NEW RESONANCES IN e^+e^- ANNIHILATION ABOVE 4 GeV

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Several vector mesons, $J^{PC}=1^{--}$, have recently been found at SPEAR in e^+e^- annihilation in the energy range 3.9-4.5 GeV[1]. It is natural to compare these new states with the states of the ψ- family ($\psi,\psi',\chi,\ldots$), the latter are adequately described as $\bar{c}c$ bound states. The states above 4 GeV are considerably different from those of the ψ-family, and they do not fit naturally into a scheme of radial excitations of the $\bar{c}c$ system. Here c is the "charmed" quark in addition to the old ones u, d and s.

We have proposed an SU(8)×SL(3,R) color quark model[2], which is a generalization of the quark model based on the dynamical group SU(6)×SL(3,R) [3]. The model can account for the mass differences, leptonic and total hadronic widtbs of the new resonances as well as for the rise in, and the magnitude of, $R=\sigma(e^+e^-\to\text{hadrons})/\sigma(e^+e^-\to\mu^+\mu^-)$.

The strong decays of the new states, which we denote by V_ρ, V_ω and V_ϕ, into the states of the ψ-family can be studied in the framework of duality diagrams. In our model the processes of Fig.1 are phase space forbiden, since $m(D^o)\approx 1.86$ GeV[4], and we predict for these of Fig.2 to be suppresed by a factor of 10^2 - 10^3, due to the Zweig rule.

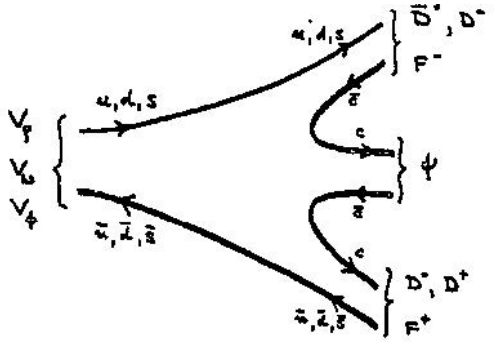

Fig. 1

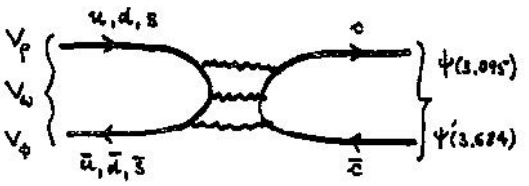

Fig. 2

References

1. J. Siegrist et al., Phys. Rev. Letters 36 (1976) 700.
2. Dj. Šijački, Phys. Letters B (to be published).
3. Dj. Šijački, Phys. Letters 62B (1976) 323.
4. G. Goldhaber et al., Phys Rev. Letters 37 (1976) 255.