

# Abstract

The differential K-theory is a differential generalized cohomology theory which combines the topological K-theory and the information of the geometric data. It is partly motivated by the study of D-branes in theoretical physics by Witten in 1998, which could be regarded as a smooth version of the arithmetic K-theory in Arakelov geometry. In differential K-theory, the role of the holomorphic torsion in arithmetic K-theory is replaced by the Bismut-Cheeger eta form.

In this talk, we introduce two models of the differential K-theory and discuss its equivariant extension and the corresponding Riemann-Roch property. Especially, we will mainly focus on the functoriality property of the push-forwards (direct images) by using the Dai-Zhang higher spectral flow and Bismut-Zhang embedding formula for eta forms. At last, we give a non-trivial geometric application of the differential K-theory: a localization formula for eta invariants, which is a joint work with Prof. Xiaonan Ma recently.