

## Abstract

We discuss phase structures of black holes in presence of Gauss-Bonnet term in five dimensional anti de Sitter space from thermodynamic perspective. Assuming AdS/CFT correspondence, we analyze how these effects of higher derivative couplings modify effective matrix model which qualitatively describes the boundary gauge theory on  $S^3 \times S^1$  at finite temperature and finite gauge coupling and we propose a phenomenologically motivated effective action. We also discuss how this effective action can qualitatively reproduce the gauge theory representing various bulk phases of R-charged black hole with Gauss-Bonnet correction.