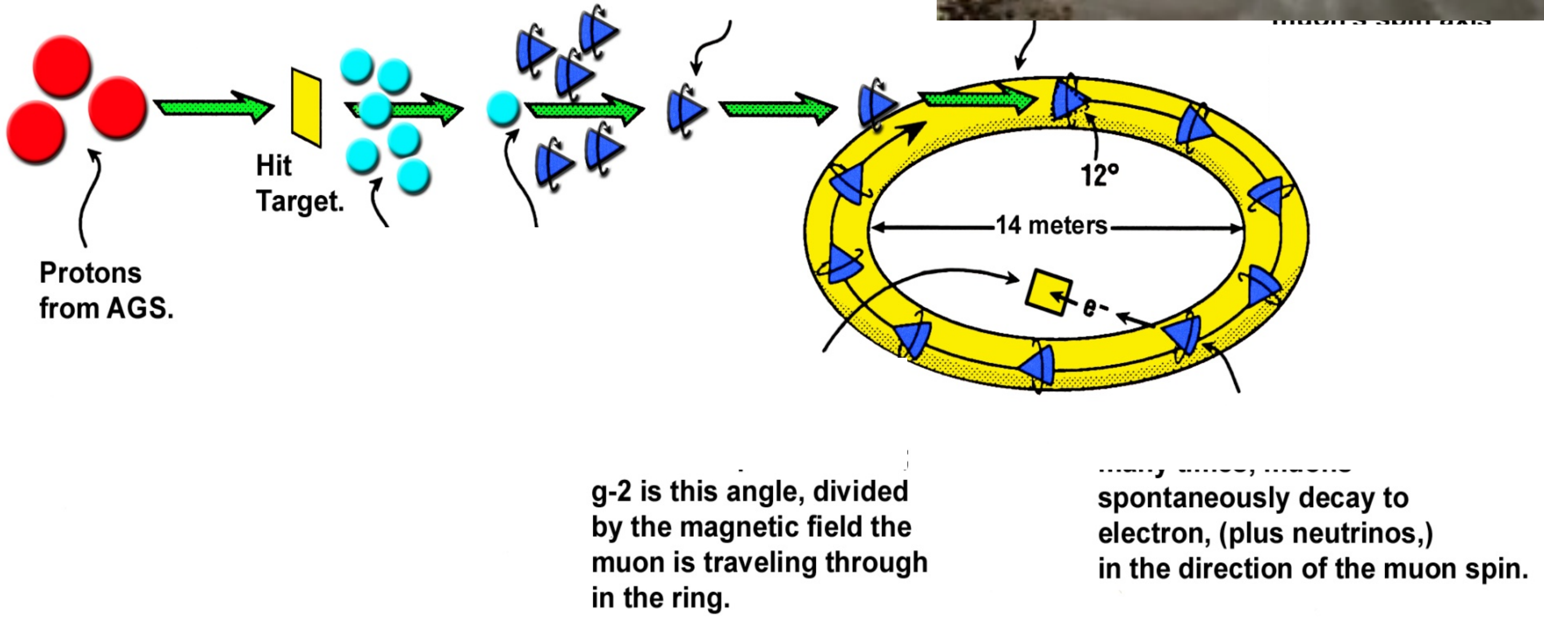
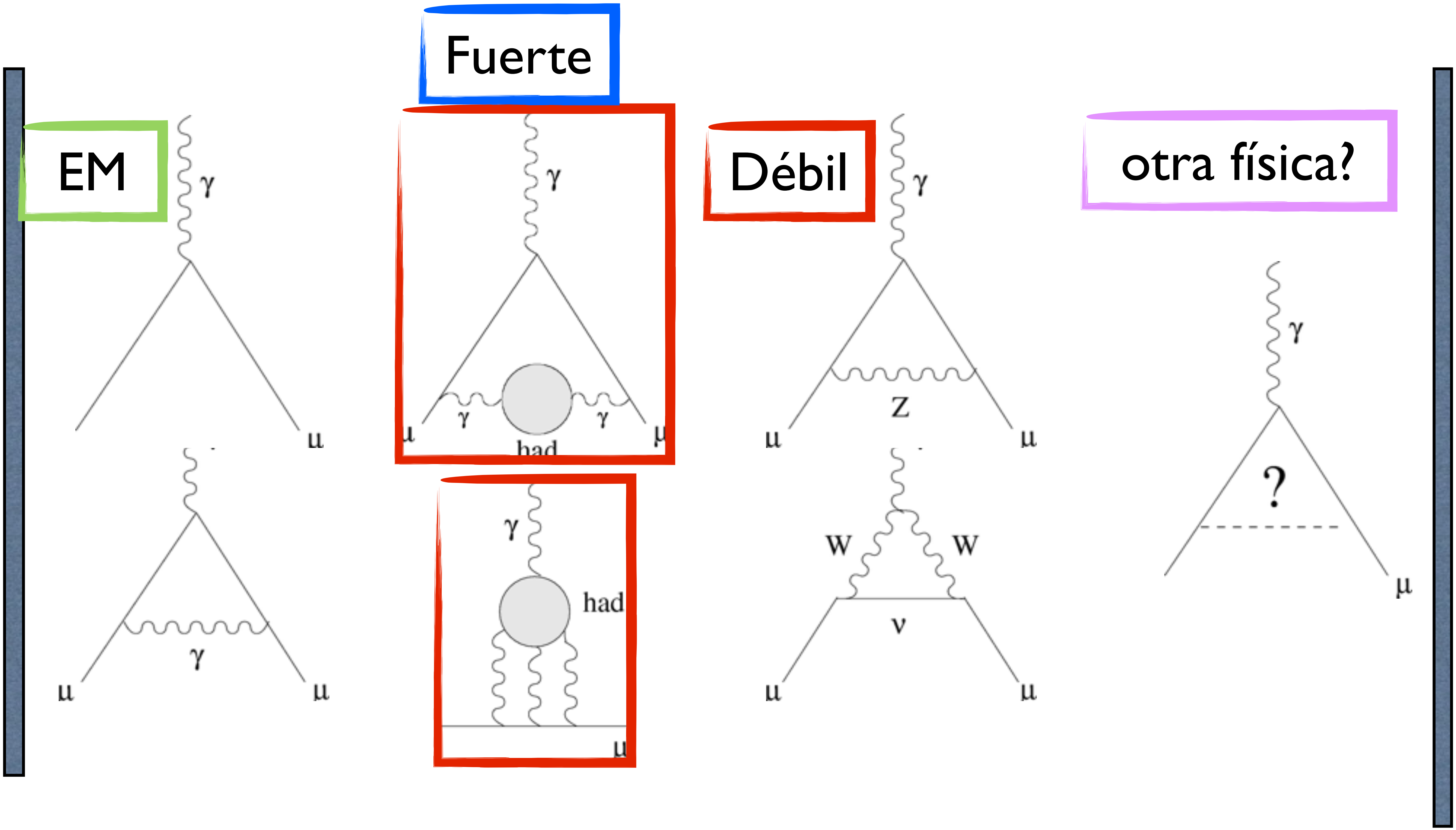
(Received 11 August 2006; published 18 October 2006)

Una de las propiedades mejor medidas: El momento dipolar magnético del muón

Experimento g-2



g-2 Contribuciones hadrónicas



Hemos estudiado las contribuciones hadrónicas

Eur. Phys. J. C
DOI 10.1140/epjc/s10052-009-1219-4

THE EUROPEAN PHYSICAL JOURNAL C

Regular Article - Theoretical Physics

The discrepancy between τ and e^+e^- spectral functions revisited and the consequences for the muon magnetic anomaly

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$$\Delta^{\rm IB} a_\mu^{\rm LO,had}[\pi\pi,\tau] = \frac{\alpha^2 m_\tau^2}{6|V_{ud}|^2\pi^2}\frac{\mathcal{B}_{\pi\pi^0}}{\mathcal{B}_e}\int_{4m_\pi^2}^{m_\tau^2} ds\,\frac{K(s)}{s} \times \frac{dN_{\pi\pi^0}}{N_{\pi\pi^0}ds}\left(1-\frac{s}{m_\tau^2}\right)^{-2}\left(1+\frac{2s}{m_\tau^2}\right)^{-1}\left[\frac{R_{\rm IB}(s)}{S_{\rm EW}}-1\right],$$

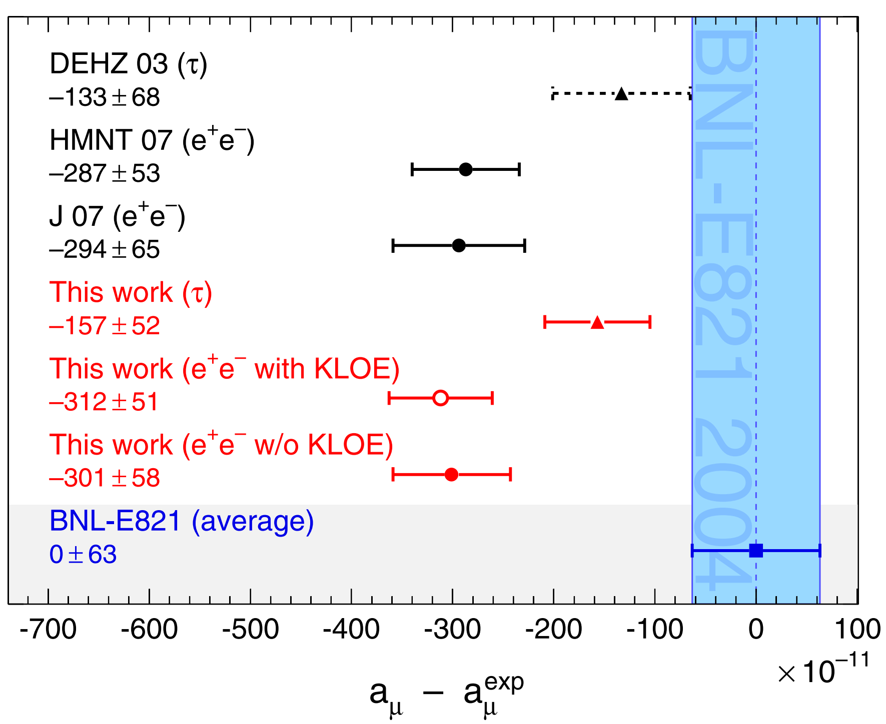
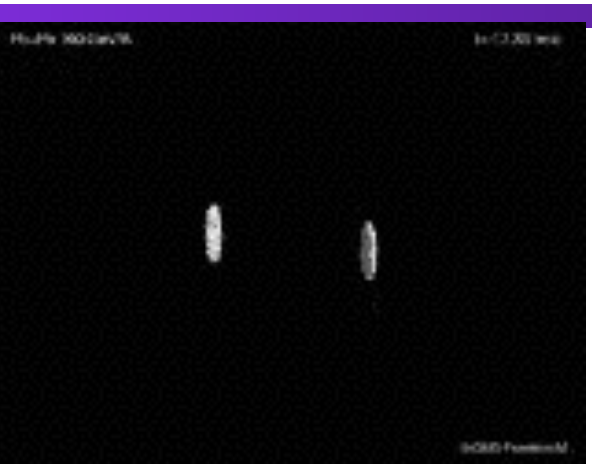


Table 1 Contributions to $a_\mu^{\rm had,LO}$ $[\pi\pi,\tau]$ $(\times 10^{-10})$ from the isospin-breaking corrections discussed in Sect. 3. Corrections shown in two separate columns correspond to the Gounaris–Sakurai (GS) and Kühn–Santamaria (KS) parametrisations, respectively

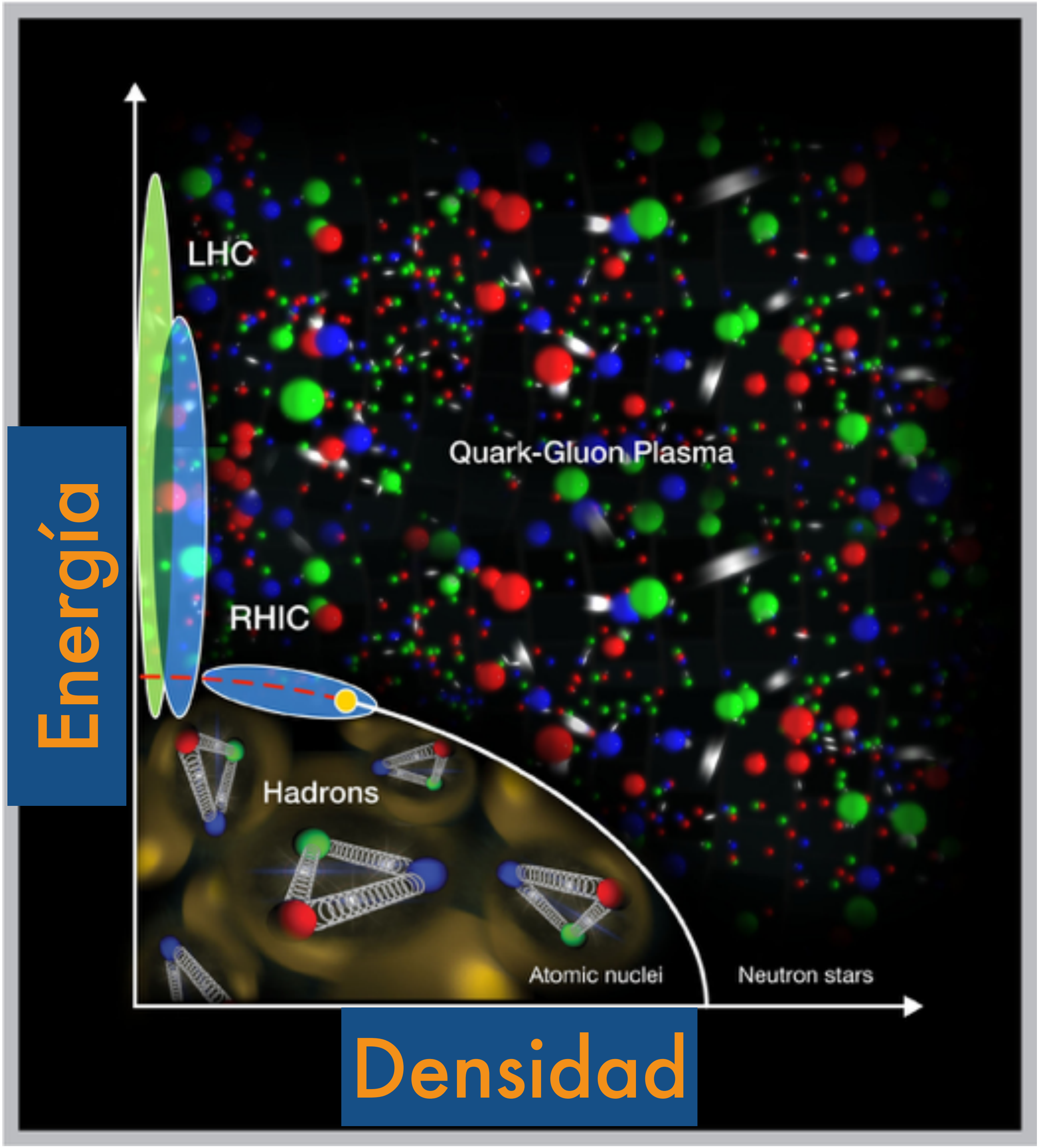
Source	$\Delta a_\mu^{\rm had,LO}[\pi\pi,\tau]$ (10^{-10})	
	GS model	KS model
$S_{\rm EW}$	-12.21 ± 0.15	
$G_{\rm EM}$	-1.92 ± 0.90	
FSR	$+4.67 \pm 0.47$	
ρ–ω interference	$+2.80 \pm 0.19$	$+2.80 \pm 0.15$
$m_{\pi^\pm} - m_{\pi^0}$ effect on σ	-7.88	
$m_{\pi^\pm} - m_{\pi^0}$ effect on Γ_ρ	$+4.09$	$+4.02$
$m_{\rho^\pm} - m_{\rho^0_{\rm bare}}$	$+0.20^{+0.27}_{-0.19}$	$+0.11^{+0.19}_{-0.11}$
$\pi\pi\gamma$, electrom. decays	-5.91 ± 0.59	-6.39 ± 0.64
Total	-16.07 ± 1.22	-16.70 ± 1.23
	-16.07 ± 1.85	

Trabajo en otras áreas

Qué observamos : de la tierra al cielo



COLISIONADORES



OBJETOS ASTRONOMICOS

Hadrones exóticos

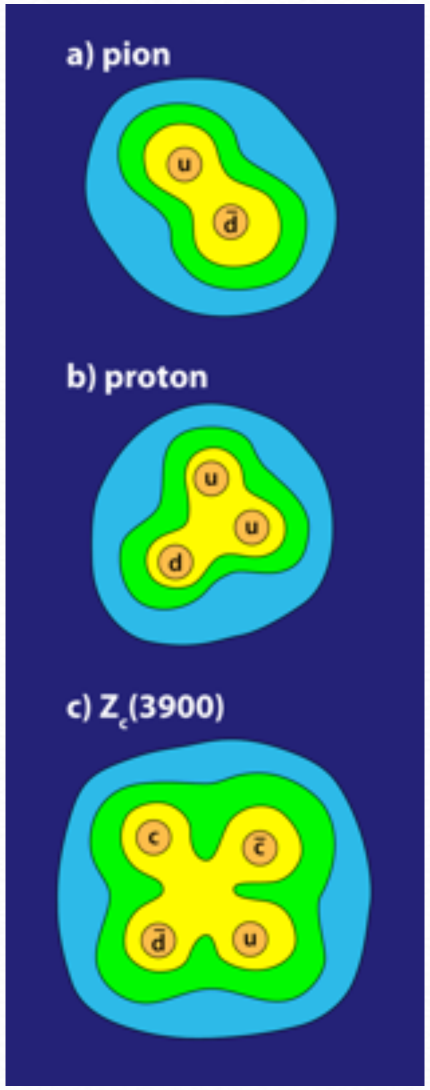
¿Se pueden formar estados con más quarks?

Mesones(qq)

Bariones (qqq)

Tetraquarks (qq-qq)

Pentaquarks (qqq-qq)

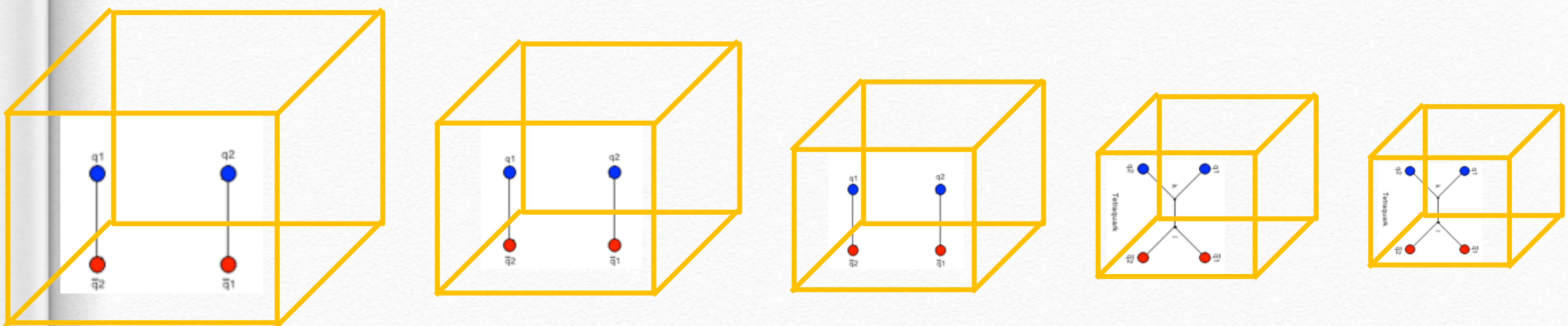


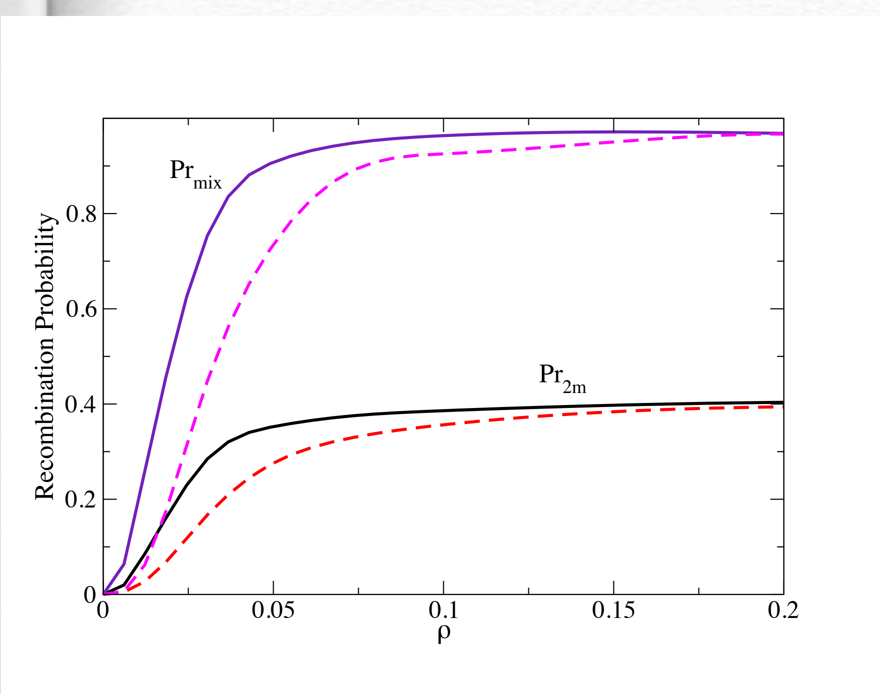
Implicaciones: **Nueva espectroscopía** **Efectos de recombinación**

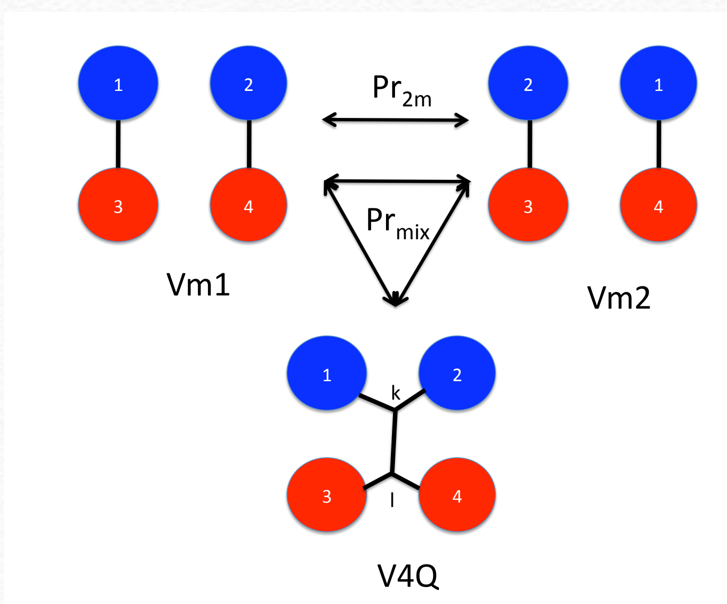
De mesones a tetraquarks

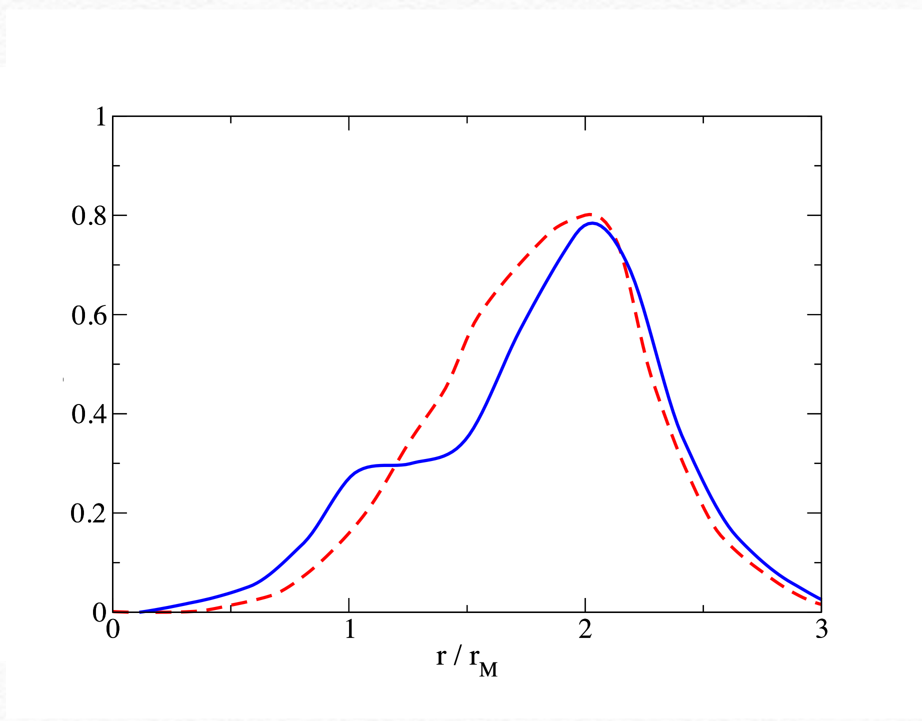
Hemos realizado una simulación para estudiar tres casos:

Dos mesons, Tetraquark y Mezcla









Física nuclear, transiciones de fase y átomos ultra-fríos

PHYSICAL REVIEW C, VOLUME 65, 045208

Modeling the strangeness content of hadronic matter

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PHYSICAL REVIEW C **85**, 015807 (2012)

Proton fraction in the inner neutron-star crust

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IOP Publishing — Journal of Physics B: Atomic, Molecular and Optical Physics
J. Phys. B: At. Mol. Opt. Phys. **43** (2010) 065301 (8pp) — doi:10.1088/0953-4075/43/6/065301

An optimized description of a confined interacting Fermi system

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PHYSICAL REVIEW C **80**, 064905 (2009)

Dynamical heavy-quark recombination and the nonphotonic single-electron puzzle at energies available at the BNL Relativistic Heavy Ion Collider (RHIC)

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PHYSICAL REVIEW C **70**, 035206 (2004)

Color screening in a constituent quark model of hadronic matter

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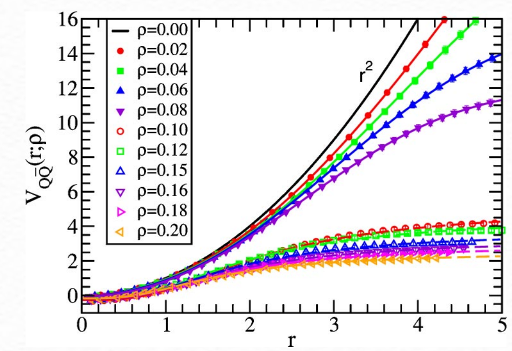
(Received 8 April 2004; published 27 September 2004)



PHYSICAL REVIEW C **92**, 065204 (2015)

Dynamical transition between two mesons and a tetraquark

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PHYSICAL REVIEW A **69**, 013606 (2004)

Simple variational approach for an interacting Fermi trapped gas

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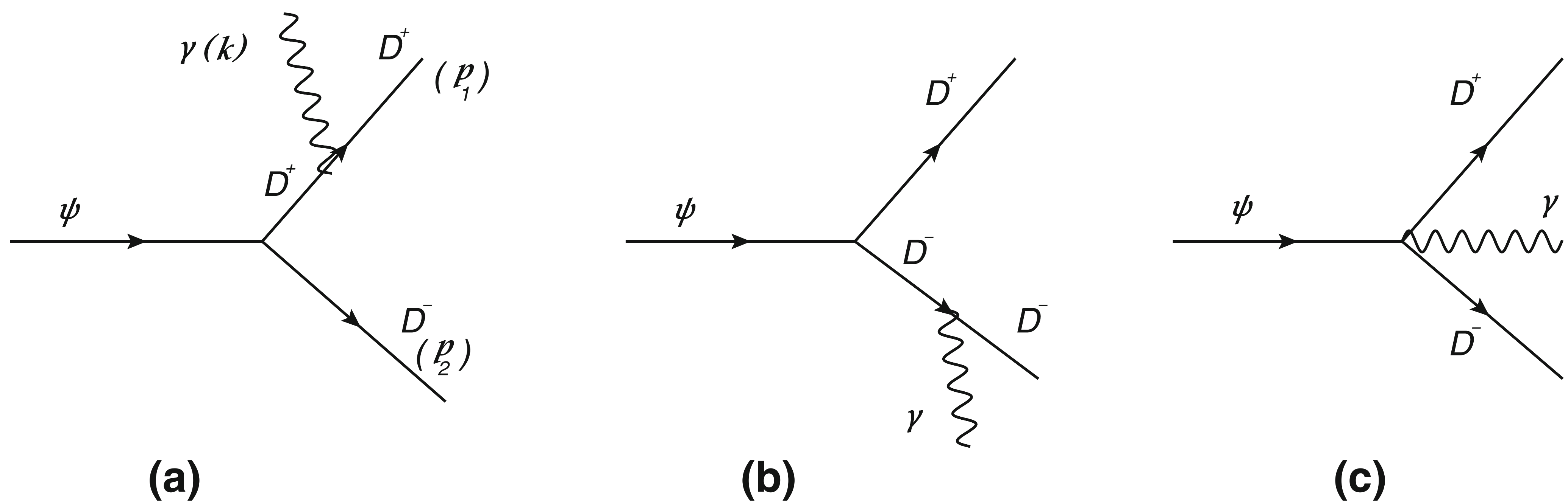
Trabajo actual

Bound state in the $\psi(3770) \to \gamma D\bar{D}$ decay

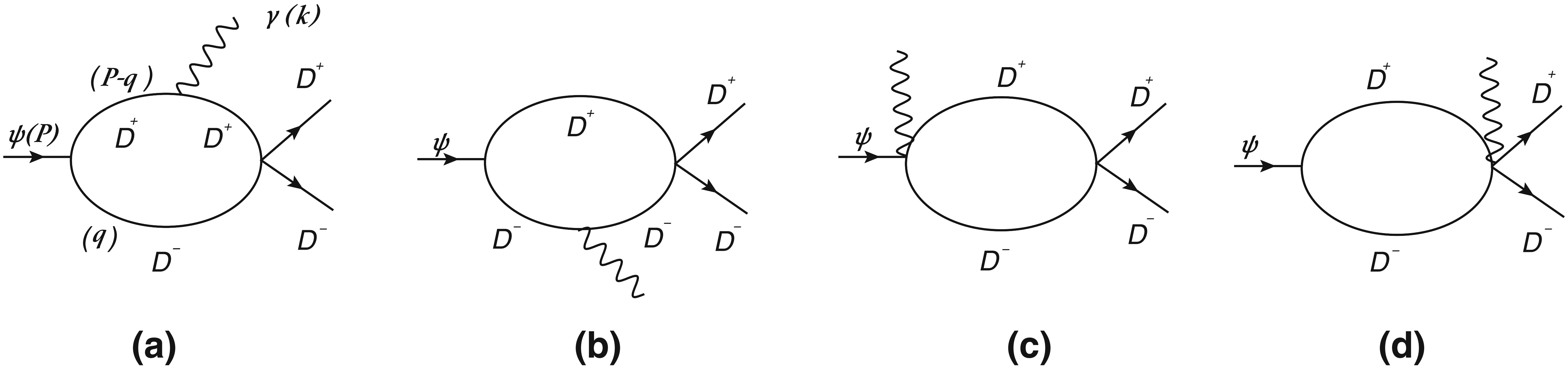


Amplitude
$$t_a + t_b + t_c = -2\, e\, g_\psi\, \epsilon^\mu(\psi)\epsilon^\nu(\gamma) \times \left(g_{\mu\nu} + p_{2\mu} p_{1\nu} \frac{1}{p_1 \cdot k + i\epsilon} + p_{1\mu} p_{2\nu} \frac{1}{p_2 \cdot k + i\epsilon} \right)$$

$$g_\psi = 13.7$$

There is no tree level for the neutral case

Loop mechanism



This is the only contribution for the neutral case

Amplitude $t_L = \epsilon_\mu(\psi)\epsilon_\nu(\gamma)\, T^{\mu\nu}$

$$T^{\mu\nu} = a\, g^{\mu\nu} + b\, P^\mu P^\nu + c\, P^\mu k^\nu + d\, \underline{k^\mu} P^\nu + e\, k^\mu k^\nu\, .$$

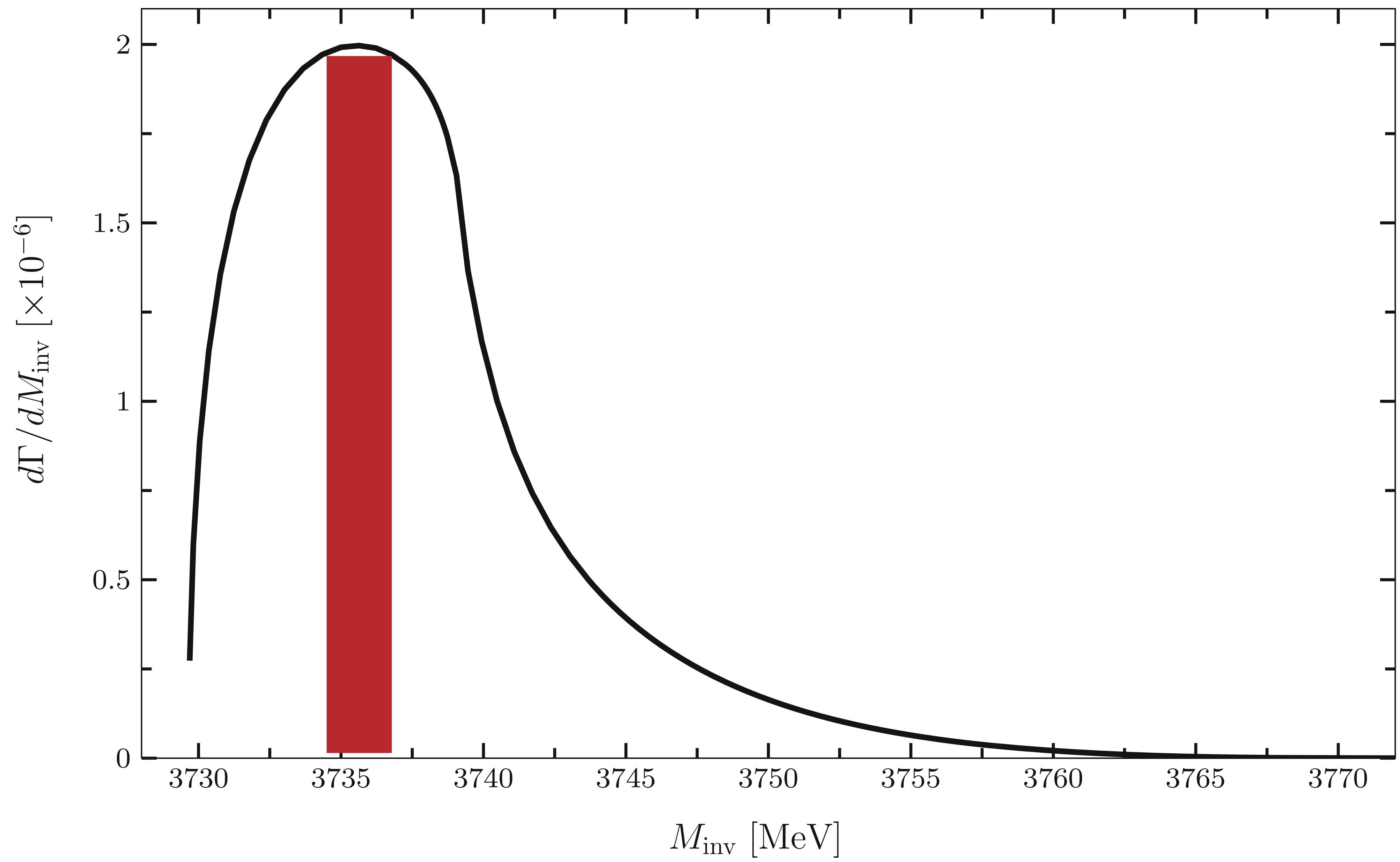
Gauge invariance $T^{\mu\nu} k_\nu = 0$ $\quad a + d\,(P\cdot k) = 0$

Lorentz condition b, c, e do not contribute

$$t = a\epsilon_\mu(\psi)\epsilon^\mu(\gamma)\,; \qquad a = -d\,(P\cdot k)$$

$D^0\bar{D}^0$

Signature on invariant mass



Perspectivas

- Anomalías. Universalidad leptónica
- El sector del Charm. Las contribuciones de larga distancia vs. corta distancia -> nueva física
- Nuevos estados multiquarks. Moleculares
- Actualización MDM de la rho

Felicidades Gabriel !