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(SUMMARIES)

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CLASSICAL 2-GRAVITON PROJECT

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At the 1966 Washington meeting [1)] I proposed a 2-graviton theory. Motivation was partly the feeling that strong exchange of $\sim$BeV spin-2 mesons together with the idea that these are likely to couple to total energy-stress, including their own, will lead by the mechanism of S.N. Gupta [2)], reviewed by J.R. Oppenheimer [3)], to a hopefully Yukawa-decaying meson metric, within nuclear distances of a massive "point" source. Owing to e^{-mr} factors in the strong metric, 3-space in that metric should close up into an S_3 with radius $\sim m^{-1}$. Weak, massless, ordinary gravity should, however, take over when e^{-mr} becomes very small. If this is not forgotten, the neighbourhood of the S_3 point antipodal to the source should open up into the usual 3-space, leaving a picture of a bottle, with a characteristic neck of strong-weak gravity transition. The hope was to study the neck and "bicausality" by perturbing a spheristatic solution of a 2-graviton classical equation system, with $r = 0$ singularity allowed, to represent the "point source".

Since then, I have been working with coupled Einstein equations, mass by a cosmological term, the details of coupling in the "matter" tensors T on the right side [4)]. By replacing $\partial^2/\partial x^i \, \partial x^j$ in the "total" Landau-Lifshitz pseudotensor [5)] by second Veblen extension [6)] in the <u>other</u> metric's affinity, I obtain a tensor, but computerized algebra will be needed to remove a 2-year-old error.

W. Hammel has suggested the simpler $T = \mu G + \lambda g$; thus, $\underset{0}{G} + \underset{0}{\Lambda}\underset{0}{g} = \underset{1}{\mu}\underset{1}{G} + \underset{1}{\lambda}\underset{1}{g}$, and $\underset{1}{G} + \underset{1}{\Lambda}\underset{1}{g} = \underset{0}{\mu}\underset{0}{G} + \underset{0}{\lambda}\underset{0}{g}$. These can be so rewritten that, if $\underset{0}{\Lambda} = 0$ and $\underset{0}{\lambda} = 0$, one gets $\underset{0}{G} = \mu\underset{1}{g}$ and $\underset{1}{G} + \underset{1}{\Lambda}\underset{1}{g} = 0$; these can alternatively be introduced heuristically. $\underset{1}{g}$ is immediately a cosmological-constant Schwarzschild solution, and $\underset{0}{G} = \mu\underset{1}{g}$ is 3 coupled ordinary differential equations in 3 functions of r. The expression $1 - \frac{A}{r} - \frac{\Lambda}{3} r^2$ which appears in strong-curvature co-ordinates [7)] means that the strongmass $\sim \frac{1}{2} A$ at $\rho = 0$ is duplicated at $\rho_{antipode}$, both having $r = 0$, giving a small nondecaying residuum for the strong girth of a large circle, a premonition perhaps of departure from Yukawa behaviour.

Since we have no solution yet, we are not ready to begin the causality study.

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5) L.D. Landau and E.M. Lifshitz, The Classical Theory of Fields (Addison-Wesley, 1951).

6) O. Veblen, Invariants of Quadratic Differential Forms (Cambridge University Press, 1927).

7) J.L. Synge, Relativity: The General Theory (North-Holland, 1960).