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(SUMMARIES)

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f-g THEORY

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The theory of "strong gravity" [1),2)] is an attempt to incorporate a "hadronic" metric tensor within the framework of general relativity. The basic idea is that the usual gravitational field $g_{\mu\nu}$ is coupled universally to leptons in the standard generally covariant way, while another tensor field $f_{\mu\nu}$ is coupled in the same universal manner to hadrons. A mixing term is then constructed which gives one massive and one massless 2^+ state with no spurious ghosts whilst preserving general covariance, the equivalence principle and other classical macroscopic features of general relativity. There are various possible choices for the mixing term, all of them being generally covariant extensions of the basic Fierz-Pauli mass term for a massive 2^+ state.

The equations of motion for the f-field $\mathcal{F}_\mu^\nu$ can be written in the suggestive form

$$\mathcal{F}_\mu^\nu = \frac{\kappa_f}{M^2} \quad {}_\mu^\nu\Theta(\text{hadrons})$$

where Θ_μ^ν(hadrons) is essentially the Einstein energy momentum complex for the hadrons constructed from the tensor field $f_{\mu\nu}$. From the quantum field theory point of view, this suggests that it would be instructive to consider the dominance of matrix elements of the stress tensor with an f-meson pole [3),4)]. The main unsolved problem from the point of view of particle physics is the insertion of an SU(3) symmetry into the structure. This is necessary in order that an exact connection can be made between the $f_{\mu\nu}$ field in the theory and some combination of the known massive 2^+ hadrons. The main effect of the theory is to introduce a cut-off in hadron physics (using non-polynomial Lagrangian techniques) of the order of a few BeV.

From the classical viewpoint, the current major point of discussion [5)] is the probable existence of a sixth massive degree of freedom. This is difficult to interpret in a normal Feynman-Dyson quantum field theory perturbative sense since the bilinear parts of the Lagrangian contain only the five degrees of a pure spin-two massive particle.

REFERENCES

1) C.J. Isham, Abdus Salam and J. Strathdee, Phys. Rev. D3, 867 (1971).

2) B. Zumino, Brandeis Lecture Notes 1970.

3) P.G.O. Freund, Phys. Letters 2, 136 (1962).

4) R. Delbourgo, Abdus Salam and J. Strathdee, Nuovo Cimento 49, 593 (1967).

5) See the contributions from S. Deser, C. Aragone, E.T. Toton, and P.C. Aichelburg in these Proceedings.