

1996 Joint Amer. Phys. Soc. / Amer. Asoc. Phys.Teach. Meeting,
2-5 May 1996

ELECTRO-WEAK INTERACTIONS, TIME MACHINE AND FOLIATIONS

Alexander K. Guts

Omsk State University,
Department of Mathematics,
pr. Mira, 55a, Omsk, 644077, Russia
Email: aguts@mail.ru

The space-time V^4 can be considered as a leaf of foliation \mathcal{F} of codimension q , $q \geq 1$ in Lorentzian manifold V^{4+q} . In some cases the leaf V^4 infinitely winds round (wraps) itself and so the Past or Future lies in any small neighbourhood (in topology of V^{4+q}) of the Present. This leaf is called spring leaf. We can transfer to the such near Past through the 4-dimensional wormhole along timelike geodesic in V^{4+q} (A.K.Guts, *Izvestija VUZov. Fizika* (Russian), no. 2 (1996)). How will it understand that our space-time is the spring leaf? The 6-dimensional theory of gravity-electro-weak interactions (Ju.S.Vladimirov, Dimension of physical space-time and union of interactions. – Moscow state univ., 1987.) connects the vector fields A_μ and Z_μ ($\mu = 0, 1, 2, 3$) with differential 1-forms $\lambda = \lambda_A dx^A$ and $\sigma = \sigma_A dx^A$ ($A = 0, 1, 2, 3, 5, 6$), where $G_{AB} = g_{AB} - \lambda_A \lambda_B - \sigma_A \sigma_B$ is the metric of V^6 and g_{AB} is metric of V^4 . The 1-forms λ, σ define the characteristic classes of foliation \mathcal{F} . The calculation of these cohomological classes gives the answer to the question. For example under $q = 1$ there exists only one such class $GV(\mathcal{F})$ that is called the Godbillon-Vey class, and if $GV(\mathcal{F}) \neq 0$ then F has a spring leaf. Hence the investigation of electro-weak interactions allows to solve some principal questions that concerns to Time machine.