

**TITLE: Semiclassical Instability of AdS-Schwarzschild Black Holes
in Large D limit**

Abstract:

We analyze the semiclassical stability of the Schwarzschild AdS black hole in the Euclidean partition function approach. We perform this computation in the large D limit and focus on scalar perturbations. We obtain the equations for non-spherically symmetric scalar perturbations in a simple form. For a class of perturbations stability is demonstrated by the S-deformation method. For some other classes we rule out unstable modes of $\mathcal{O}(D^2)$. We also analyze the spherically symmetric perturbations and demonstrate the appearance of an unstable mode for small black holes in the large D limit. We obtain an expression for the eigenvalue corresponding to the unstable mode to next to leading order in a $1/D$ expansion. This result agrees with a previously obtained numerical bound on this eigenvalue. For cosmological constant zero, our answer matches a previous result obtained for the corresponding eigenvalue for the D dimensional Schwarzschild-Tangherlini black hole to next to leading order in a $1/D$ expansion.