THE UNIVERSITY   **OF HONG KONG**

Institute of Mathematical Research
Department of Mathematics

MINI COURSE

Derived Category of a GIT Quotient

Dr. Ying Xie

Southern University of Science and Technology

Abstract

The bounded derived category of coherent sheaves (derived category for short) is a fundamental invariant for a smooth algebraic variety or stack in modern algebraic geometry. A lot of geometric information, for instance, dimension, cohomology, and rational K-theory of a smooth projective algebraic variety can be extracted from its derived category. Geometric invariant theory (GIT), introduced by Mumford, is a way to construct nice quotients of algebraic varieties by group actions, which can be applied to the construction of moduli spaces.

In 2014, Daniel Halpern-Leistner (DHL) gave a full description of the derived category of a global quotient stack in terms of the derived categories of its GIT quotient and the unstable locus. DHL's work reveals the geometric relationships between a global quotient stack and its GIT quotient. Conceptually, this relationship can be viewed as a categorification of Kirwan's surjectivity. Moreover, there are lots of implications, including D/K conjectures on flops, derived category of smooth toric stacks, and derived category of various moduli spaces.

In this mini-course, I will explain DHL's work in detail, as well as its applications in examples of GIT quotients.

Lecture 1:	January 16, 2024 (Tuesday)	2:30 – 4:30pm
Lecture 2:	January 18, 2024 (Thursday)	2:30 – 4:30pm
Lecture 3:	January 19, 2024 (Friday)	2:30 – 4:30pm

Room 210, Run Run Shaw Bldg., HKU

All are welcome