Kleines Seminar, RCOA at ECNU

学年　2020 年秋季学期，2020 年 9 月 14 日至 2021 年 1 月 24 日，共 19 周

地点　线上 Zoom 会议及线下理科大楼 A 座 5 楼（暂定）　时间　周一上午 10 点

报告者	报告内容
郭　亮	9 月 17 日；Localization algebras and the coarse Baum-Connes conjecture，Guoliang Yu
罗　政	9 月 28 日；A Bott periodicity theorem for infinite-dimensional Euclidean space, Nigel Higson, Gennadi Kasparov and Jody Trout
张亚洲	10 月 12 日；Connes' analogue for crossed products of the Thom isomorphism, Marc Rieffel
王子竞	10 月 19 日；Witten’s approach to Morse Theory, John Roe
刘一凡	10 月 26 日；Subnormal Operators, Conway
张超华	11 月 9 日；*K*-homology and Fredholm operators I: Dirac operators, Paul Baum, Erik van Erp
韦斯翰	11 月 16 日；Minimal dynamical systems and approximate conjugacy, Huaxin Lin, Hiroki Matui
周大鹏	11 月 23 日；Quantitative K-theory, positive scalar curvature and band width, Hao Guo, Zhizhang Xie, Guoliang Yu
王苍园	11 月 30 日；K_1-injectivity of C*-algebras, Randi Rohde

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报告者	报告内容
王若飞	12 月 7 日；Hilbert C*-modules, E. C. Lance
张建国	12 月 14 日；Künneth formula for *K*-theory, M. F. Atiyah; C. Schochet
郭　亮	12 月 21 日；On the localization algebra of Guoliang Yu, J. Roe, Y. Qiao
罗　政	12月28日；A Bott periodicity theorem for infinite-dimensional Euclidean space, N. Higson, G. Kasparov and J. Trout
张亚洲	1 月 4 日；Isoperimetric inequality on hyperbolic groups, M. Gromov
王子竞	1 月 11 日；The Lefschetz formula, J. Roe
张超华	1 月 18 日；Kasparov's *K*-homology, N. Higson, J. Roe

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学年	2021 年春季学期，2021 年 3 月 1 日至 2021 年 7 月 4 日，共 18 周		
地点	线上腾讯会议 ID 329 8591 7934 及线下（暂定）	时间	周五上午 10 点

报告者/时间	报告内容
韦斯翰 3 月 19 日	Title: Classification of minimal dynamical systems and approximate conjugacy Abstract: Let (X,α) and (X,β) be two minimal dynamical systems on a compact metric space X. In 1995, Jun Tomiyama shows that (X,α) and (X,β) are flip conjugate if and only if there is a unital isomorphism between the crossed products $C^*(X,\alpha)$ and $C^*(X,\beta)$ keeping their masa. On the other hand, inheriting the philosophy of Tomiyama's classification theorem, H. Lin and H. Matui defined the concepts of approximate K-conjugacy and C^*-strongly approximate conjugacy in 2004, and showed that for Cantor minimal systems, the approximate K-conjugacy and C^*-strongly approximately conjugacy coincide with the strong orbit equivalence defined by T. Giordano, F. Putnam and C. Skau. Furthermore, it is also equivalent to a K-version of Tomiyama's commutative diagram. In quick succession, this is also shown to be the case for certain kind of minimal rigid dynamical systems on the product of the Cantor space and the circle by H. Lin and H. Matui, and on the product of the Cantor space and the torus by W. Sun. Therefore, in a paper of H. Lin and N. Phillips, H. Lin asked that, what additional hypothesis are required for α and β (and of course, X_1

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and X_2) such that the approximate K-conjugacy and C^*-strongly approximate conjugacy are equivalent?

In this talk, we define the Lipschitz-minimal-property (LMP) for a compact metric space. Then upon applying the technique developed by S. Glasner and B. Weiss, for proving the existence of skew minimal products, we answer the question of H. Lin by showing that, for any Cantor minimal system (K, α) and any infinite finite-dimensional connected finite CW-complex Ω with the LMP, there is an uncountable class $R_0(\alpha)$ of minimal skew products on $K \times \Omega$ such that, with the additional condition that $K_0\left(C\left(\Omega\right)\right)$ is torsion free and $K_1\left(C\left(\Omega\right)\right) = 0$, for any two minimal rigid homeomorphisms $\alpha \in R_0(\alpha)$ and $\beta \in R_0(\beta)$, the approximate K-conjugacy and the C^*-strongly approximate conjugacy coincide, which are also equivalent to the K-version of Tomiyama's commutative diagram. This includes the cases that Ω is an even-dimensional sphere S^{2n} or a product of even dimensional spheres of different dimensions. However, note that the even-dimensional spheres admit no minimal homeomorphism.

The case that $K_1\left(C\left(\Omega\right)\right)$ is not necessarily trivial is also considered, where we get a corresponding classification result. This covers the situation that Ω=circle considered by H. Lin and that Ω=torus considered by W. Sun.

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报告者/时间	报告内容
Valerio Proietti 1/5: 3 月 26 日 2/5：4 月 2 日 3/5：4 月 23 日 4/5：5 月 14 日 5/(5+x): 5 月 21 日 6/(5+2): 6 月 4 日	Title: On the K-theory of groupoids acting properly Tentative plan for 5 lectures: 1. Preliminaries on (proper) groupoids, C*-dynamical systems and equivalence theorems 2. Induction-Restriction adjunction in KK-theory 3. Basics on triangulated categories, pairs of complementary subcategories and their relevance in K-theory 4. The Baum-Cones conjecture and the Dirac-dual-Dirac method 5. Applications

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报告者/时间	报告内容
王若飞 4 月 9 日	Distance between unitary orbits
郭　亮 4 月 16 日	On warped products of CAT(0) spaces; Warped products of metric spaces of curvature bounded from above, Chien-Hsiung Chen
罗　政 5 月 7 日	The coarse geometric Novikov conjecture for spaces of non-positive curved manifolds
张亚洲 5 月 28 日	Infinitely presented small cancellation groups have the Haagerup property, G. Arzhantseva, D. Osajda
王子竞 6 月 18 日	Atiyah's Γ-index theorem, J. Roe
张超华 7 月 2 日	A note on the relative index theorem, J. Roe

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学年	2021 年秋季学期，2021 年 9 月 6 日至 2022 年 1 月 7 日，共 18 周		
地点	线上腾讯会议 ID 329 8591 7934 及线下（暂定）	时间	周三上午 10 点

报告者/时间	报告内容
韦斯翰 9 月 29 日	题目：拓扑动力系统和混沌系统 （On topological dynamical systems and chaotic systems）； 摘要：我们主要讨论讨论拓扑动力系统里关于混沌理论的一些基本概念和经典的定理，例如 Li-Yorke 混沌性和灵敏性，极小性，传递性，强混合性，拓扑动力系统的熵等等，并看看它可以和算子代数有怎么样的关系。
王若飞 10 月 13 日	The tracial topological rank; The tracial topological rank of C*-algebras, Huaxin Lin
郭　亮 10 月 20 日	Counterexamples to the coarse Baum-Connes conjecture; Higher index theory, Rufus Willett, Guoliang Yu
罗　政 11 月 3 日	The coarse Novikov conjecture and Banach spaces with Property (H); Xiaoman Chen, Qin Wang, Guoliang Yu
张亚洲 11 月 10 日	Embeddable box spaces of free groups; A. Khukhro

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报告者/时间	报告内容
王子竞 12 月 1 日	Higher orbit integrals, cyclic cocycles, and K-theory of reduced group C^*-algebra; Yanli Song, Xiang Tang
张朝华 12 月 8 日	Bott periodicity and almost commuting matrices; Rufus Willett
韦斯翰 12 月 15 日 12 月 22 日	题目：Topological dynamics of subshifts; 摘要：我们会在报告中主要介绍 minimal shift space 和 Cuntz-Krieger algebra 的相关内容，讨论一下 minimal shift of interval exchange transformation 以及各类其他的 minimal shift 对应的 Cuntz 代数可能的性质。这些内容牵扯到的有动力系统范畴内的问题和非单 C^*-代数分类的问题。 本次报告主要关于 shift space 的动力基础。
	Topological dynamics of subshifts II;
王若飞 12 月 29 日	Approximate unitary equivalence in $\mathrm{C(X)} \otimes M_n$
马文芝 1 月 5 日	Generalised roundness, universal uniform embedding spaces and coarsely embeddable spaces; On a problem of Smirnov, Per Enflo

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学年	2022 年春季学期，2022 年 2 月 21 日至 2022 年 6 月 27 日，共 18 周		
地点	线上腾讯会议 ID 329 8591 7934 及线下（暂定）	时间	周四上午 10 点

报告者/时间	报告内容
郭　亮 3 月 24 日	On rigidity of Roe algebras; J. Spakula, R. Willett
张亚洲 3 月 31 日	L^2-index theorems, KK-theory, and connections; Thomas Shick
罗　政 4 月 7 日	题目：The Novikov conjecture and geometry of Banach spaces 摘要：In this paper, we prove the strong Novikov conjecture for groups coarsely embeddable into Banach spaces satisfying a geometric condition called Property (H).

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报告者/时间	报告内容
王子竞 4 月 14 日	题目：Superconnections，Thom class，and Equivariant differential forms; Mathias and Quillen; 摘要：In this paper，authors apply a superconnection formalism to the explicit Clifford module representative for the Thom class in K-theory belonging to a real vector bundle of even rank with spin structure. What they find is a refinement of the well-known Riemann-Roch formula linking the Thom classes in K-theory and cohomology to an equality on the level of differential forms.
张超华 4 月 21 日	题目：Localization C*-algebras and K-theoretic duality； Marius Dadarlat, Rufus Willett, and Jianchao Wu, 摘要：Based on the localization algebras of Yu, and their subsequent analysis by Qiao and Roe, authors give a new picture of KK-theory in terms of time-parametrized families of (locally) compact operators that asymptotically commute with appropriate representations.
韦斯翰 4 月 28 日	题目：Embedding Problem and almost finiteness 摘要：We will talk about an embedding theorem of actions of non-commutative groups on compact spaces into subshifts. The embedding theorem is a classic problem in topological dynamical system and the last result regards for the first time of non-commutative group actions, which involves the concepts of almost finiteness, in the sense of Matui and Kerr.

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王燕如 5 月 12 日	题目：Quantitative K-theory for Banach algebras； Yeong Chyuan Chung 摘要: Based on Yu and Oyono-Oyono’s work on quantitative K-theory for C*-algebras, Chung developed a framework of quantitative K-theory for the SQp algebras and proved the existence of a controlled Mayer-Vietoris sequence.
王若飞 5 月 19 日	题目: Almost normal implies close to normal 摘要: Huaxin Lin proves an old important problem that almost normal element in matrices implies close to normal element. Peter Friis extends the theorem for some more C*-algebras.
郭　亮 5 月 26 日	题目：Relative commutant pictures of Roe algebras 摘要：In this report, we will introduce some new discriptions of the Roe algebra of a proper metric space with Yu's Property A. This report is based on [1] and [2]. 参考文献： [1] Ján Špakula, Aaron Tikuisis. Relative Commutant Pictures of Roe Algebras, Commun. Math. Phys. 365, 1019–1048 (2019) [2] Ján Špakula, Jiawen Zhang. Quasi-locality and Property A, Journal of Functional Analysis 278, no. 1, 108299 (2020)

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报告者/时间	报告内容
罗　政 6 月 2 日	题目： Coarse Actions 摘要：In this chapter we study coarse actions of coarse groups. One of the main points is to illustrate the connection between coarse group actions and geometric group theory
王子竞 6 月 16 日	题目：The equivariant Chern character and index of G-invariant operators; Lectures at CIME, Venise 1992; Nicole Berline and Michele Vergne 摘要：In this paper, we will use superconnections instead of excision in order to define the Chern character. Our motivation is to apply to the Atiyah-Singer index formula this way of computing the Chern character. The index formula thus obtained will generalize nicely to the equivariant case, including the case of transversally elliptic pseudodifferential operators.

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报告者/时间	报告内容
张超华 6 月 23 日	题目：Crossed product approach to equivariant localization algrbras； Shintaro Nishikawa； 摘要：The goal of this article is to provide a bridge between the gamma element method for the Baum–Connes conjecture (the Dirac dual-Dirac method) and the controlled algebraic approach of Roe and Yu (localization algebras). For any second countable, locally compact group G, we study the reduced crossed product algebras of the representable localization algebras for proper G spaces. We show that the naturally defined forget control map is equivalent to the Baum–Connes assembly map for any locally compact group G and for any coefficient G-C*-algebra B. We describe the gamma element method for the Baum–Connes conjecture from this controlled algebraic perspective. As an application, we extend the recent new proof of the Baum–Connes conjecture with coefficients for CAT(0)-cubical groups to the non-cocompact setting.
王燕茹 6 月 30 日	题目：A modern look at algebras of operators on Lp-spaces； Eusebio Gardella； 摘要：For L_p operator algebras, we give a modern overview of this research area whose beginnings can be traced back to the 1950s and that has seen renewed attention in the last decade through the infusion of new techniques.

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