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S. Nampuri: Wormholes from automorphic forms in string theory: A black hole counting story

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We use the exact statistical degeneracy formula of single-centred $1/4$ BPS dyonic black holes in 4D $N = 4$ toroidally compactified heterotic string theory, given in terms of the Igusa cusp form of $Sp(2, \mathbb{Z})$ to write down the gravitational path integral that captures black hole degeneracy as a sum over Euclidean backgrounds including orbifolds of the Euclidean $AdS_2 \times S^2$ attractor geometry. We further show how a rewriting of the degeneracy formula is amenable, at a semi-classical level, to a gravitational interpretation involving 2D Euclidean wormholes. This alternative picture is useful to elucidate different aspects of the gravitational path integral capturing the microstate degeneracies.

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