NOTES

[*a*] See the "Note on $\pi^{\pm} \to \ell^{\pm}\nu\gamma$ and $K^{\pm} \to \ell^{\pm}\nu\gamma$ Form Factors" in the $\pi^{\pm}$ Particle Listings for definitions and details.

[*b*] Measurements of $\Gamma(e^+\nu_e)/\Gamma(\mu^+\nu_\mu)$ always include decays with γ's, and measurements of $\Gamma(e^+\nu_e\gamma)$ and $\Gamma(\mu^+\nu_\mu\gamma)$ never include low-energy γ's. Therefore, since no clean separation is possible, we consider the modes with γ's to be subreactions of the modes without them, and let $[\Gamma(e^+\nu_e) + \Gamma(\mu^+\nu_\mu)]/\Gamma_{\text{total}} = 100\%$.

[*c*] See the $\pi^{\pm}$ Particle Listings for the energy limits used in this measurement; low-energy γ's are not included.

[*d*] Derived from an analysis of neutrino-oscillation experiments.

[*e*] Astrophysical and cosmological arguments give limits of order 10^{-13}; see the π^0 Particle Listings.

[*f*] See the "Note on the Decay Width $\Gamma(\eta \to \gamma\gamma)$" in our 1994 edition, Phys. Rev. **D50**, 1 August 1994, Part I, p. 1451.

[*g*] *C* parity forbids this to occur as a single-photon process.

[*h*] See the "Note on scalar mesons" in the $f_0(1370)$ Particle Listings . The interpretation of this entry as a particle is controversial.

[*i*] See the "Note on $\rho(770)$" in the $\rho(770)$ Particle Listings .

[*j*] The e^+e^- branching fraction is from $e^+e^- \to \pi^+\pi^-$ experiments only. The $\omega\rho$ interference is then due to $\omega\rho$ mixing only, and is expected to be small. If $e\mu$ universality holds, $\Gamma(\rho^0 \to \mu^+\mu^-) = \Gamma(\rho^0 \to e^+e^-) \times 0.99785$.

[*k*] See the "Note on scalar mesons" in the $f_0(1370)$ Particle Listings .

[*l*] See the "Note on $a_1(1260)$" in the $a_1(1260)$ Particle Listings .

[*m*] This is only an educated guess; the error given is larger than the error on the average of the published values. See the Particle Listings for details.

[*n*] See the "Note on the $f_1(1420)$" in the $\eta(1440)$ Particle Listings.

[*o*] See also the $\omega(1650)$ Particle Listings.

[*p*] See the "Note on the $\eta(1440)$" in the $\eta(1440)$ Particle Listings.

[*q*] See the "Note on the $\rho(1450)$ and the $\rho(1700)$" in the $\rho(1700)$ Particle Listings.

[*r*] See the "Note on non-$q\overline{q}$ mesons" in the Particle Listings (see the index for the page number).

[*s*] See also the $\omega(1420)$ Particle Listings.

[*t*] See the "Note on $f_0(1710)$" in the $f_0(1710)$ Particle Listings .

[*u*] See the note in the $K^{\pm}$ Particle Listings.

[*v*] The definition of the slope parameter g of the $K \to 3\pi$ Dalitz plot is as follows (see also "Note on Dalitz Plot Parameters for $K \to 3\pi$ Decays" in the $K^{\pm}$ Particle Listings):

$$\left|M\right|^2 = 1 + g(s_3 - s_0)/m^2_{\pi^+} + \cdots .$$

[*w*] For more details and definitions of parameters see the Particle Listings.

[*x*] Most of this radiative mode, the low-momentum γ part, is also included in the parent mode listed without γ's.

[*y*] See the $K^{\pm}$ Particle Listings for the energy limits used in this measurement.

[*z*] Direct-emission branching fraction.

[*aa*] Structure-dependent part.

[*bb*] Derived from measured values of ϕ_{+-}, ϕ_{00}, $\left|\eta\right|$, $\left|m_{K^0_L} - m_{K^0_S}\right|$, and $\tau_{K^0_S}$, as described in the introduction to "Tests of Conservation Laws."

[*cc*] The *CP*-violation parameters are defined as follows (see also "Note on *CP* Violation in $K_S \to 3\pi$" and "Note on *CP* Violation in K^0_L Decay" in the Particle Listings):

$$\eta_{+-} = \left|\eta_{+-}\right| e^{i\phi_{+-}} = \frac{A(K^0_L \to \pi^+\pi^-)}{A(K^0_S \to \pi^+\pi^-)} = \epsilon + \epsilon'$$

$$\eta_{00} = \left|\eta_{00}\right| e^{i\phi_{00}} = \frac{A(K^0_L \to \pi^0\pi^0)}{A(K^0_S \to \pi^0\pi^0)} = \epsilon - 2\epsilon'$$

$$\delta = \frac{\Gamma(K^0_L \to \pi^-\ell^+\nu) - \Gamma(K^0_L \to \pi^+\ell^-\nu)}{\Gamma(K^0_L \to \pi^-\ell^+\nu) + \Gamma(K^0_L \to \pi^+\ell^-\nu)} ,$$

$$\mathrm{Im}(\eta_{+-0})^2 = \frac{\Gamma(K^0_S \to \pi^+\pi^-\pi^0)^{CP\ \text{viol.}}}{\Gamma(K^0_L \to \pi^+\pi^-\pi^0)} ,$$

$$\mathrm{Im}(\eta_{000})^2 = \frac{\Gamma(K^0_S \to \pi^0\pi^0\pi^0)}{\Gamma(K^0_L \to \pi^0\pi^0\pi^0)} .$$

where for the last two relations *CPT* is assumed valid, *i.e.*, $\mathrm{Re}(\eta_{+-0}) \simeq 0$ and $\mathrm{Re}(\eta_{000}) \simeq 0$.

[*dd*] See the K^0_S Particle Listings for the energy limits used in this measurement.

[*ee*] The value is for the sum of the charge states or particle/antiparticle states indicated.

[*ff*] ϵ'/ϵ is derived from $\left|\eta_{00}/\eta_{+-}\right|$ measurements using theoretical input on phases.

[*gg*] See the K^0_L Particle Listings for the energy limits used in this measurement.

[*hh*] Allowed by higher-order electroweak interactions.

[*ii*] Violates *CP* in leading order. Test of direct *CP* violation since the indirect *CP*-violating and *CP*-conserving contributions are expected to be suppressed.

[*jj*] See the "Note on $f_0(1370)$" in the $f_0(1370)$ Particle Listings and in the 1994 edition.

[*kk*] See the note in the $L(1770)$ Particle Listings in Reviews of Modern Physics **56** No. 2 Pt. II (1984), p. S200. See also the "Note on $K_2(1770)$ and the $K_2(1820)$" in the $K_2(1770)$ Particle Listings .

[*ll*] See the "Note on $K_2(1770)$ and the $K_2(1820)$" in the $K_2(1770)$ Particle Listings .

[*mm*] This result applies to $Z^0 \rightarrow c\overline{c}$ decays only. Here ℓ^+ is an average (not a sum) of e^+ and μ^+ decays.

[*nn*] This is a weighted average of $D^{\pm}$ (44%) and D^0 (56%) branching fractions. See "D^+ and $D^0 \rightarrow$ (η anything) / (total D^+ and D^0)" under "D^+ Branching Ratios" in the Particle Listings.

[*oo*] This value averages the e^+ and μ^+ branching fractions, after making a small phase-space adjustment to the μ^+ fraction to be able to use it as an e^+ fraction; hence our ℓ^+ here is really an e^+.

[*pp*] An ℓ indicates an e or a μ mode, not a sum over these modes.

[*qq*] The branching fraction for this mode may differ from the sum of the submodes that contribute to it, due to interference effects. See the relevant papers in the Particle Listings.

[*rr*] The two experiments measuring this fraction are in serious disagreement. See the Particle Listings.

[*ss*] This mode is not a useful test for a ΔC=1 weak neutral current because both quarks must change flavor in this decay.

[*tt*] This D^0_1-D^0_2 limit is inferred from the D^0-$\overline{D}^0$ mixing ratio $\Gamma(K^+\pi^-$ (via $\overline{D}^0$)) / $\Gamma(K^-\pi^+)$ near the end of the D^0 Listings.

[*uu*] The experiments on the division of this charge mode amongst its submodes disagree, and the submode branching fractions here add up to considerably more than the charged-mode fraction.

[*vv*] However, these upper limits are in serious disagreement with values obtained in another experiment.

[*ww*] For now, we average together measurements of the $X e^+ \nu_e$ and $X \mu^+ \nu_\mu$ branching fractions. This is the *average*, not the *sum*.

[*xx*] This branching fraction includes all the decay modes of the final-state resonance.

[*yy*] This value includes only K^+K^- decays of the $f_0(1710)$, because branching fractions of this resonance are not known.

[*zz*] This value includes only $\pi^+\pi^-$ decays of the $f_0(1500)$, because branching fractions of this resonance are not known.

[*aaa*] B^0 and B_s^0 contributions not separated. Limit is on weighted average of the two decay rates.

[*bbb*] These values are model dependent. See 'Note on Semileptonic Decays' in the B^+ Particle Listings.

[*ccc*] D^{**} stands for the sum of the $D(1\,^1P_1)$, $D(1\,^3P_0)$, $D(1\,^3P_1)$, $D(1\,^3P_2)$, $D(2\,^1S_0)$, and $D(2\,^1S_1)$ resonances.

[*ddd*] $D^{(*)}\overline{D}^{(*)}$ stands for the sum of $D^*\overline{D}^*$, $D^*\overline{D}$, $D\overline{D}^*$, and $D\overline{D}$.

[*eee*] Inclusive branching fractions have a multiplicity definition and can be greater than 100%.

[*fff*] D_j represents an unresolved mixture of pseudoscalar and tensor D^{**} (P-wave) states.

[*ggg*] Not a pure measurement. See note at head of B_s^0 Decay Modes.

[*hhh*] Not a pure branching ratio, it is the fraction $(\Gamma_i/\Gamma)\times$B$(\overline{b} \to\ B_c)$.

[*iii*] Includes $p\overline{p}\pi^+\pi^-\gamma$ and excludes $p\overline{p}\eta$, $p\overline{p}\omega$, $p\overline{p}\eta'$.

[*jjj*] J^{PC} known by production in e^+e^- via single photon annihilation. I^G is not known; interpretation of this state as a single resonance is unclear because of the expectation of substantial threshold effects in this energy region.

[*kkk*] Spectroscopic labeling for these states is theoretical, pending experimental information.