



# ALGEBRA AND GEOMETRY SEMINAR

The Hong Kong University of Science and Technology  
Department of Mathematics

## Lecture series: Wall-crossing for invariants of equivariant 3CY categories

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### I. An overview

I will give an overview of: what is wall-crossing; geometric techniques for producing wall-crossing formulas; recent advances in such techniques for enumerative invariants, particularly those of “3-Calabi-Yau type”, in various equivariant cohomology theories like K-theory or elliptic cohomology. This includes joint work with N. Kuhn and F. Thimm which can be thought of as a refinement and generalization of results of Joyce-Song and Kontsevich-Soibelman. Applications include the Donaldson-Thomas/Pandharipande-Thomas vertex correspondence (related to the topological vertex) and the study of refined Vafa-Witten invariants.

### II. A user guide

In practice, in order to apply the Joyce-style wall-crossing formulas from my previous talk, some control over the wall-crossing term is needed. I will explain how this wall-crossing term, in K-theory, is governed by a certain “vertex coproduct” arising from a multiplicative vertex (co)algebra. This vertex coproduct is compatible with K-theoretic Hall operations — which form positive halves of quantum loop algebras — whenever they exist. I will present formulas for this coproduct in the easiest cases in 3-fold and 4-fold Donaldson-Thomas theory. Applications include an explicit descendent Donaldson-Thomas/Pandharipande-Thomas vertex correspondence.

I	Room 5562 (Lift 27/28)	Wed, Apr 29, 2026 04:00 PM
II	Room 2126D (Lift 19)	Thu, Apr 30, 2026 04:00 PM

