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4. Algebraic Geometry

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On the instanton complex of holomorphic Morse theory

Consider holomorphic group actions on vector bundles over complex manifolds. Under the Kähler assumption, Morse-type inequalities were obtained by Witten and proved analytically by Mathai, Zhang and myself. These inequalities could fail without the Kähler condition. In this talk, I construct the holomorphic analog of instanton complex when there is a partial ordering on the set of connected components of the fixed-point set; this assumption is much weaker than the Kähler condition. Furthermore, the construction completely determines Dolbeault cohomology groups by the combinatorial data of the group action.