

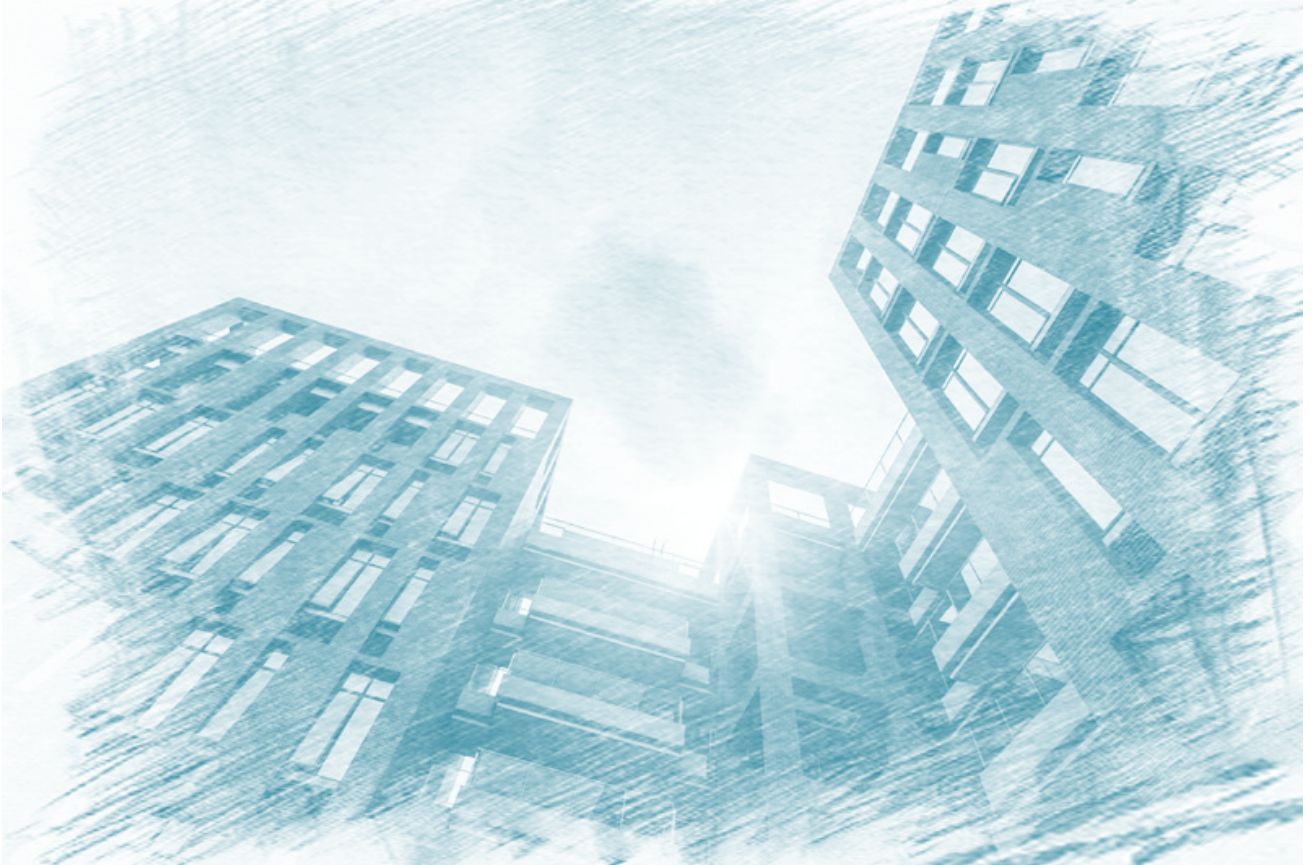
中山大学 K-理论研讨会

2023 年 5 月 26-28 日

广州, 中国

会议目的

此次研讨会旨在为国内的同行提供一次交流近期所取得的研究成果及探讨未来研究发展方向的机会。



Speakers:

郭学军	南京大学
胡勇	南方科技大学
刘杭	深圳大学
秦厚荣	南京大学
唐国平	中国科学院大学
惠昌常	首都师范大学
杨森	东南大学

Organizers:

胡建勋	中山大学
李长征	中山大学
谢恒	中山大学

Venue: Room 416, New Math Building (新数学楼),
School of Mathematics, Sun Yat-sen University



会议日程

2023年5月26日（星期五）下午（数学楼四楼416）

16:15-16:30	报到
16:30-17:30	秦厚荣

2023年5月27日（星期六）上午(数学楼四楼416)

9:00-10:00	惠昌常
10:00-10:20	茶歇
10:20-11:20	唐国平
11:25-12:25	胡勇

2023年5月27日（星期六）下午

	自由讨论
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2023年5月28日（星期日）上午(数学楼四楼416)

9:00-10:00	杨森
10:00-10:20	茶歇
10:20-11:20	刘杭
11:25-12:25	郭学军



报告题目与摘要

秦厚荣（南京大学）

题目：同余数与代数 K 理论

摘要：同余数问题是一个历史悠久的著名问题，很多数学家做出了重要贡献。我国数学家田野教授在同余数问题研究中取得了突出的成就。我们将介绍同余数问题的研究历史，以及最近我们在这一问题上的研究成果，特别是我们发现了同余数问题与代数 K 理论存在着深刻的联系。

惠昌常（首都师范大学）

题目：Derived equivalences applied in algebraic K -groups of rings

摘要：In this talk we shall first present methods to construct both derived equivalences of algebras and recollements of derived module categories. We then apply these methods to studying algebraic K -theory of rings. Especially we obtain reduction formulas for higher algebraic K -groups of rings, including matrix subrings and the endomorphism rings of modules, from both derived equivalences and recollements of derived module categories.

唐国平（中国科学院大学）

题目：代数 K 理论、Mahler 测度以及 Beilinson 猜想

摘要：代数 K 理论是一个重要的数学分支，为许多数学分支提供了强有力的研究工具，众多的著名数学家从事过这一领域的研究，并因此而获得了菲尔兹奖。报告首先介绍代数 K 理论的基本概念、重要成果，以及应用。然后介绍 Mahler 测度以及代数 K 理论中的非常重要的 Beilinson 猜想。最后报告我们最近在这方面所做的一些研究工作。

胡勇（南方科技大学）

题目：Reduced norms and field arithmetic

摘要：The reduced norm map for central simple algebras is a generalization of the determinant map for matrices. Studies of the kernel and the image of reduce norm maps often have close relations with K -theory and arithmetic of fields. In this talk we discuss some results about reduced norms over some fields with special arithmetic properties. This is based on joint works with Zhengyao Wu and Yisheng Tian.

杨森（东南大学）

题目： K -theory, prorepresentable functors and algebraic cycles

摘要：In 1970s, for X a smooth projective surface, Bloch used K -theory to understand the structure of Chow group $\text{CH}^2(X) = (\mathbb{Z}^2(X))/(\mathbb{Z}_{\text{rat}}^2(X))$. Bloch observed that the functor $\widehat{\text{CH}}^2$ of formal completion of $\text{CH}^2(X)$ is not a prorepresentable functor in general. This motivated him to make the well-known conjecture which predicted that, for X a smooth projective surface with trivial geometric genus, the Albanese map $\text{CH}_h^2(X) \rightarrow \text{Alb}(X)$ is an isomorphism. This conjecture is closely related with a famous example of Mumford and still remains open, though it had been intensively studied.

Following Bloch's idea, we investigate the functor $\widehat{\mathbb{Z}^p}$ of formal completion of algebraic cycles group $\mathbb{Z}^p(X)$ and verify that, for any d -dimensional smooth projective variety, the following holds:

- (1) when $p = 1$, the functor \widehat{Z}^1 is both a prorepresentable functor and a deformation functor;
- (2) when $2 \leq p \leq d$, the functor \widehat{Z}^p is neither a prorepresentable functor nor a deformation functor.

刘杭 (深圳大学)

题目: Mahler Measure of \mathbb{Q} -curves and K_2 of elliptic curves

摘要: We extend Boyd's conjecture on the Mahler measure of 2-variable polynomials to several families of polynomials with coefficients in real quadratic fields. This includes Deninger's family and Hesse's family. In order to attack these conjectures, we develop an algorithm which finds \mathbb{Q} -curves parametrised by modular units. We give a list of non-CM \mathbb{Q} -curves related to cusp forms of level less than 200 and having quadratic Fourier coefficients. Using our algorithm, we prove our conjecture on the Mahler measure for several polynomials in these families, corresponding to newforms of level 24, 40 and 56.

We also construct families of elliptic curves E over real cubic and quartic fields with 3 and 4 integral elements in the K_2 group of E respectively. These fields are non-abelian in many families. We prove that these elements are in general linearly independent. We give tempered models of two families when the fields are simplest cubic fields and simplest quartic fields respectively. We conjecture the Mahler measure of these families are linear combinations of L -functions of newforms of weight 2 and prove one example in each family using our algorithm.

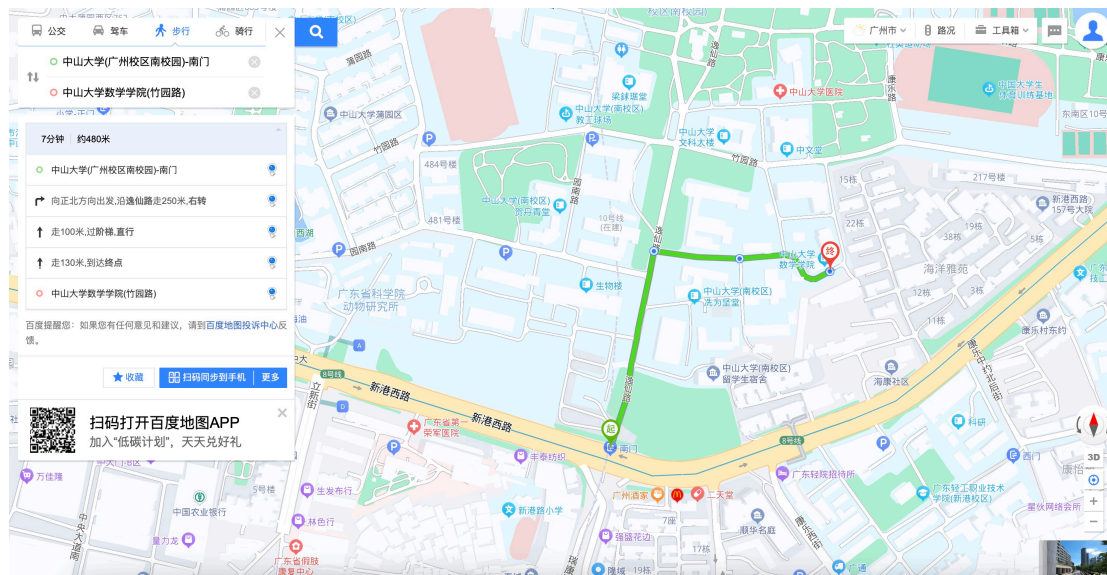
(joint works with Francois Brunault, Wang Haixu and Francois Brunault, Rob de Jeu, Fernando Rodriguez Villegas)

郭学军 (南京大学)

题目: Mahler measures and Beilinson's conjecture for elliptic curves over quadratic fields

摘要: By a formula of Villegas, the Mahler measures of $P_k(x, y) = x + 1/x + y + 1/y + k$ can be written as Kronecker-Eisenstein series. We systematically derive 30 new identities linking the Mahler measures of P_k to L -values of modular forms. Guided by Beilinson's conjecture for K_2 of elliptic curves, we also prove 5 identities linking L -values of elliptic curves over real quadratic fields to Beilinson regulators which are 2×2 determinants of Mahler measures.

1. 会议期间我们提供酒店与会场的接驳车服务，请大家注意接车时间。
2. 如自行前往会场，请走中山大学南门，我们只在南门申报了各位老师的信息。请注意的士车不允许进入南门，南门到会场步行大约 10 分钟。



3. 会议地址：中山大学数学学院，广东省广州市海珠区新港西路 135 号（建议用百度地图搜索）
4. 酒店地址：丽枫酒店(广州太古仓店)，广东省广州市海珠区革新路 126 号（建议用百度地图搜索）

