High Energy Physics - Theory

# A Unified Gravity-Electroweak Model Based on a Generalized Yang-Mills Framework

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Gravitational and electroweak interactions can be unified in analogy with the unification in the Weinberg-Salam theory. The Yang-Mills framework is generalized to include space-time translational group T(4), whose generators $T_{\mu}(=\p/\p x^{\mu})$ do not have constant matrix representations. By gauging $T(4) \times SU(2) \times U(1)$ in flat space-time, we have a new tensor field $\phi_{\mu\nu}$ which universally couples to all particles and anti-particles with the same constant $g$, which has the dimension of length. In this unified model, the T(4) gauge symmetry dictates that all wave equations of fermions, massive bosons and the photon in flat space-time reduce to a Hamilton-Jacobi equation with the same `effective Riemann metric tensor' in the geometric-optics limit. Consequently, the results are consistent with experiments. We demonstrated that the T(4) gravitational gauge field can be quantized in inertial frames.

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