华东师范大学算子代数中心

2025 算子代数春季研讨会

为进一步研讨算子代数、泛函分析、非交换几何等前沿课题，促进算子代数理论及相关应用学科的交叉渗透与发展，并加强国内外研究人员的交流与合作，算子代数中心将邀请国内外专家做主题报告、开展专题讨论。会议系列活动将于 2025 年 4 月 7 日至 2025 年 4 月 17 日的周二、四在普陀校区文附楼（503、413）举行。研讨会将由两个短课和多个学术报告组成。

4 月 7 日星期一（算子代数中心 理科大楼 A503 腾讯会议 265717452 密码 202504）

- 3:30－4:30 Raphael Ponge (四川大学) Noncommutative Geometry, Semiclassical Analysis, and Weak Schatten p-Classes

4 月 8 日星期二 (文附楼 413 腾讯会议 926213799 密码 202504)

- 9:30-10:30 林华新(上海数学与交叉学科研究院) Almost representations
- 11:00-12:00 Ryszard Nest (哥本哈根大学) Cyclic Cohomology, Deformation Quantization, and Algebraic Index Theorems 1
- 2:00－3:00 Raphael Ponge, Semiclassical Analysis on Curved Noncommutative Tori
- 3:30－4:30 Heon Lee (哈尔滨工业大学) Laplacians on q-deformations of compact semisimple Lie groups

4 月 10 日星期四 (文附楼 503 腾讯会议 642685337 密码 202504)

- 10:00－11:40 Ryszard Nest, Cyclic Cohomology, Deformation Quantization, and Algebraic Index Theorems 2
- 2:00－4:00 宋言理 (Washington University at st Louis) An Introduction to the Trace Formula 1

4 月 15 日星期二 (文附楼 413 腾讯会议 766974745 密码 202504)

- 10:00－11:40 Ryszard Nest, Cyclic Cohomology, Deformation Quantization, and Algebraic Index Theorems 3
- 2:00－4:00 宋言理 An Introduction to the Trace Formula 2

4 月 17 日星期四 (文附楼 503 腾讯会议 914104757 密码 202504)

- 10:00－11:40 Ryszard Nest, Cyclic Cohomology, Deformation Quantization, and Algebraic Index Theorems 4
- 2:00－3:30 宋言理 An Introduction to the Trace Formula 3

Lecture information

Minicourse 1：Cyclic Cohomology, Deformation Quantization, and Algebraic Index Theorems （Ryszard Nest，哥本哈根大学）

- ✧ Lecture 1 (4 月 8 日星期二 11：00 – 12:00 文附楼 413) Cyclic complexes (Cyclic homology; Hochschild cohomology; Commutative case, Lie derivative, contraction and Cartan formula; Non−commutative calculus)
- ✧ Lecture 2 (4 月 10 日星期四 10:00 – 11:40 文附楼 503) Formal quantisation, jets and Fedosov construction (Formal quantisation of Poisson manifolds; Formal power series, jets, Kazhdan connection; Weyl algebra, Weyl bundle, Fedosov connection; Geometry of Fedosov construction)
- ✧ Lecture 3 (4 月 15 日星期二 10:00 – 11:40 文附楼 413) Lie algebra cohomology, Gelfand−Fuks construction (Lie algebra cohomology; Gelfand−Fuks map; Examples, characteristic classes of foliations; homology of Weyl algebra, canonical trace)
- ✧ Lecture 4 (4 月 17 日星期四 10:00 – 11:40 文附楼 503) Algebraic index theorem (K−theory (a) Commutative case, classical Chern character (b) General case, Denis trace and Chern character; Example − formal deformations; Cyclic homology and formal deformations, Goodwilli theorem; Algebraic index theorem − statement and the sketch of the proof.)

About the course instructor: Ryszard Nest 是著名算子代数与非交换几何专家，现为丹麦哥本哈根大学荣誉退休教授，曾为哥本哈根大学非交换几何研究中心主任。Nest 教授长期致力于指标理论、非交换几何、数学物理方面的研究，尤其在循环同调论、代数指标定理、Baum−Connes 猜测方面取得了一流的研究成果，并发表在《Publ. Math. Inst. Hautes Études Sci.》、《Acta Mathematica》等顶级学术期刊上。Nest 教授还是《Journal of Noncommutative Geometry》的期刊编委，在世界范围内组织过近 30 次的非交换几何与算子代数相关的大型会议，是非交换几何领域公认的领军人物。

Minicourse 2：An Introduction to the Trace Formula （宋言理，Washington University at st Louis）

4 月 10, 15, 17 日，周二(文附楼 413)、周四（文附楼 503）2:00–4:00

Abstract: The Selberg trace formula provides a powerful identity connecting the spectral theory of the Laplacian with geometric invariants of locally symmetric spaces. Originally formulated in the setting of compact quotients, its extension to noncompact finite−volume spaces — such as those arising from arithmetic lattices — introduces new analytic and geometric challenges.

This mini−course will trace the development of the trace formula in the real rank one case:

- ✧ Lecture I: We begin with Selberg’s trace formula for compact quotients and explore its applications to spectral theory and index theory.
- ✧ Lecture II: We introduce Eisenstein series and describe the spectral decomposition for the modular surface $SL(2,\mathbb{Z})\backslash H$.

✧ Lecture III: We discuss Arthur's truncation method and its role in formulating the trace formula in the finite volume setting. We extend the discussion to the general trace formula for real rank one locally symmetric spaces.

Throughout the series, we aim to emphasize both the analytic structure and the geometric meaning of the trace formula, highlighting its relevance in representation theory, automorphic forms, and global analysis.

About the course instructor: 宋言理是华盛顿大学(圣路易斯)的教授。他主要从事泛函分析、算子代数和非交换几何等领域的研究，尤其在几何量子化、表示论、迹公式及其应用方面具有深入造诣。宋教授在国际学术界享有较高声誉，曾在相关领域发表多篇高水平论文如《Duke Mathematical Journal》。

林华新 上海数学与交叉学科研究院 (4 月 8 日星期二 9:30-10:30 文附楼 413)

Almost representations

Abstract: We study the problem when an almost representation is close to a representation. We will report some progress in the case that the Hilbert space is infinite dimensional and separable.

About the speaker: 林华新，上海数学与交叉科学研究院教授，曾任美国俄勒冈大学教授、华东师范大学紫江讲座教授，华东师范大学算子代数研究中心创始人。作为算子代数领域的国际领军学者，他在 C*-代数分类方面取得了一系列突破性成果。林教授解决了著名的 Halmos 问题，创立了具有里程碑意义的迹秩理论，并证明了"迹秩有限的单、顺从、Z-稳定 C*-代数的同构分类定理"。2014 年后与合作者完成 Elliott 分类纲领，推动了算子代数领域的重大发展。其成果发表于《Ann. of Math.》、《Invent. Math.》、《美国国家科学院院刊》等顶级期刊。2013 年当选美国数学会首届会士，2005 年获上海市科学技术进步一等奖，2023 年荣获首届国际基础科学大会前沿科学奖。林教授以深厚的理论造诣和学术领导力，持续推动算子代数研究的创新发展，同时为学科建设与国际交流作出了重要贡献。

Raphael Ponge 四川大学 (4 月 7 日星期一 3:30-4:30 算子代数中心 理科大楼 A503)

Noncommutative Geometry, Semiclassical Analysis, and Weak Schatten p−Classes.

Abstract: The first part of the lecture will cover some background Connes' integration, Weyl's laws for compact operators and their relationships with semiclassical analysis. In particular, we will explain the link between Connes' integration formula and semiclassical Weyl's laws. We will then explain how to extend these results to a very wide class of noncommutative manifolds (i.e., spectral triple). This sheds new light on known examples and allows us to extend Connes' integration formula to a wide class of new examples.

Raphael Ponge 四川大学 (4 月 8 日星期二 10:00-11:00 文附楼 413)

Semiclassical Analysis on Curved Noncommutative Tori.

Abstract: In this lecture we will explain how the results presented in the first lecture enables us to deal with a conjecture of Ed McDonald and I on semiclassical Weyl's laws on curved noncommutative tori, i.e., NC tori equipped with arbitrary Riemannian metrics.

Heon Lee 哈尔滨工业大学 (4 月 8 日星期二 3:30-4:30 文附楼 413)

Title: Laplacians on q−deformations of compact semisimple Lie groups

Abstract: In this talk, we suggest a simple definition of Laplacian on a compact quantum group (CQG) associated with a first−order differential calculus (FODC) on it. Applied to the classical differential calculus on a compact Lie group, this definition yields classical Laplacians, as it should. Moreover, on the CQG K_q arising from the q−deformation of a compact semisimple Lie group K, we can find many interesting linear operators that satisfy this definition, which converge to a classical Laplacian on K as q tends to 1, and share many desirable properties. In light of this, we call them q−Laplacians on K_q. We explore some problems related to the heat equations on K_q defined by them. This work is based on the preprint arXiv:2410.00720.

Spring Operator Algebra Program

April 7-22, 2025

East China Normal University (Putuo campus) Wenfu Building 413(Tue) 503(Thu)

April 7 Monday (RCOA Science Building A503)

- 3:30 – 4:30 Raphael Ponge (Sichuan University) Noncommutative Geometry, Semiclassical Analysis, and Weak Schatten p-Classes

April 8 Tuesday (Wenfu Building 413)

- 9:30-10:30 Huaxin Lin (Shanghai Institute for Mathematics and Interdisciplinary Sciences)
- 11:00 – 12:00 Ryszard Nest (University of Copenhagen) Cyclic Cohomology, Deformation Quantization, and Algebraic Index Theorems 1
- 2:00 – 3:00 Raphael Ponge (Sichuan University) Semiclassical Analysis on Curved Noncommutative Tori
- 3:30 – 4:30 Heon Lee (Harbin Institute of Technology) Laplacians on q-deformations of compact semisimple Lie groups

April 10 Thursday (Wenfu Building 503)

- 10:00 – 11:40 Ryszard Nest (University of Copenhagen) Cyclic Cohomology, Deformation Quantization, and Algebraic Index Theorems 2
- 2:00 – 4:00 Yanli Song (Washington University at st Louis) An Introduction to the Trace Formula 1

April 15 Tuesday (Wenfu Building 413)

- 10:00 – 11:40 Ryszard Nest (University of Copenhagen) Cyclic Cohomology, Deformation Quantization, and Algebraic Index Theorems 3
- 2:00 – 4:00 Yanli Song (Washington University at st Louis) An Introduction to the Trace Formula 2

April 17 Thursday (Wenfu Building 503)

- 10:00 – 11:40 Ryszard Nest (University of Copenhagen) Cyclic Cohomology, Deformation Quantization, and Algebraic Index Theorems 4
- 2:00 – 4:00 Yanli Song (Washington University at st Louis) An Introduction to the Trace Formula 3

Map of the Putuo campus of East China Normal University
No. **27** is **Wenfu building** 文附楼； No. 1 is the Science building where Research Center of Operator Algebras locates)

