

## GA(4,R) GAUGE THEORY QUADRATIC LAGRANGIAN

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Ga(4,R) theory is a gauge theory based on the space-time symmetry group of general affine transformations of the four-dimensional Minkowski space. The basic variables, i.e. the gauge potentials, of this theory are the tetrad fields  $e^a_\mu(x)$  and the general connection fields  $\Gamma^a_{b\mu}(x)$ ;  $a, b$  are the local - anholonomic indices and  $\mu, \nu$  are the world - holonomic indices. The corresponding field strengths are the torsion fields  $R^a_{\mu\nu}$  and the general curvature fields  $R^a_{b\mu\nu}$ . The Noether currents are the energy-momentum current  $\Theta_a^\mu$  and the hypermomentum current  $\Upsilon_a^{b\mu}$  respectively. The general connection can be split into the Lorentz part  $\Gamma_{[ab]\mu}$ , and the shear part  $\Gamma_{\{ab\}\mu}$ .

The only physically acceptable quadratic GA(4,R) gauge field lagrangian has the following structure:

$$\mathcal{L} = \frac{e}{4\alpha} \Phi^2(x) (R^a_{\mu\nu})^2 - \frac{e}{4\kappa} (R^{\{ab\}}_{\mu\nu})^2,$$

where  $\Phi(x)$  is a scalar field and  $\alpha, \kappa$  are dimensionless constants. In the broken-symmetric phase of the world  $\Phi(x)$  acquires a nontrivial VEV, and the Newton constant is generated spontaneously in this theory. For the macroscopic matter the theory yields a Newton-Einstein gravity, while in the microscopic domain we find a confining potential which applies to quarks and not to leptons.

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