Yang Liu – Résumé

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Research Interests

Noncommutative geometry and its application to geometry, topology and number theory:

- Operator-theoretic index theorems: K-theory, cyclic cohomology;
- Global analysis: pseudo-differential calculus, heat kernel expansion;
- Hopf algebra symmetry and quantum groups;
- Modular forms and special functions.

Education

2008-2015   PH.D in Mathematics, Ohio State University

Advisor: Henri Moscovici
Thesis: Modular curvature for toric noncommutative manifolds

2004-2008   B.S. in Mathematics, Harbin Institute of Technology (China)

Positions and Short Term Visits

Postdoctoral Fellow   `Oct. 2019 - Present`
SISSA - Scuola Internazionale Superiore di Studi Avanzati, Trieste

Postdoctoral Fellow   `Sep. 2016 - Dec. 2018`
Max Planck Institute for Mathematics, Bonn.

Visiting Guest   `Jun 3, 2019 -Jul 5, 2019`
Shanghai Center for Mathematical Sciences

Visiting Guest   `Apr 8, 2019 -May 23, 2019`
Sichuan University, Chengdu

Riemann Fellow   `Jan. 2019 -Mar. 2019`
Riemann Center for Geometry and Physics (Leibniz University), Hannover

Visiting Guest   `Nov 1, 2017 - Dec 31, 2017`
I.H.E.S, Bures-sur-Yvette

Lecturer   `Sep. 2015- May 2016`
Ohio State University

Publications and Preprints

- Modular curvature for toric noncommutative manifolds, *Journal of Noncommutative Geometry*, Vol 12(2), 2018, 511-575.

- Scalar curvature in conformal geometry of Connes-Landi noncommutative manifolds, *Journal of Geometry and Physics*, Vol 121, Nov 2017, 138-165.

- Hypergeometric function and modular curvature I. Hypergeometric functions in Heat Coefficients, arXiv:1810.09939

- Hypergeometric function and modular curvature II. Connes-Moscovici functional relation after Lesch's work, arXiv:1811.07967

- General Rearrangement Lemma for Heat Trace Asymptotic on Noncommutative Tori, arXiv:2004.05714.

- Cyclic Structure behind Modular Gaussian Curvature, arXiv:2201.08730.

- with X. Han and G. Landi, Hopf Algebroids from Noncommutative Bundles, arXiv:2201.01612.

Invited Talks

2022

- Virtual Seminar: Oberseminar Global Analysis and Operator Algebras, Bonn, Jan. Title: Cyclic Structure behind the Modular Gaussian Curvature.

2021

- Virtual Seminar: Global NCG seminar (Americas). Title: Hypergeometric Functions and Heat Coefficients on Noncommutative Tori.

- Virtual Seminar: Mini Conf: Geometry Through Spectral Functionals (Banach Center). Title: Modular Curvature and Morita Equivalence.

- Noncommutative geometry seminar, SISSA, Trieste, Oct.

2019

- Conference of K-theory and Noncommutative Geometry, SCMS, Shanghai, June;

- Noncommutative geometry seminar (mini course), Sichuan University, Chengdu, China, April;

2018

- Analysis seminar, Leibniz University, Hannover, Nov.

- Global analysis seminar, University of Bonn, Oct.

- International Workshop of Operator Theory and its Applications, special section on "Noncommutative Geometry", Shanghai, July.

- Workshop "Noncommutative geometry and index theory for group actions and singular spaces", TAMU, College Station, USA.

- Noncommutative Geometry and Representation Theory, Sichuan, China (May).

- Geometry and Physics Seminar, Tsinghua University / Yau Mathematical Sciences Center, Beijing (April).

- Noncommutative geometry seminar, Trieste, Italy (April).

- Analysis seminar, University of Potsdam, Golm, Germany (April).

2017

- Working Group on Dirac Operators seminar (two talks), University Paris-Sud, Orsay, Dec.

- IHES seminar, Dec.

- Operator algebras seminar, Université Paris Diderot - Paris 7, Dec.

- Global analysis seminar, University of Bonn, Oct.

- Noncommutative Geometry Seminar, Caltech, Aug.

- Workshop "Analysis, Noncommutative Geometry, Operator Algebras", Gothenburg, Sweden, Jun.

- Noncommutative Geometry Seminar (two lectures), University of Western Ontario, Feb.

- Noncommutative Geometry Seminar, Ohio State University, Feb.

- Noncommutative Geometry Seminar, Caltech, Feb.

- Global analysis seminar, University of Bonn, Jan.

2016

- Noncommutative geometry seminar, University of Copenhagen, Dec.

- MPI-Oberseminar, MPIM Bonn, Nov.

- Rencontre de l'ANR Singstar et du GDR Géométrie non commutative, Metz, Nov.

- Global analysis seminar, University of Bonn, Oct.

- Seminar on Algebra, Geometry and Physics, MPIM Bonn, Oct.

- The Second Summer School on Operator Algebras and Noncommutative Geometry 2016, East China Normal University, Shanghai, Aug.

- Noncommutative geometry seminar, Penn State University, Apr.

- Noncommutative geometry seminar, Texas A&M University, Feb.

Teaching

As a teaching assistant at Ohio State University from Sep. 2009 - May 2015 and a lecturer from Sep. 2015 - May 2016 , I had taught the following courses:

- Calculus sequence I, II and III. The sequence contains four parts: differential calculus, integral calculus, series and sequences, multivariable calculus.

- Mathematical Topics for Engineers: a rapid course whose topics consist of multivariable calculus, matrix algebra and linear (ordinary and partial) differential equations.

During my fellowship at SISSA, I have given three topic courses, as a part of annual graduate course: introduction to noncommutative geometry:

- 2020 Feb.: Harmonic analysis and differential geometry on noncommutative tori;

- 2021 Jan.: Atiyah Singer local index theorem;

- 2021 Oct: Selected topics in functional analysis (Introduction to Banach and C^*-algebras).

Last updated: March 2, 2022