Annihilation Cross Section Near M_Z

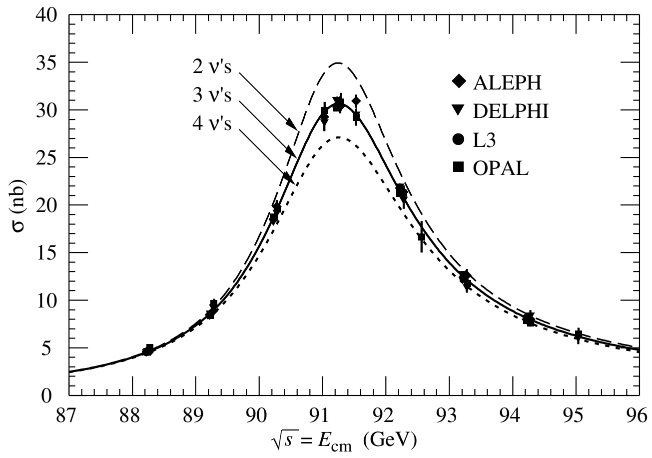

Figure 37.14: Data from the ALEPH, DELPHI, L3, and OPAL Collaborations for the cross section in e^+e^- annihilation into hadronic final states as a function of c.m. energy near the Z. LEP detectors obtained data at the same energies; some of the points are obscured by overlap. The curves show the predictions of the Standard Model with three species (solid curve) and four species (dashed curve) of light neutrinos. The asymmetry of the curves is produced by initial-state radiation. References:

ALEPH: D. Decamp *et al.*, Z. Phys. **C53**, 1 (1992).
DEPHI: P. Abreu *et al.*, Nucl. Phys. **B367**, 511 (1992).
L3: B. Adeva *et al.*, Z. Phys. **C51**, 179 (1991).
OPAL: G. Alexander *et al.*, Z. Phys. **C52**, 175 (1991).

Average e^+e^-, pp, and $\overline{p}p$ Multiplicity

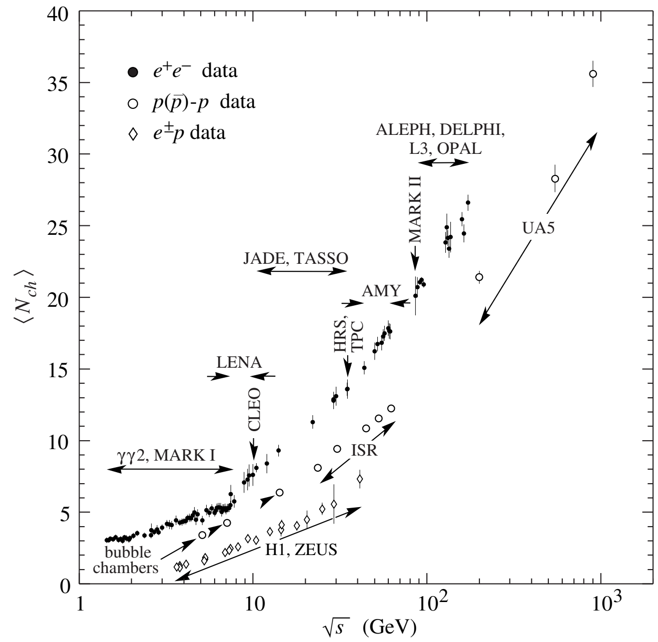

Figure 37.15: Average multiplicity as a function of $\sqrt{s}$ for e^+e^- and $p\overline{p}$ annihilations, and pp and ep collisions. The indicated errors are statistical and systematic errors added in quadrature, except when no systematic errors are given. Files of the data shown in this figure are given in `http://home.cern.ch/b/biebel/www/RPP00`

—

$\boldsymbol{e^+e^-}$: All e^+e^- measurements include contributions from K^0_S and Λ decays with the exception of the L3 measurements. The $\gamma\gamma 2$ and MARK I measurements contain a systematic 5% error. Points at identical energies have been spread horizontally for clarity:

ALEPH: D. Buskulic *et al.*, Z. Phys. **C69**, 15 (1995) and Z. Phys. **C73**, 409 (1997)

DELPHI: P. Abreu *et al.*, Eur. Phys. J. **C6**, 19 (1999); *et al.*, Phys. Lett. **B372**, 172 (1996); and *et al.*, Phys. Lett. **B416**, 233 (1998)

L3: M. Acciarri *et al.*, Phys. Lett. **B371**, 137 (1996); Phys. Lett. **B404**, 390 (1997); and Phys. Lett. **B444**, 569 (1998)

OPAL: K. Ackerstaff *et al.*, Z. Phys. **C75**, 193 (1997); P.D. Acton *et al.*, Z. Phys. **C53**, 539 (1992) and references therein; R. Akers *et al.*, Z. Phys. **C68**, 203 (1995)

TOPAZ: K. Nakabayashi *et al.*, Phys. Lett. **B413**, 447 (1997),

VENUS: K. Okabe *et al.*, Phys. Lett. **B423**, 407 (1998).

—

$\boldsymbol{e^\pm p}$: Multiplicities have been measured in the current fragmentation region of the Breit frame:

H1: C. Adloff *et al.*, Nucl. Phys. **B504**, 3 (1997)

ZEUS: M. Derrick *et al.*, Z. Phys. **C67**, 93 (1995).

—

$\boldsymbol{p^{(\overline{p})}}$: The errors of the $p^{(\overline{p})}$ measurements are the quadratically added statistical and systematic errors, except for the bubble chamber measurements for which only statistical errors are given in the references. The values measured by UA5 exclude single diffractive dissociation:

bubble chamber: J. Benecke *et al.*, Nucl. Phys. **B76**, 29 (1976), W.M. Morse *et al.*, Phys. Rev. **D15**, 66 (1977),

ISR: A. Breakstone *et al.*, Phys. Rev. **D30**, 528 (1984),

UA5: G.J. Alner *et al.*, Phys. Lett. **167B**, 476 (1986), R.E. Ansorge *et al.*, Z. Phys. **C43**, 357 (1989).

(Courtesy of O. Biebel, Max-Planck-Institut für Physik, München, 1999.)