

Theory of the Deutsch Multiverse

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The Deutsch multiverse R^4 is collection of parallel worlds $R^4(l)$ with label l [1]. The formal theory and a topos-theoretic model of the Deutsch multiverse are constructed. For this the Lawvere-Kock Synthetic Differential Geometry and topos models for smooth infinitesimal analysis are used [2].

A model of multiverse is *generator of virtual reality* which has some *repertoire of environments*. Generator of virtual reality creates environments and we can observe them. Each environment is many-dimensional hyperuniverse $R^4(l)$ with label $l = \ell A \in \mathbb{I}$ for generator $\mathbf{Set}^{\mathbb{I}^{op}}$, where \mathbb{I} is dual category for category of finitely generated C^∞ -rings and $\ell A = \ell C^\infty(\mathbb{R}^m)/I$. Hyperuniverse has foliation that consists of parallel 4-dimensional spacetimes (= parallel universes). There exist morphisms between hyperuniverses $R^4(\ell A)$ and $R^4(\ell B)$.

Metric of multiverse is sum of "parallel" hyperuniverse metrics $g^{(4)}(\ell A)$:

$$|g^{(4)}\rangle = \int_{\mathbb{I}} \mathcal{D}[\ell A] c(\ell A) |g^{(4)}(\ell A)\rangle, \quad c(\ell A) \in \mathbb{C}, \quad (1)$$

and satisfies formal Einstein equations.

Multiverse is multivariant quantum World. Physical constants are source of this multiplicity, because they are real numbers which as we understand can not be found without errors. So every value of physical constant k is smooth function with label ℓA (= smooth real at stage ℓA). Every hyperuniverse $R^4(\ell A)$ is many-dimensional Kaluza universe that has own family of physical constants. The properties of Deutsch-Minkowski and Deutsch-Gödel multiverses are analyzed.

We can speak about relation our theory with Everett interpretation of quantum mechanics and with anthropic principle.

References

- [1] Deutsch, D. The Fabric of Reality. Allen Lane. The Penguin Press, 2000.
- [2] Guts, A.K. Topos-theoretic Model of the Deutsch multiverse. Los Alamos E - Print Archive Paper: physics/0203071 (2002).
– <http://www.univer.omsk.su/omsk/Sci/Everett/goots8.html>