Table 33.3: Regge theory provides a simple and compact description of total cross sections. It is sufficient to write $\sigma_{\text{total}} = X\, s^{\epsilon} + Y\, s^{-\eta}$, where the first term arises from pomeron exchange and the second from ρ, ω, f, a exchange. We list the results of A. Donnachie and P.V. Landshoff, Phys. Lett. **B296**, 227 (1992). Simultaneous fits were first made to pp and $\overline{p}p$ data for $\sqrt{s} > 10$ GeV, requiring the same values of X, ϵ, and η for both reactions. They obtained

$$\epsilon = 0.0808 \qquad \eta = 0.4525\ .$$

The same values of ϵ and η were used in fits to other reactions. For other pairs of reactions of the form ab and $a\overline{b}$, fits were made for a common value of X and a value of Y, using data with $\sqrt{s} > 6$ GeV. These fits are shown by the gray background curves on the following graphs.

Reaction	X (mb)	Y (mb)
$\overline{p}p$	21.70	98.39
pp	21.70	56.08
$\overline{p}n$	21.70*	92.71
pn	21.70*	54.77
π^-p	13.63	36.02
π^+p	13.63	27.56
K^-p	11.82	26.36
K^+p	11.82	8.15
γp	0.0677	0.129

*Requiring the same pomeron exchange coefficient as for $\sigma(pp)$ and $\sigma(\overline{p}p)$. Fits without the constraint result in an almost identical value, $X = 22.15$ mb.

Table 33.4: Extensively revised 1991 by A. Baldini, V. Flaminio, and O. Yushchenko. The CERN-HERA and COMPAS Groups have made least-squares fits to many high-energy cross sections. The parametrization is $\sigma(p) = A + Bp^n + C\ln^2(p) + D\ln(p)$, where σ is in mb and p is in GeV/c. The best-fit coefficients A, B, C, and D, and the exponent n are tabulated below; where indicated, not all the terms in $\sigma(p)$ are included in the fit. The errors on the parameters are highly correlated since the terms in $\sigma(p)$ are far from orthogonal. Also given is the range of momentum over which the fit was done; extrapolation outside this range is likely to give incorrect results.

Reaction	Momentum range (GeV/c)	Fitted parameters A	B	n	C	D
γp total	3.0–183	0.147 ± 0.001	—	—	0.0022 ± 0.0001	-0.0170 ± 0.0007
γd total	2.0–17.8	0.300 ± 0.005	—	—	0.0095 ± 0.0020	-0.057 ± 0.007
π^+p total	4.0–340	16.4 ± 1.2	19.3 ± 0.8	-0.42 ± 0.05	0.19 ± 0.02	—
π^+p elastic	2.0–200	—	11.4 ± 0.3	-0.4 ± 0.2	0.079 ± 0.005	—
π^-p total	2.5–370	33.0 ± 1.2	14.0 ± 1.8	-1.36 ± 0.29	0.456 ± 0.049	-4.03 ± 0.48
π^-p elastic	2.0–360	1.76 ± 0.42	11.2 ± 0.3	-0.64 ± 0.07	0.043 ± 0.011	—
$\pi^{\pm}d$ total	2.5–370	56.8 ± 3.6	42.2 ± 8.4	-1.45 ± 0.38	0.65 ± 0.14	-5.39 ± 1.43
K^+p total	2.0–310	18.1 ± 0.1	—	—	0.26 ± 0.03	-1.0 ± 0.1
K^+p elastic	2.0–175	5.0 ± 1.2	8.1 ± 1.5	-1.8 ± 0.7	0.16 ± 0.06	-1.3 ± 0.5
K^+n total	2.0–310	18.7 ± 0.2	—	—	0.21 ± 0.02	-0.89 ± 0.14
K^+d total	2.0–310	34.2 ± 1.2	7.9 ± 3.8	-2.1 ± 1.1	0.346 ± 0.074	-0.99 ± 0.61
K^-p total	3.0–310	32.1 ± 0.2	—	—	0.66 ± 0.01	-5.6 ± 0.1
K^-p elastic	3.0–175	7.3 ± 0.1	—	—	0.29 ± 0.01	-2.40 ± 0.09
K^-n total	1.8–310	25.2 ± 0.5	—	—	0.38 ± 0.03	-2.9 ± 0.3
K^-d total	3.0–310	57.6 ± 0.4	—	—	1.17 ± 0.03	-9.5 ± 0.2
pp total	3.0–2100	48.0 ± 0.1	—	—	0.522 ± 0.005	-4.51 ± 0.05
pp elastic	2.0–2100	11.9 ± 0.8	26.9 ± 1.7	-1.21 ± 0.11	0.169 ± 0.021	-1.85 ± 0.26
pn total	3.0–370	47.30 ± 0.17	—	—	0.513 ± 0.023	-4.27 ± 0.15
pd total	3.0–370	91.3 ± 0.2	—	—	1.05 ± 0.03	-8.8 ± 0.2
pd elastic	2.0–384	16.1 ± 0.7	—	—	0.32 ± 0.04	-3.4 ± 0.4
$\overline{p}p$ total	5.0–1.73×10^6	38.4 ± 4.4	77.6 ± 2.8	-0.64 ± 0.07	0.26 ± 0.05	-1.2 ± 0.9
$\overline{p}p$ elastic	5.0–1.73×10^6	10.2 ± 0.7	52.7 ± 1.8	-1.16 ± 0.05	0.125 ± 0.014	-1.28 ± 0.20
$\overline{p}n$ total	1.1–280	—	133.6 ± 4.6	-0.70 ± 0.03	-1.22 ± 0.13	13.7 ± 0.7
$\overline{p}n$ elastic	1.1–5.55	36.5 ± 1.5	—	—	—	-11.9 ± 1.8
$\overline{p}d$ total	2.0–280	112 ± 13	125 ± 8	-1.08 ± 0.15	1.14 ± 0.49	-12.4 ± 4.9