

Generic vanishing learning seminar

Lin Xun

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02/2022 – 06/2022, every Wednesday 9:00pm-11:00pm UTC + 8.
Zoom 849 963 1368 Code: YMSC

1. (Su Weilin, Feb 23) Derived categories and Fourier–Mukai transforms, focus on abelian varieties.
References: Fourier–Mukai transforms in algebraic geometry, Chap 9. D. Huybrechts.
2. (Lin Xun, Mar 02) Hacon’s proof of generic vanishing theorems via Fourier–Mukai transforms for abelian varieties.
References: A derived category approach to generic vanishing, J. Reine Angew. Math. 575 (2004), 173–187.
3. (Su Xiaoyu, Mar 09) Original proof of the generic vanishing theorem. Green, Lazarsfeld.
References: Green, M., Lazarsfeld, R. Deformation theory, generic vanishing theorems, and some conjectures of Enriques, Catanese and Beauville. Invent Math 90, 389–407 (1987).
4. (Wen Xueqing, Mar 16) Simpson’s related works.
References: C. Simpson, Subspaces of moduli spaces of rank one local systems, Ann. Sci. École Norm. Sup. (4) 26 (1993), 361–401.
5. (Chen Bingyi, Mar 23) The proof using Mixed Hodge modules.
References: M. Popa and C. Schnell, Generic vanishing theory via mixed Hodge modules, Forum Math. Sigma 1 (2013), e1, 60.
6. (Jiang Xiaowei, Mar 30) Birational geometry of varieties of Kodaira dimension zero.
References: J. A. Chen and C. D. Hacon, Characterization of abelian varieties, Invent. Math. 143 (2001), no. 2, 435–447.
7. (Zhong Yiming, April 6) Singularities of theta divisors on principally polarized abelian varieties.
References: L. Ein and R. Lazarsfeld, Singularities of theta divisors and the birational geometry of irregular varieties, J. Amer. Math. Soc. 10 (1997), no. 1, 243–258.

8. (Wang Bin, April 13) Inequalities among Hodge numbers of irregular varieties.
References: <https://people.math.harvard.edu/~mpopa/papers/cdf.pdf>
9. (Yu Chenglong, April 20) M-regularity on abelian varieties.
References: [arXiv:0802.1021](https://arxiv.org/abs/0802.1021)
10. (Two times, not decided) Chen-jiang decomposition. The proofs via Hodge modules and without Hodge modules.
References: J.A. Chen and Z. Jiang, Positivity in varieties of maximal Albanese dimension, *J. Reine Angew. Math.* 736 (2018), 225–253.
G. Pareschi, M. Popa and C. Schnell, Hodge modules on complex tori and generic vanishing for compact Kähler manifolds, *Geom. Topol.* 21 (2017), no. 4, 2419–2460.
M. B. Villadsen, Chen-Jiang decompositions for projective varieties, without Hodge modules, published online at *Math. Z.* doi.org/10.1007/s00209-021-02851-2 (2021).
11. (Not decided) More applications on birational geometry.
12. (Probably researchers related to these topics).....

References: C. Schnell, Lectures on generic vanishing theorem.
Hacon's Lectures on generic vanishing theorem.

Suggestions of the related topic are welcome. You are also welcome to add references. If you are interested in giving a presentation of one of the topics, please send "number of the topic, name" to the Wechat group or e-mail linx18@mails.tsinghua.edu.cn