

The Casimir effect for current densities in braneworlds with compact dimensions

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The vacuum expectation values (VEVs) of the current densities for charged scalar and fermionic fields are investigated in braneworlds on AdS spacetime with toroidally compact spatial dimensions and in the presence of a constant Abelian gauge field. Because of the non-trivial topology, the latter gives rise Aharonov-Bohm type effect for currents. The VEVs are decomposed into the purely AdS and brane-induced contributions. Both these contributions are periodic functions of the magnetic flux enclosed by compact dimensions, with the period equal to the flux quantum. The asymptotic behavior of the current density along compact dimensions is investigated near the branes, near the AdS boundary and near the horizon. It is shown that, unlike the case of the Minkowski bulk, the total current density in supersymmetric models on AdS bulk does not vanish.