Oblig7 FYS9130

Deadline: Thursday 28/10 at 14.15 (beginning of class)

1. Vacuum energy

Calculate the vacuum energy E_0 for a free scalar field in D = 1 + d dimensional Minkowski spacetime. Use a cutoff at Planck-scale M_P to keep the energy density $\epsilon_0 = \frac{E_0}{V}$ finite. V is here the (infinite) volume of the spatial dimensions.

2. Casimir energy

Add an extra compact dimension of length L to the above spacetime. (The total number of dimensions are now D + 1 = 1 + d + 1.) Calculate the extra, finite, contribution to the vacuum energy due to this compact dimension.

If possible, deliver a paper copy, handwritten is ok. Otherwise, e-mail to ingunnkw@fys.uio.no