

Duality between Witten complex and Morse-Bott complex for singular spaces

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Abstract: The famous Morse-Thom-Smale complex on a smooth compact manifold M associated to a smooth Morse function $f : M \rightarrow \mathbb{R}$ is a complex generated by the critical points of the Morse function f and computing the singular (co-)homology of M . An important generalisation of this complex for smooth Morse-Bott functions is due to Austin and Braam. An analytic proof of the Morse inequalities, due to Witten, follows from the study of the deformation of the smooth de Rham complex and the spectral properties of the associated Laplacian. The duality between Witten and Morse-Thom-Smale complex has found applications in the study of comparison results in global analysis.

The aim of this talk is to adapt the construction of Austin and Braam for a stratified pseudomanifold and intersection cohomology. The main idea is to replace the de Rham complex of critical submanifolds in the construction of Austin and Braam with the complex of liftable intersection forms, due to Brasselet, Hector and Saralegi. In the case of isolated conical singularities, the duality between this Morse-Bott type complex and the Witten complex has been used to generalise the Cheeger-Müller theorem to these spaces.