

Derived category of coherent sheaves

Noobs

July 15, 2023

Abstract

This is an informal seminar on derived category of coherent sheaves. The main reference is [Huy06], which is recommended by Sasha Kuznetsov. We mainly refer to [Har13] for algebraic geometry and to [GM13] for homological algebra.

1 Schedule

Starting from 18:30, the seminar takes place at 近春园西楼报告厅 in the spring semester of 2023. We move to 近春园西楼第一会议室 since 5th June. The seminar will be postponed if there are more important issues.

Lecture 1 (2023/02/20) Review on algebraic geometry and homological algebra: abelian categories of modules and coherent sheaves. See [Har13] and [GM13].

Speaker: 张鼎新

Lecture 2 (2023/02/27) Derived category of an abelian category & derived functors. See Chapter 2 in [Huy06].

Speaker: 唐龙天

Lecture 3 (2023/03/04) Abstract notion: triangulated category, semi-orthogonal decomposition, exceptional collections. See Chapter 1 in [Huy06].

Speaker: 张鼎新

Lecture 4 (2023/03/20) Derived functors in algebraic geometry, Serre and Grothendieck–Verdier duality. See Chapter 3 in [Huy06].

Speaker: 唐龙天

Lecture 5 (2023/03/27) Fourier–Mukai transform. See Chapter 5 in [Huy06].

Speaker: 任建宇

Lecture 6 (2023/04/03) Equivalence criteria. See Chapter 7 in [Huy06].

Speaker: 任建宇

Lecture 7 (2023/04/10) Derived category & canonical bundle. See Chapter 4 & 6 in [Huy06].

Speaker: 苏晓羽

Lecture 8 (2023/04/17) Derived category & canonical bundle (cont’d). See Chapter 4 & 6 in [Huy06].

Speaker: 苏晓羽

Lecture 9 (2023/05/01) Derived category of curves and \mathbb{P}^n . See [Bei78].

Speaker: 李心宇

Lecture 10 (2023/05/08) Spherical objects. See Chapter 8 in [Huy06].

Speaker: 蒋昕童

Special Lecture (2023/05/22) Homological mirror symmetry.

Speaker: 周杰

Lecture 11 (2023/05/29) Background on abelian varieties.

Speaker: 张鼎新

Lecture 12 (2023/06/05) Derived categories of abelian varieties. See Chapter 9 in [Huy06].

Speaker: 唐龙天

Lecture 13 (2023/06/12) Background on K3 surfaces.

Speaker: 余成龙

Lecture 14 (2023/06/20) Derived categories of K3 surfaces. See Chapter 10 in [Huy06].

Speaker: 蒋昕童

Lecture 15 (2023/06/22) Stability conditions. See [Huy14].

Speaker: 许福临

Lecture 16 (2023/06/24) Stability conditions (cont'd). See [Huy14].

Speaker: 许福临

*The last two talks are cancelled. Instead, we will watch the [series of lecture](#) by Emanuele Macri.

References

- [Bei78] Alexander A Beilinson. Coherent sheaves on \mathbb{P}^n and problems of linear algebra. Functional Analysis and Its Applications, 12(3):214–216, 1978.
- [GM13] Sergei I Gelfand and Yuri I Manin. Methods of homological algebra. Springer Science & Business Media, 2013.
- [Har13] Robin Hartshorne. Algebraic geometry, volume 52. Springer Science & Business Media, 2013.
- [Huy06] Daniel Huybrechts. Fourier-Mukai transforms in algebraic geometry. Clarendon Press, 2006.
- [Huy14] Daniel Huybrechts. Introduction to stability conditions. Moduli spaces, 411:179–229, 2014.