List of potential topics for final presentations

Note:

- Enrolled students should speak with me (after class, during office hours, or by scheduling a meeting via email: `ywfan@mail.tsinghua.edu.cn`) **before October 18** to discuss and decide on a suitable topic for their final presentation. Students who are not enrolled are also welcome to give presentations!

- The presentation does not need to be scheduled near the end of the semester. (For example, if your presentation topic is to prove Theorem A, and we discuss/use Theorem A in the 10th week, it would be logical to present around the 10th week.) The exact date of your presentation will be determined in our meeting.

- Below is a list of potential topics for your final presentations. Note that the difficulty of these papers varies significantly. Generally, you should choose something you haven't read before but are interested in exploring in more detail. You may also opt to present other relevant results, as long as they are relevant to our course.

Examples of spaces of Bridgeland stability conditions:

- Stability conditions on $D^b(\mathbb{P}^1)$: Okada, Stability Manifold of $\mathbb{P}^1$

- Stability conditions on curves C of genus $g(C) \geq 1$: Macrì, Stability conditions on curves

- Stability conditions on $D^b(\mathbb{P}^2)$: Li, The Space of Stability Conditions on the Projective Plane

- Stability conditions on K3 surfaces and abelian surfaces: Bridgeland, Stability conditions on K3 surfaces

- Stability conditions on varieties whose Albanese morphism is finite: Fu–Li–Zhao, Stability manifolds of varieties with finite Albanese morphisms

- Stability conditions on Fukaya-type categories of Riemann surfaces: Haiden–Katzarkov–Kontsevich, Flat surfaces and stability structures

- Stability conditions on certain 3-Calabi–Yau categories associated to Riemann surfaces: Bridgeland–Smith, Quadratic differentials as stability conditions

Mirror symmetry related:

- Homological mirror symmetry for elliptic curves: Polishchuk–Zaslow, Categorical Mirror Symmetry: The Elliptic Curve

- Homological mirror symmetry for quartic K3 surface: Seidel, Homological mirror symmetry for the quartic surface

- Symplectic topology of K3 surfaces via mirror symmetry: Sheridan–Smith, Symplectic topology of K3 surfaces via mirror symmetry

- Homological mirror symmetry for certain Batyrev–Borisov's mirror pairs: Sheridan–Smith, Homological mirror symmetry for generalized Greene-Plesser mirrors

- Homological mirror symmetry for $\mathbb{P}^2$ and its mirror Landau–Ginzburg model: Auroux–Katzarkov–Orlov, Mirror symmetry for weighted projective planes and their noncommutative deformations

- Homological mirror symmetry for del Pezzo surfaces and their mirror Landau–Ginzburg models: Auroux–Katzarkov–Orlov, Mirror symmetry for Del Pezzo surfaces: Vanishing cycles and coherent sheaves

Donaldson–Thomas invariants, wall-crossing formula; Joyce structures:

- Wall-crossing of Donaldson–Thomas invariants: Kontsevich–Soibelman, Wall-crossing structures in Donaldson-Thomas invariants, integrable systems and Mirror Symmetry

- Stability conditions on abelian categories and Stokes data: Bridgeland–Toledano-Laredo, Stability conditions and Stokes factors

- Riemann–Hilbert problems from Donaldson–Thomas invariants: Bridgeland, Riemann–Hilbert problems from Donaldson–Thomas theory

- Joyce structures from Donaldson–Thomas invariants: Bridgeland, Joyce structures and their twistor spaces

Birational geometry and stability conditions:

- Minimal model program of surfaces realized as wall-crossings of stability conditions: Toda, Stability conditions and birational geometry of projective surfaces

- Birational geometry of moduli spaces of sheaves on K3 surfaces: Bayer–Macrì, MMP for moduli of sheaves on K3s via wall-crossing: nef and movable cones, Lagrangian fibrations

- Birational geometry and semiorthogonal decompositions: Halpern-Leistner, The noncommutative minimal model program

Stability conditions and differential equations; categorical Kähler geometry:

- King's stability for quiver representations: King, Moduli of representations of finite dimensional algebras

- Stability conditions for Lagrangian submanifolds: Thomas–Yau, Special Lagrangians, stable bundles and mean curvature flow and Joyce, Conjectures on Bridgeland stability for Fukaya categories of Calabi-Yau manifolds, special Lagrangians, and Lagrangian mean curvature flow

- Stability conditions on line bundles and deformed Hermitian–Yang–Mills equations: Collins–Yau, Moment maps, nonlinear PDE, and stability in mirror symmetry

- Categorical Kähler geometry: Haiden–Katzarkov–Kontsevich–Pandit, Semistability, modular lattices, and iterated logarithms and Haiden–Katzarkov–Kontsevich–Pandit, Iterated logarithms and gradient flows

Dimension of category; invariants of autoequivalences:

- Several notions of dimensions of triangulated categories: Elagin–Lunts, Three notions of dimension for triangulated categories

- Some dynamical aspects of categories: Dimitrov–Haiden–Katzarkov–Kontsevich, Dynamical systems and categories