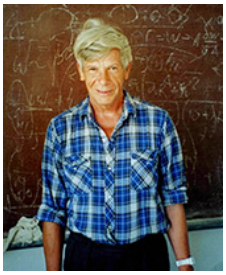

Contribution ID: **65** Type: **Session Talk**

Cosmological particle creation: Weyl geometry + Scalar field

Thursday, 13 October 2022 14:30 (25 minutes)

Cosmological particle creation: Weyl geometry + Scalar field
Victor Berezin
Institute for Nuclear Research of the Russian Academy of Sciences,
60th October Anniversary Prospect 7a, 117312 Moscow, Russia
E-mail: berezin@inr.ac.ru

Abstract

We investigated the possibility of the homogeneous and isotropic cosmological solution in Weyl geometry, which differs from the Riemannian geometry by adding the so-called Weyl vector. The Weyl gravity is obtained by constructing the gravitational Lagrangian both to be quadratic in curvatures and conformal invariant. It is found that such solutions may exist provided there exists the direct interaction between the Weyl vector and the matter fields. Assuming the matter Lagrangian is that of the perfect fluid, we found how such an interaction can be implemented. Due to the existence of the quadratic curvature terms and the direct interaction the perfect fluid particles may be created straight from the vacuum, and we found the expression for the rate of their production which appeared to be conformal invariant. In the case of creating the universe "from nothing" in the vacuum state, we investigated the
problem, whether this vacuum may persist or not. It is shown that the vacuum may persist with respect to producing the non-dust matter (with positive pressure), but cannot resist to producing the dust particles. These particles, being non-interactive, may be considered as the candidates for the dark matter.

Primary author: BEREZIN, Victor (Institute for Nuclear Research, Russian Academy of Sciences)

Presenter: BEREZIN, Victor (Institute for Nuclear Research, Russian Academy of Sciences)

Session Classification: Section D

Track Classification: Section D: Gravitation and cosmology