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**Xianzhe Dai** and **Junrong Yan\*** ([j\\_yan@math.ucsb.edu](mailto:j_yan@math.ucsb.edu)), Department of Mathematics, SH6607, UC, Santa Barbara, Santa Barbara, CA 93106. *Witten deformation on noncompact manifolds.*

In an extremely influential paper, Witten introduced a deformation of the de Rham complex by considering the new differential  $d + df$ , where  $f$  is a Morse function. It turns out that Witten deformation has great applications including Bismut-Zhang/Cheeger-Muller theorem as well as being instrumental in the developing of Floer homology theory. Motivated by Landau-Ginzberg model, we study the case of noncompact manifolds. We are able to prove that the cohomology of the Witten deformation acting on the complex of smooth  $L^2$  forms is isomorphic to cohomology of Thom-Smale complex and relative cohomology of the pair  $(M, U)$  for some open set  $U$  in noncompact case. In the end, we will apply our main results to the case of compact manifolds with boundaries. This is joint work with Xianzhe Dai. (Received September 08, 2019)