哈爾濱工業大學
HARBIN INSTITUTE OF TECHNOLOGY

2026调和分析青年学者论坛（哈尔滨）

会议手册

数学研究院

2026年1月16日–1月19日

2026 调和分析青年学者论坛（哈尔滨）

欢迎您莅临参加“2026 调和分析青年学者论坛（哈尔滨）”。此次会议将由哈尔滨工业大学数学研究院主办，旨在探讨调和分析及相关领域的最新研究成果和前沿进展，并促进该领域的学术交流与合作。鉴于您是该领域的知名专家，我们诚挚地邀请您莅临指导。

会议安排：

住宿地点：桔子酒店（哈尔滨工业大学火车站店）

报到时间：2026 年 1 月 16 日

学术报告：2026 年 1 月 17 日—18 日

离会时间：2026 年 1 月 19 日

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主办单位：哈尔滨工业大学数学研究院

2026 调和分析青年学者论坛（哈尔滨）日程安排

会议报到（2026 年 1 月 16 日）

1 月 16 日（周五）		
时间	日程	地点
14:30-19:00	报到	桔子酒店大堂
18:00-20:00	晚餐	

会议第一天（2026 年 1 月 17 日）

1 月 17 日（周六）上午			
时间	报告人	报告题目	主持人
8:40-9:00	开幕式及合影		许全华
9:00-9:35	宋亮	Weak type (1,1) bounds for Riesz transforms for elliptic operators in non-divergence form	孙文昌
9:35-10:10	席亚昆	Recent progress on Kuznecov sums	陈杰诚
10:10-10:30	茶歇		
10:30-11:05	陈曦	Inverse scattering by diffracted waves	李洪全
11:05-11:40	郑继强	Pointwise convergence of cubic Schrödinger flow on 2d spherel	谌稳固
12:00-13:00	午餐		
1 月 17 日（周六）下午			
15:00-15:23	杨四辈	On solvability of L^p Poisson-Robin(-regularity) problems on rough domains	朱月萍
15:35-16:10	黄山林	Dispersive estimates for magnetic Schrödinger equations in two dimensions	娄增建
16:10-16:30	茶歇		

16:30-17:05	宋曼利	Orthonormal Strichartz inequalities on abstract measure spaces	陈艳萍
17:05-17:40	范晨捷	Strichartz estimate for hyperbolic Schrödinger on the waveguide	陶祥兴
18:30-20:30	晚宴		

会议第二天（**2026** 年 **1** 月 **18** 日）

1 月 18 日（周日）上午			
时间	报告人	内容	主持人
9:00-9:35	张军勇	Strichartz estimates for the Dirac equation in a cosmic string spacetime	李嘉禹
9:35-10:10	诸葛金平	Convergence rates and uniform regularity for multiscale elliptic homogenization	燕敦验
10:10-10:30	茶歇		
10:30-11:05	陈露	Scattering theory and inverse scattering theory in hyperbolic space	马柏林
11:05-11:40	秦墨言	Criteria for weak-type properties of generalized singular integral operators with rough kernels	李中凯
12:00-13:00	午餐		
1 月 18 日（周日）下午			
15:00-18:00	自由讨论		

报告题目及摘要

Scattering theory and Inverse scattering theory in hyperbolic space

陈露（北京理工大学）

摘要： In this talk, we introduce a theoretical framework for time-harmonic wave scattering on hyperbolic spaces. We give the accurate characterizations of the asymptotic behaviors of the Green functions and use them to establish the ingoing and outgoing radiation conditions, which are analogues to the Sommerfeld radiation conditions in the Euclidean setting. We also discuss a hyperbolic Rellichs type theorem which guarantees that the scattered field as well as its far-field pattern are uniquely defined. Finally, we also study some model of inverse scattering problem in hyperbolic space. To our best knowledge, the theoretical framework is new to the literature and it paves the way for many subsequent developments for wave scattering on hyperbolic spaces. This talk is based on the joint work with Professor Hongyu Liu from City University of Hong Kong.

Inverse scattering by diffracted waves

陈曦（复旦大学）

摘要： Beyond reflection and refraction, another form of wave deviation is defined as diffraction. Notably, when incident waves strike a corner, diffracted waves emanate from the corner tip and propagate in all directions. We propose a novel framework for detecting rigid cornered obstacles using measured diffracted wave data. This methodology offers two key advantages: first, the receiver's size and location can be arbitrary; second, the numerical inversion process does not require numerical data from the associated wave equations.

Strichartz estimate for hyperbolic Schrodinger on the waveguide

范晨捷（中国科学院）

摘要： Sharp Strichartz estimates for 2D （hyperbolic） Schrodinger in the whole space follows from dispersive estimates and by now standard TT^* argument. It is not easy to generalize such a proof to the torus or wave guide case. We will present another proof of such estimates in the whole space case, which will actually yield end point L^4 Strichartz estimates for hyperbolic Schrodinger on wave guide with no derivative loss. This is joint work with Deng, Zhao (BIT).

Dispersive estimates for magnetic Schrodinger equations in two dimensions

黄山林（中山大学（珠海））

摘要： In this talk, we discuss the two-dimensional Schrodinger equation with general electromagnetic potentials. We establish sharp $L^1 - L^\infty$ estimates in the presence of zero-energy resonances. The proof combines a refined analysis of singular oscillatory integrals (for high frequencies) with spectral analysis near zero energy (for low frequencies).

Criteria for weak-type properties of generalized singular integral operators with rough kernels

秦墨言（北京师范大学）

摘要： We establish a criterion for the limiting weak-type behavior property of generalized singular integral operators with rough kernels. The operators under consideration are of the form

$$T_{\Omega,\mathrm{K}}\, f(x) \;=\; p.v. \int \Omega(x-y)\, K(x,y)\, f(y)\; dy.$$

Assume that the kernel Ω belongs to $Llog(S^{n-1})$ and satisfies the standard cancellation condition, while the kernel K satisfies suitable size and regularity assumptions. Under these hypotheses, we show that the limiting weak-type behavior of $T_{\Omega,K}$ follows from its weak-type (1, 1) boundedness. As applications of this criterion, we show that the limiting weak-type behavior property holds for several classical operators with rough kernels, including Calderón-Zygmund singular integral operator, Calderón commutator, higher-order Calderón commutator, as well as the corresponding maximal truncated operators.

Weak type (1,1) bounds for Riesz transforms for elliptic operators in non-divergence form

宋亮（中山大学）

摘要： Let L be the elliptic operator in non-divergence form with smooth real coefficients satisfying uniformly elliptic condition. Let W be the global nonnegative adjoint solution. If $W \in A_2$, we prove that the Riesz transforms $\nabla L^{1/2}$ is of weak type (1, 1) with respect to the measure $W(x)dx$. This, together with L^2_W boundedness of Riesz transforms, implies that the Riesz transforms are bounded in L^p_W for $1 < p < 2$.

This is a joint work with Huohao Zhang.

Orthonormal Strichartz inequalities on abstract measure spaces

宋曼利（西北工业大学）

摘要： The main objective of this talk is to extend certain fundamental inequalities from a single function to a family of orthonormal systems. In the first part of the talk, we consider a non-negative, self-adjoint operator L on $L^2(X,\mu)$, where (X,μ) is a measure space. Under the Keel-Tao type assumption that the kernel $K_{it}(x,y)$ of the Schrödinger propagator e^{itL} satisfies a uniform L^∞-decay estimate of the form

$$sup_{x,y\in X}|K_{it}(x,y)| \lesssim t^{-n/2}, \qquad |t|<T_0, for\ some\ n\geq 1,$$

where $T_0 \in (0,\infty]$, we establish Strichartz estimates for the Schrödinger propagator e^{itL} and using a duality principle argument by Frank-Sabin (Amer J Math, 2017), we extend it for a system of infinitely many fermions on $L^2(X,\mu)$. In the next part of the talk, we obtain some new orthonormal Strichartz estimates, which extend prior work of Kenig-Ponce-Vega (Indiana Univ Math J, 1991) for single functions.

Recent progress on Kuznecov sums

席亚昆（浙江大学）

摘要： This talk presents recent developments in Kuznecov sums, focusing on the two-term asymptotics, the generic improvement of remainder terms, and the sharp fractal Kuznecov formula. These results provide new advancements in the understanding of spectral sums, and improve our understanding of the spectral behavior of Riemannian manifolds and fractal sets.

On solvability of L^p Poisson-Robin(-regularity) problems on rough domains

杨四辈（兰州大学）

摘要： Let $n\geq 2$, $\Omega\subset\mathbb{R}^n$ be a bounded one-sided chord arc domain, and $p\in(1,\infty)$. In this talk, I will introduce several equivalent characterizations for the solvability of the L^p Poisson-Robin(-regularity) problem for a uniformly elliptic operator $L=-div(A\nabla)$ of divergence form on Ω, which considers weak solutions to the equation $L=h-div\,F$ in Ω with the Robin boundary condition $A\nabla u\cdot\nu+\alpha u=F\cdot\nu$ on the boundary $\partial\Omega$ for functions h and F in some tent spaces, and their applications to obtain an extrapolation property for the solvability of the classical L^p Robin problem.

Strichartz estimates for the Dirac equation in a cosmic string spacetime

张军勇（北京理工大学）

摘要： I will discuss the Dirac equation on a cosmic string background, which models a one-dimensional topological defect in the spacetime. Precisely, I will discuss dispersive estimates for the flow, with and without weights and then discuss Strichartz estimates for the Dirac flow in a sharp restricted set of indices, which are different from the classical Euclidean ones.

Pointwise convergence of cubic Schrödinger flow on 2d spherel

郑继强（北京应用物理与计算数学研究所）

摘要： In this talk, we study the almost everywhere limit of cubic nonlinear Schrödinger flow to the initial data in 2d spherel. Inspired by the randomization technique and the construction of ansatz in Burq-Camps-Sun-Tzvetkov [Preprint, arXiv:2404.18229], we proved the almost surely uniform convergence of the nonlinear solution in a very low regularity. This result extends Compann-Luca-Staffilani [Int. Math. Res. Not., 1(2021), 596-647] to the spherical setting. We also provide a new necessary condition of L^p maximal estimate for the linear Schrödinger equation on 2d spherel, which improves the previous result of Chen-Lee-Duong-Yan [J. Math. Pure Appl. 163 (2022), 433-449]. This work is jointed with Fanfei Meng, Yilin Song, Chenmin Sun and Ruixiao Zhang.

Convergence rates and uniform regularity for multiscale elliptic homogenization

诸葛金平（中国科学院）

摘要： I will talk about second-order linear elliptic equations with coefficients periodically oscillating at multiple different scales. The optimal convergence rates and uniform regularity will be discussed in different situations, particularly when the scale-separation condition is not satisfied. This is joint work with Weisheng Niu and Yao Xu.

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数学研究院简介

哈工大数学研究院成立于 2016 年 7 月，直接隶属于学校，是数学学院密不可分的合作 伙伴。研究院以基础数学为基石，以从事国际一流的原始创新研究和培养杰出青年数学人才 为第一要务，致力于推动数学、经济学、物理、工程和计算机科学的交叉研究。

目前，数学研究院共有科研人员 35 人，其中国家高层次人才 17 人，人才占比高达 48.6%。 此外，研究院聘请了 3 名国际讲席教授，其中一名为菲尔兹奖得主。关于研究院现有人员列 表及其研究领域，请参见研究院网站：http://im.hit.edu.cn/8378/list.htm

研究院的管理理念遵循法国的宽松模式，不侧重文章数量或杂志级别等。其目的是打造 一个愉快、舒适、和谐、向上的工作环境，为所有科研人员提供一个利于事业发展的有效平 台，让每个人都找到适合自己发展的方式和位置。

数学研究院大力发展现代分析、数论-代数-组合、概率论统计及其应用等现有的 3 个重 点优势学科方向，发展交叉学科研究。自成立以来，获批各类国家自然科学基金 41 项，博 士后基金 8 项，2020 年获批国家自然科学基金重点项目 1 项，填补了我校数学学科在此项 目中的空白，2023 年学院教师同时获批国家自然科学基金杰出青年基金和国家自然科学基金优秀青年科学基金。学院教师先后在《Adv. Math.》《Biometrika》《Comm. Math. Phys.》《Duke Math. J.》《IEEE Trans. Inf. Theory》《IEEE TPAMI》《J. Eur. Math. Soc.》《Math. Ann.》《Mem. Amer. Math. Soc.》《Probab. Theory Relat. Fields》《美国科学院院刊》(PNAS)等国际顶级期 刊及高水平期刊发表论文 80 余篇，其中绝大多数填补了哈工大数学学科发表期刊空白。

規格嚴格
功夫到家