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2) G. Zweig, CERN report SL/TH 401, 1964 and to be
4) CERN Neutrino Group, private communication.
7) See e.g., H. Bradner, ARNS 10 (1960) 109;
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A POSSIBLE HIGHER SYMMETRY SCHEME
FOR STRONGLY INTERACTING PARTICLES

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It was noted some time ago 1) that the SU₃
classification of the baryon, vector and pseudo-
scalar meson and antibaryon octets possessed a
peculiar symmetry. It remains invariant under
the simultaneous interchange of isospin with or-
dinary spin and hypercharge with baryon number,
as illustrated in table 1. The normal classification
places particles having the same ordinary
spin S and baryon number B into multiplets and
characterizes the states within the multiplet by
the values of the isospin T and the hypercharge
Y. An alternative classification, the "barbaryon" classification
interchanges the roles of these
quantum numbers, placing particles having the
same isospin and hypercharge into multiplets
whose states are characterized by the values of
the ordinary spin and baryon number. The two
classifications are illustrated by the square ar-ray of table 1. The particles in the same vertical
column are members of the same octet in the or-
dinary classification, while those in the same
horizontal row are members of the same octet in
the barbaryon classification.

One might consider combining the four octets
into a "hyper supermultiplet" corresponding to
the group SU₃ × SU₃, the direct product of two
SU₃ groups. This might be considered as a gen-
eralization of the Wigner supermultiplets, which
combined ordinary spin and isospin into SU₂ × SU₂,
by the additions of B and Y respectively to each

SU₂ group to make SU₃. The combining of ordi-
nary spin and isospin into the same algebra has
been also suggested by the strong coupling isobar
model. However, the idea of putting bosons and
fermions into the same multiplet seemed rather
fantastic and hardly worthy of serious publication.

Since possibilities are now being considered 2)
which seem just as fantastic as the barbaryon
classification, perhaps the latter is not so crazy
after all and deserves more serious considera-
tion. One notes, in particular, that the "quark"
or elementary triplet for SU₃ fits very naturally
into the barbaryon classification. By including a
spin zero boson triplet, one obtains the "hyper-
supermultiplet" of table 2, the direct product of
two triplets in the ordinary SU₃ and barbaryon
SU₃ spaces. The boson triplet also has third in-
tegral values for the baryon number and hyper-
charge.
The most obvious prediction of this classification, if it is taken seriously, is that hypersupermultiplets should be constructed around all new resonances. The requirement that the baryon decuplet \((N^*, Y^*, \Xi^*, \Omega^-)\) belongs to such a hypersupermultiplet predicts the existence of additional boson and fermion decuplet resonances. The baryon decuplet, having \(S = \frac{1}{2}\) and \(B = 1\), can be fitted only into decuplet or a 27-dimensional multiplet in the barbaryon classification. The decuplet classification then predicts the existence of a boson decuplet with \(S = 1\), an antibaryon decuplet with \(S = \frac{1}{2}\), and a decuplet with \(B = -2\), \(S = 0\).

Since there exists the corresponding 10 representation with the antiparticles of all these multiplets, these predictions can be summarized as requiring two vector boson decuplets. 10 and \(\bar{10}\), a spin \(\frac{1}{2}\) baryon decuplet and a decuplet of baryon-baryon resonances with spin zero (this cannot include the deuteron, since the latter has spin one). If the baryon decuplet is placed in a 27-dimensional barbaryon multiplet, the states of \(B = \pm 2\) have spin one, and can therefore include the deuteron. However, a large number of other states are predicted, including baryon decuplets with \(S = \frac{3}{2}\) and \(\frac{1}{2}\) belonging to both 10 and \(\bar{10}\) decuplets in the ordinary classification and meson decuplets of spin 0.1 and 2. Since the decuplet does not contain a \(T = 0\), \(Y = 0\) state, the unitary singlet vector meson which mixes with the octet to form the \(\omega - \rho\) mesons cannot be included. A \((\text{singlet} \times \text{octet})\) is the minimum size hypersupermultiplet to accommodate this meson. This would include a unitary singlet baryon of spin \(\frac{1}{2}\) (the \(Y_0^*\) at 1405 MeV?) and a unitary singlet spin zero meson.

Tables 3 and 4 show some of these possibilities.

**References**


A STUDY OF THE \(K^-\pi^+\pi^-\) STATE PRODUCED BY \(K^-\pi^-\) AT 1.5 GeV/c

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We have studied the reaction \(K^-\pi^- \rightarrow K^-\pi^+\pi^-\) in an attempt to search for the reported \(2, 3, 7\) \(kappa\) meson, \(K^*(730)\) MeV resonance. The available centre of mass energy of 2 GeV is just at threshold for production of the \(K^*(880)\) and one would expect little or no competition from the production of this resonance. We do not observe any \(K^*(880)\) events in our data. The kappa meson is not observed to be produced to any strong extent. Some upper limits for kappa meson production cross sections are given. The \(Y_0^*(1520)\) \(K^-\pi^-\)

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