Average Hadron Multiplicities in Hadronic e^+e^- Annihilation Events

Table 37.1: Average hadronic multiplicities per hadronic e^+e^- annihilation event at $\sqrt{s} \approx 10$, 29–35, and 91 GeV. The rates given include decay products from resonances with $c\tau < 10$ cm, and include charge conjugated states. Correlations of the systemaic uncertainties were considered for the calculation of the averages. (Updated July 1999 by O. Biebel.)

Particle	$\sqrt{s} \approx 10$ GeV		$\sqrt{s} = 29$–35 GeV		$\sqrt{s} = 91$ GeV	
Pseudoscalar mesons:						
π^+	6.6	± 0.2	10.3	± 0.4	16.99	± 0.27
π^0	3.2	± 0.3	5.83	± 0.28	9.47	± 0.54
K^+	0.90	± 0.04	1.48	± 0.09	2.242	± 0.063
K^0	0.91	± 0.05	1.48	± 0.07	2.013	± 0.033
η	0.20	± 0.04	0.61	± 0.07	0.971	± 0.030
$\eta\prime(958)$	0.03	± 0.01	0.26	± 0.10	0.156	± 0.021
D^+	0.16	± 0.03	0.17	± 0.03	0.175	± 0.016
D^0	0.37	± 0.06	0.45	± 0.07	0.454	± 0.030
D_s^+	0.13	± 0.02	0.45	± 0.20 [a]	0.131	± 0.021
B^+, B_d^0		—		—	0.165	± 0.026 [b]
B_s^0		—		—	0.057	± 0.013 [b]
Scalar mesons:						
$f_0(980)$	0.024	± 0.006	0.05	± 0.02 [c]	0.146	± 0.012
$a_0(980)^\pm$		—		—	0.27	± 0.11 [d]
Vector mesons:						
$\rho(770)^0$	0.35	± 0.04	0.81	± 0.08	1.231	± 0.098
$\rho(770)^\pm$		—		—	2.40	± 0.43 [d]
$\omega(782)$	0.30	± 0.08		—	1.08	± 0.12
$K^*(892)^+$	0.27	± 0.03	0.64	± 0.05	0.715	± 0.059
$K^*(892)^0$	0.29	± 0.03	0.56	± 0.06	0.738	± 0.024
$\phi(1020)$	0.044	± 0.003	0.085	± 0.011	0.0963	± 0.0032
$D^*(2010)^+$	0.22	± 0.04	0.43	± 0.07	0.183	± 0.010
$D^*(2007)^0$	0.23	± 0.06	0.27	± 0.11		—
$D_s^*(2112)^+$		—		—	0.101	± 0.048 [f]
B^* [e]		—		—	0.288	± 0.026
$J/\psi(1S)$		—		—	0.0052	± 0.0004 [g]
$\psi(2S)$		—		—	0.0023	± 0.0004 [g]
$\Upsilon(1S)$		—		—	0.00014	± 0.00007 [g]
Pseudovector mesons:						
$\chi_{c1}(3510)$		—		—	0.0041	± 0.0011 [g]
Tensor mesons:						
$f_2(1270)$	0.09	± 0.02	0.14	± 0.04	0.166	± 0.020
$f_2'(1525)$		—		—	0.012	± 0.006
$K_2^*(1430)^+$		—	0.09	± 0.03		—
$K_2^*(1430)^0$		—	0.12	± 0.06	0.084	± 0.022 [g]
B^{**} [h]		—		—	0.118	± 0.024
Baryons:						
p	0.253	± 0.016	0.640	± 0.050	1.048	± 0.045
Λ	0.080	± 0.007	0.205	± 0.010	0.374	± 0.009
Σ^0	0.023	± 0.008		—	0.070	± 0.012
Σ^-		—		—	0.081	± 0.010
Σ^+		—		—	0.099	± 0.015
$\Sigma^\pm$		—		—	0.174	± 0.009
Ξ^-	0.0059	± 0.0007	0.0176	± 0.0027	0.0258	± 0.0010
$\Delta(1232)^{++}$	0.040	± 0.010		—	0.085	± 0.014
$\Sigma(1385)^-$	0.006	± 0.002	0.017	± 0.004	0.0240	± 0.0017
$\Sigma(1385)^+$	0.005	± 0.001	0.017	± 0.004	0.0239	± 0.0015
$\Sigma(1385)^\pm$	0.0106	± 0.0020	0.033	± 0.008	0.0462	± 0.0028
$\Xi(1530)^0$	0.0015	± 0.0006		—	0.0055	± 0.0005
Ω^-	0.0007	± 0.0004	0.014	± 0.007	0.0016	± 0.0003
Λ_c^+	0.100	± 0.030 [i]	0.110	± 0.050	0.078	± 0.017
Λ_b^0		—		—	0.031	± 0.016
$\Sigma_c^{++}, \Sigma_c^0$	0.014	± 0.007		—		—
$\Lambda(1520)$	0.008	± 0.002		—	0.0222	± 0.0027

All average multiplicites are per hadronic e^+e^- annihilation event.

(a) B($D_s \to \eta\pi,\ \eta'\pi$) was used (RPP94).

(b) The Standard Model B($Z \to b\bar{b}$) = 0.217 was used.

(c) $x_p = p/p_{\rm beam} > 0.1$ only.

(d) Both charge states.

(e) Any charge state (*i.e.*, B_d^*, B_u^*, or B_s^*).

(f) B($D_s^* \to D_S^+\gamma$), B($D_s^+ \to \phi\pi^+$), B($\phi \to K^+K^-$) have been used (RPP98).

(g) B($Z \to$ hadrons) = 0.699 was used (RPP94).

(h) Any charge state (*i.e.*, B_d^{**}, B_u^{**}, or B_s^{**}).

(i) The value was derived from the cross section of $\Lambda_c^+ \to p\pi K$, assuming the branching fraction to be $(3.2 \pm 0.7)\%$ (RPP92).

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