Measurement of $D_s^- \to \tau^- \bar{\nu}_\tau$ and a new limit for $B^- \to \tau^- \bar{\nu}_\tau$

L3 Collaboration

Using a data sample of 1,475,000 $Z \to q\bar{q}(\gamma)$ events collected during 1994 with the L3 detector at LEP, we have studied the purely leptonic decays of heavy flavour mesons, $D_s^- \to \tau^- \bar{\nu}_\tau$ and $B^- \to \tau^- \bar{\nu}_\tau$. A signal is observed in the invariant mass distribution $M(\gamma D_s^-)$ corresponding to the decay sequence $D_s^{*-} \to \gamma D_s^-$, $D_s^- \to \tau^- \bar{\nu}_\tau$, $\tau^- \to l^- \bar{\nu}_l \nu_\tau$. The branching fraction for $D_s^- \to \tau^- \bar{\nu}_\tau$ decays is measured to be $\mathrm{Br}(D_s^- \to \tau^- \bar{\nu}_\tau) = 0.074 \pm 0.028(\mathrm{stat}) \pm 0.016(\mathrm{syst}) \pm 0.018(\mathrm{norm})$. No signal of $B^- \to \tau^- \bar{\nu}_\tau$ decays is observed in the data, corresponding to an upper limit on the branching fraction $\mathrm{Br}(B^- \to \tau^- \bar{\nu}_\tau) < 5.7 \times 10^{-4}$ at 90% CL.

K^0_s and Λ production in quark and gluon jets at LEP

L3 Collaboration

A measurement of the K^0_s and Λ inclusive production rates and momentum spectra in two- and three-jet events is presented. On the basis of 3.1 million Z decays collected with the L3 detector at LEP, we observe that production of these particles is well modelled by string fragmentation, but that cluster fragmentation fails to describe their production in gluon jets.

Υ production in hadronic Z decays

L3 Collaboration

We have searched for evidence for Υ production in 3.5 million hadronic Z events collected by the L3 detector at LEP in 1991-1995. No signals are observed for the decay chains $\mathrm{Z} \to \Upsilon\mathrm{X}$; $\Upsilon \to \ell^+\ell^-$ ($\ell = \mathrm{e}, \mu$). Limits are set on the branching fractions $\mathrm{Br}(\mathrm{Z} \to \Upsilon(1\mathrm{S})\mathrm{X})$, $\mathrm{Br}(\mathrm{Z} \to \Upsilon(2\mathrm{S})\mathrm{X}$ and $\mathrm{Br}(\mathrm{Z} \to \Upsilon(3\mathrm{S})\mathrm{X}$.

J production in hadronic Z decays

L3 Collaboration

We report on measurements of the inclusive production of J, ψ' and χ_c mesons in hadronic Z decays, based on 3.2 million hadronic events collected using the L3 detector at LEP. The J and ψ' mesons are reconstructed through their decays into lepton pairs, while the χ_c mesons are reconstructed via the decay mode $\chi_c \to J + \gamma$. The measured branching fractions are:

$$\begin{aligned}
\mathrm{Br}(Z \to J + X) &= (3.40 \pm 0.23\,(\mathrm{stat.}) \pm 0.27\,(\mathrm{sys.})) \times 10^{-3} \\
\mathrm{Br}(Z \to \psi' + X) &= (1.6 \pm 0.5\,(\mathrm{stat.}) \pm 0.3\,(\mathrm{sys.})) \times 10^{-3} \\
\mathrm{Br}(Z \to \chi_{c1} + X) &= (2.7 \pm 0.6\,(\mathrm{stat.}) \pm 0.5\,(\mathrm{sys.})) \times 10^{-3}.
\end{aligned}$$

In the absence of a clear χ_{c2} signal, the upper limit at 90% C.L. is set:

$$\mathrm{Br}(Z \to \chi_{c2} + X) < 3.2 \times 10^{-3}.$$

Resonance formation in two-photon collisions

L3 Collaboration

The two-photon partial width of several resonances formed in $\gamma\gamma$ collisions has been measured in the L3 detector at LEP at $\sqrt{s}$=91 GeV and $130 \leq \sqrt{s} \leq 172$ GeV. Results are presented for the decay channels $\pi^+\pi^-\gamma$ where the Q^2 dependence and the form factor of the $\eta^{'}(958)$ have been measured. In the $\pi^+\pi^-\pi^0$ final state, dominated by the $\mathrm{a}_2(1320)$ meson, there is evidence for a radially excited state, $\mathrm{a}_2(1765)$, of J^P=2^+, produced predominantly in the helicity λ=2 channel. The $\mathrm{f}_2'(1525)$ is analysed in the channels $K^0_S K^0_S$ and $\mathrm{K}^+\mathrm{K}^-$. The charmonium states η_c and χ_{c2} have also been observed.