Meeting: 1001, Evanston, Illinois, SS 3A, Special Session on Index Theory, Morse Theory, and the Witten Deformation Method

1001-53-427   **Ionel Popescu*** (`ipopescu@math.mit.edu`). *Morse Inequalitites, A Path Space Approach.*
We give a proof of both, non-degenerate and degenerate, Morse Inequalities based on heat kernel analysis of the Hodge-Laplace type operator associated with the Witten deformation of the De Rham complex.

We write the heat kernel as a path space integral and using this we show how one can localize it. The localization is ultimately reduced to the construction of a supersolution to a parabolic PDE.

In the non-degenerate case the localized heat kernel is the heat kernel of a Hermite operator on the Euclidean space. In the degenerate case we show how one can justify the original idea of Witten of localizing the heat kernel to the critical submanifolds. This can be done by a comparison of heat kernels for various operators. The localized operator is the Hodge-Laplacian operator of the De Rham operator twisted by the orientation bundles. (Received September 01, 2004)

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