Contribution ID: **76**   Type: **not specified**

Gauge field theory vacuum and cosmological inflation without scalar field

Thursday 6 April 2023 16:00 (30 minutes)

We derive the quantum energy-momentum tensor and the corresponding quantum equation of state for gauge field theory using the effective Lagrangian approach. The energy-momentum tensor has a term proportional to the space-time metric and provides a finite non-diverging contribution to the effective cosmological term. This allows to investigate the influence of the gauge field theory vacuum polarisation on the evolution of Friedmann cosmology, inflation and primordial gravitational waves. The Type I-IV solutions of the Friedmann equations induced by the gauge field theory vacuum polarisation provide an alternative inflationary mechanism and a possibility for late-time acceleration. The Type II solution of the Friedmann equations generates the initial exponential expansion of the universe of finite duration and the Type IV solution demonstrates late- time acceleration. The solutions fulfil the necessary conditions for the amplification of primordial gravitational waves.

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Session Classification: Plenary