

# Seminar on KSBA Moduli Theory

Fall 2022

Thursday, 18:30-20:30  
Jinchunyuan West Building, 2nd Floor

## 1 Families of Varieties of General Type

### Reference:

János Kollár, Families of varieties of general type, 2022. Chapter 1  $\sim$  8.

### Schedules:

- Lecture 1 (Sep 22, 2022): History of moduli problems.  
Speaker:
- Lecture 2-3: One-parameter families.  
Speaker:
- Lecture 4: Moduli problems with flat divisorial part.  
Speaker:
- Lecture 5: Hulls and Husks.  
Speaker:
- Lecture 6: Families of stable varieties.  
Speaker:
- Lecture 7-8: Stable pairs over reduced base schemes.  
Speaker:
- Lecture 9: Numerical flatness and stability criteria.  
Speaker:
- Lecture 10-11: Cayley flatness.  
Speaker:

- Lecture 12: Moduli of stable pairs.

Speaker:

## 2 Projectivity

- Lecture 1: Kollár's ampleness lemma.

Reference: [Kol90].

Speaker:

- Lecture 2: Semipositivity theorems for moduli problems.

Reference: [Fuj18].

Speaker:

- Lecture 3-5: Projectivity of the moduli space of stable log-varieties.

Reference: [KP17] [PX17].

Speaker:

## 3 Explicit Examples

- Lecture 1: Plane curves.

Reference: [Hac04].

Speaker:

- Lecture 2: Abelian varieties.

Reference: [Ale02].

Speaker:

- Lecture 3: K3 surface.

Reference: [Laz16].

Speaker:

- Lecture 4: Wall crossing for curves.

Reference: [Has03].

Speaker:

- Others: Surfaces in  $\mathbb{P}^3$ , elliptic K3 surfaces, wall crossing in general...

## References

- [Ale02] Valery Alexeev. Complete moduli in the presence of semiabelian group action. *Ann. of Math. (2)*, 155(3):611–708, 2002. 2
- [Fuj18] Osamu Fujino. Semipositivity theorems for moduli problems. *Ann. of Math. (2)*, 187(3):639–665, 2018. 2
- [Hac04] Paul Hacking. Compact moduli of plane curves. *Duke Math. J.*, 124(2):213–257, 2004. 2
- [Has03] Brendan Hassett. Moduli spaces of weighted pointed stable curves. *Adv. Math.*, 173(2):316–352, 2003. 2
- [Kol90] János Kollár. Projectivity of complete moduli. *J. Differential Geom.*, 32(1):235–268, 1990. 2
- [KP17] Sándor J. Kovács and Zsolt Patakfalvi. Projectivity of the moduli space of stable log-varieties and subadditivity of log-Kodaira dimension. *J. Amer. Math. Soc.*, 30(4):959–1021, 2017. 2
- [Laz16] Radu Laza. The KSBA compactification for the moduli space of degree two  $K3$  pairs. *J. Eur. Math. Soc. (JEMS)*, 18(2):225–279, 2016. 2
- [PX17] Zsolt Patakfalvi and Chenyang Xu. Ampleness of the CM line bundle on the moduli space of canonically polarized varieties. *Algebr. Geom.*, 4(1):29–39, 2017. 2

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