Representation Theory

• Modular Forms, Geometric Modular Forms and Automorphic Forms, 2022.4 - Present

It's the 'Undergraduate Research Opportunities' Project with a series of reading groups. We studied the representation theory with emphasis on GL(2), in particular, Langlands Classification of Real Reductive Groups, Automorphic Forms and Representations, Tate Thesis, Harmonic Analysis on Reductive p-adic Groups and Lie Algebras: The Local Trace Formula, Jacquet Langlands Correspondence for GL(2). The respective references are by Wallach, Bump, Tate, Kottwitz, Taïbi. In 2023 fall, we studied Galois and Cartan Cohomology of Real Groups, the Local Theta Correspondence, and the Local GGP conjecture (Beuzart-Plessis used the trace formula to prove the GGP conjecture for unitary group in both Archimedean and Non-Archimedean case uniformly). The respective references are by Taïbi, Takeda and Beuzart-Plessis.

• Representation Theory, 2023 Spring

The course was taken at BICMR, Peking University, which was offered by Prof. Scheidegger. The references are by Fulton and Harris and Humphreys. We studied the representations of finite groups and of Lie Algebras.

• Topics in Representation Theory: Automorphic Representation, 2023 Autumn

The course was audited at BICMR, Peking University, which was offered by Prof. Wenwei Li. We recalled some results about modular forms. Our main theorem is Gelfand–Piatetski-Shapiro theorem: the cuspidal spectrum can be decomposed as the direct sum of irreducible representations, where each occurs finitely.

Number Theory and Elliptic Curves

• Advanced Number Theory: Perfectoid Spaces, (my lecture note) 2023 Spring

The course was taken at BICMR, Peking University, which was offered by Prof. Yiwen Ding. We introduce perfectoid spaces, which naturally appear in number theory and algebraic geometry. Our references were Perfectoid Spaces and p adic Hodge by Scholze and the note by Bhatt. It was a beautiful and thrilling journey.

• Arizona Preliminary Winter School, Arizona (Online), 2023.9 – 2023.12

The course was offered by Prof. Wanlin Li. We studied the Elliptic curves with complex multiplication: class field theory of imaginary quadratic fields and some arithmetic properties. Reference was by Silverman. I'm also attending a long term (2022.9 - Present) student seminars on Algebraic Geometry and Elliptic Curves.

• Modular Forms and Number Theory, (my note, partly) 2023 Spring

The course was taken at BICMR, Peking University, which was offered by Prof. Jun Yu. We studied the modular forms and their L-functions (mainly are analytic properties). The references were Intro. to the arithmetic theory of automorphic functions by Shimura and Intro. to modular forms by Prof. Wenwei Li.

• Algebraic number theory, summer school, Nanjing University, 2022.7

The summer school course was offered by Prof. Hang Xue. We studied the excellent Tate Thesis!

• Core Topics in Modern Number Theory, 2022.12 - 2023.6

The course was taken at YMSC, Tsinghua University, which was offered by Prof. Ivan Fesenko. At first we studied the basic number theory and commutative algebra as a prerequisite, then we studied local fields and class field theory. This term I'm attending a reading group with topics on the local fields at Renmin Univ. of China. Our references are Serre: Local Fields and Number Theory I,II by Yiwen Ding.

Other courses: Commutative Algebra, Homological Algebra (2023 Spring, Ref: AtiyahMac, Weibel), Category Theory and Homological Algebra (2023 Spring), 2022 Summer School on Differential Geometry (2022.8, Ref. Riemannian Geometry by do Carmo, Principles of Algebraic Geometry by Griffiths-Harris), Homology Theory and Characteristic Classes (BICMR course, 2023 Spring).