TOPOLOGY SEMINAR

Commutative d-torsion K-theory and its applications

By

Cihan Okay
(Bilkent)

Abstract: Commutative K-theory is introduced by Adem-Gomez-Lind-Tillmann. As a generalized cohomology theory obtained from topological K-theory. The construction uses classifying spaces for commutativity, first introduced by Adem-Cohen-Torres Giese. In this paper we are interested in a d-torsion version of this construction: Let G be a topological group. The aforementioned classifying space $B(\mathbb{Z}/d,G)$ is assembled from tuples of pairwise commuting elements in G whose order divides d. We will describe the homotopy type of this space when G is the stable unitary group, following the ideas of Gritschacher-Hausmann. The corresponding generalized cohomology theory will be called the commutative d-torsion K-theory, and will be denoted by $k\mu_d$. Our motivation for studying this cohomology theory comes from applications to operator-theoretic problems that arise in quantum information theory. For this we introduce another spectrum obtained from $k\mu_d$ and show that a famous construction from the study of quantum contextuality, known as Mermin's square, corresponds to a non-trivial class in this generalized cohomology theory. This refines the topological approach to quantum contextuality developed earlier jointly with Raussendorf.

Date: 5 October, 2020
Time: 13:40
Place: ZOOM. To request the event link, please send a message
cihan.okay@bilkent.edu.tr