Contribution ID: **142** Type: **not specified**

A non-perturbative analysis of the cosmological constant problem

Wednesday, 13 July 2016 08:30 (20 minutes)

Conventional wisdom relates the vacuum energy arising from the zero point fluctuations of quantum fields with the cosmological constant which is a parameter in Eidnstien's field equations. The basis of this relation is in the semi-classical approximation where gravity is treated classically. However, as is well known, the effective cosmological constant generated by the zero-point fluctuations, even with a TeV scale cut-off, is many orders of magnitudes higher than the observed value.

We perform a non-perturbative analysis of the problem treating gravity and matter both quantum mechanically in a homogenous and isotropic setting. A deep connection between choice of time gauge and energy density of the universe is found. In the volume time gauge, we find that the relation between the ground state energy of the universe and the cosmological constant is not linear and depends explicitly on time. The ground state energy becomes small at later times even after summation over zero-point fluctuations. The talk is based on work published in PRL:

http://journals.aps.org/prl/abstract/10.1103/PhysRevLett.116.061302

Summary

Primary author: QURESHI, Babar (Dept. of Physics, School of Science and Engineering, LUMS)

Presenter: QURESHI, Babar (Dept. of Physics, School of Science and Engineering, LUMS)

Session Classification: Parallel VI

Track Classification: Dark Matter, Dark Energy, Astroparticle