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Electromagnetic two-point functions and Casimir densities for a conducting plate in de Sitter spacetime

Two-point functions for the electromagnetic field in background of (D + 1) dimensional de Sitter spacetime are evaluated assuming that the field is prepared in the Bunch-Davies vacuum state. By using these functions the vacuum expectation values (VEVs) of the field squared and the energy-momentum tensor are investigated in the geometry of a conducting plate. The VEVs are explicitly decomposed into the boundary-free and plate-induced parts. For points outside of the plate the renormalization is needed for the first parts only. Because of the maximal symmetry of the background spacetime and of the Bunch-Davies vacuum state the boundary-free parts do not depend on spacetime coordinates, whereas the plate-induced parts are functions of the proper distance of the observation point from the plate. The plate-induced part in the VEV of the energymomentum tensor vanishes for D = 3 which is a direct consequence of a conformal invariance of the electromagnetic field for this spatial dimension. For D > 3, in addition to the diagonal components, the vacuum energy-momentum tensor has a nonzero off-diagonal component which describes energy flux along the direction normal to the plate.

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