



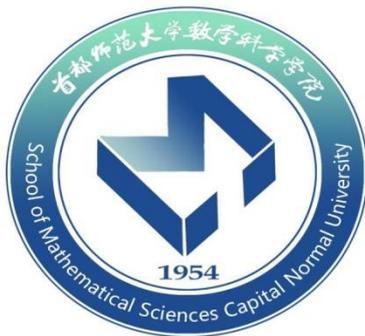
首都师范大学
建校七十周年
THE 70TH ANNIVERSARY OF
CAPITAL NORMAL UNIVERSITY

励新卓越论坛

——首都师范大学数学科学学院建校 70 周年系列学术活动

励新卓越博士生学术论坛

会议手册



首都师范大学数学科学学院

2023 年 11 月 15 日

励新卓越博士生学术论坛

一、主办单位

首都师范大学数学科学学院

二、会议安排

时间：2023年11月15日 13:10-17:00

分组报告地点（13:30开始）：

第一组	基础数学	教二楼508
第二组	偏微分方程	教二楼913
第三组	组合与信息技术	教二楼927
第四组	数学物理	教二楼727

11 月 15 日 (星期三)	
地点: 教二楼927	
13:10-13:30	院长致辞

第一组 基础数学 教二楼508		
主持人: 张振雷		
13:30-13:45	于中虹	A local almost euclidean isoperimetric inequality
13:45-14:00	邹尚芝	Almost Rigidity Theorems Of Manifolds With Bounded Curvature
14:00-14:15	刘道强	Index theory and distance estimates under scalar curvature bounded from below
主持人: 姚芳		
14:30-14:45	王姿婷	圆弧型等宽曲线的构造
14:45-15:00	李健松	Optimal quadratures for weighted Sobolev and Besov classes on localizable homogenous spaces
主持人: 童纪龙		
15:15-15:30	李勇	Resurgent treatment of the two equations
15:30-15:45	周宏杰	Introduction to the Moduli spaces of stable holomorphic vector bundles and flat connections over Riemann Surfaces

第二组 偏微分方程 教二楼913

主持人：酒全森

13:30-13:45	晋雪婷	Stability for the 2D Micropolar equations near Couette flow
13:45-14:00	樊洁	Blow up criteria for the 2D compressible Navier-Stokes equations
14:00-14:15	谢耀玮	Global well-posedness and optimal decay for incompressible MHD equations with fractional dissipations

主持人：牛冬娟

14:30-14:45	金美琳	Well-posedness for the incompressible Hall-MHD equations
14:45-15:00	吴会茹	Stability and large-time behavior of 2D Tropical climate model with zero thermal diffusion
15:00-15:15	王璐	Global Well-Posedness of 3D Navier-Stokes Equations with Variable Viscous Coefficient

主持人：阮欣然

15:30-15:45	杨子亮	Existence of Nontrivial Solutions for the Nonlinear Equation on Locally Finite Graphs
15:45-16:00	张越	Global existence and large-time behavior of compressible two-phase flow
16:00-16:15	梁少琪	两类趋化模型行波解的谱稳定性研究

第三组 组合与信息技术 教二楼927

主持人：辛国策

13:30-13:45	张晨	The constant term algebra of type A : the structure
13:45-14:00	张子豪	Fast Evaluation of Generalized Todd Polynomials
14:00-14:15	徐欣雨	Algebraic Volume for Polytope Arise from Ehrhart Theory
14:15-14:30	刘飞虎	A Combinatorial Approach to Frobenius Numbers of Some Special Sequences

主持人：赵斌

14:45-15:00	陆艺	DNA存储的一种实现方案
15:00-15:15	孙钰博	Codes for correcting deletions
15:15-15:30	顾浩杰	On twisted generalized Reed-Solomon codes with L twists

主持人：李宏伟

15:45-16:00	樊淑琼	金属伪影去除相关算法研究
16:00-16:15	于欣冉	GPU based Iterative Reconstruction Algorithm for Multi-scale 3D High-resolution Cone Beam Computed Tomography
16:15-17:00	鲁昕	A ring artifact removal model with dual domain regularization for x-ray computed tomography

第四组 数学物理 教二楼727

主持人：李春霞

13:30-13:45	闫安慧	两个经典可积系统的负流及其与正交多项式的关系
13:45-14:00	MUHAMMAD KASHIF	The commutative and non-commutative versions of extended KP equation, extended mKP equation and their Miura transformation
14:00-14:15	刘凡	数学物理中的对称函数
14:15-14:30	娄楷	Higher form symmetry and 't hooft anomaly
14:30-14:45	张富豪	$W_{1+\infty}$ \mathfrak{n} -algebra and hierarchies related to Deformed Calogero-Sutherland model
14:45-15:00	王路瑶	W-representation of tensor model

主持人：王志玺

15:15-15:30	吕俏俏	Sharing EPR steering between sequential pairs of observers
15:30-15:45	杨康康	Super-additivity Relations for Quantum Coherence Measures
15:45-16:00	王珂珂	Operational entanglement detection based on lamata -moments
16:00-16:15	沈中喜	General monogamy and polygamy relations of arbitrary quantum correlations for multipartite systems
16:15-16:30	徐聪	Uncertainty of quantum channels via modified generalized variance and modified generalized Wigner-Yanase-Dyson skew information

会议报告简介

(按报告时间顺序)

第一组：教二楼508

(1) 于巾虹

题目：A local almost euclidean isoperimetric inequality

简介：We apply Brendle's argument to the local Sobolev constant estimate on a domain with integral Ricci curvature bound. It gives an almost Euclidean isoperimetric inequality on a small domain in a unit metric ball. In case of nonnegative Ricci curvature the inequality is almost sharp.

(2) 邹尚芝

题目：Almost Rigidity Theorems Of Manifolds With Bounded Curvature

简介：Man-Chun Lee, Aaron Naber and Robin Neumayer propose a weaker notion of convergence, d_p -convergence, which is valid for a class of rectifiable Riemannian spaces. Under this d_p notion of closeness, a space with almost nonnegative scalar curvature and small entropy bound must be close to Euclidean space, and this constitute ε -regularity theorem.

In this report we give a new ε -regularity theorem that replaces the scalar curvature lower bound with an integral scalar curvature lower bound. Moreover, under this condition, we also have the compactness theorem, an L^∞ -Sobolev embedding and apriori L^p scalar curvature bounds for $p < 1$.

(3) 刘道强

题目：Index theory and distance estimates under scalar curvature bounded from below

简介：In this talk, I will introduce some classical results about the geometry and topology of positive scalar curvature from the point of view of index theory. Then based on Callias-type operator approach, I will discuss my results on the long neck problem and width estimates of the geodesic collar neighborhood proposed by Gromov. An important step is to introduce the relative Gromov-Lawson pair on a compact manifold with boundary, relative to a background manifold. Additionally, I will give an alternative harmonic level set proof of width estimates of generalized geodesic collar neighborhood in dimension three. If time permits, finally, I will present my recent works on the tilted spacetime positive mass theorem with arbitrary ends. Moreover, I will give a quantitative shielding theorem where the underlying initial data sets are unnecessarily complete, and in a sense, the symmetric-time case of our dominant energy shield condition improves and sharpens the largeness assumptions in the papers [Lesourd-Unger-Yau 2021] and [Lee-Lesourd-Unger 2022].

(4) 王姿婷

题目：圆弧形等宽曲线的构造

简介：本文讨论了两种构造圆弧形等宽曲线的方法.通过归纳基于正多边形构造圆弧形等宽曲线的方法,给出等线长角星点集的定义以及构造方法,进而指出基于等线长角星点集可以绘制有尖点的圆弧形等宽曲线;更一般地,给出了基于交叉线丛且宽最小的圆弧形等宽曲线的构造方法,是基于角星构造方法的进一步推广和补充.

(5) 李健松

题目: Optimal quadratures for weighted Sobolev and Besov classes on localizable homogenous spaces

简介: We consider the numerical integration

$$\text{INT}_{\Omega^d, w}(f) = \int_{\Omega^d} f(x)w(x)dx$$

for a continuous function f defined on a localizable homogenous type space Ω^d which contains many regular domains, such as sphere, ball, simplex, conic domain and so on. In this lecture, we obtain the upper estimates of optimal quadrature errors for weighted Sobolev and Besov classes on localizable homogenous spaces in the deterministic and randomized settings. Besides, in generally, these estimates are also optimal.

(6) 李勇

题目: Resurgent treatment of the two equations

简介: Resurgence Theory has become more and more used in the mathematics / physics research literature. In this talk we start with two equations, which show the role of Resurgent theory in topological string theory.

(7) 周宏杰

题目: Introduction to the Moduli spaces of stable holomorphic vector bundles and flat connections over Riemann Surfaces

简介: Higgs bundle, a crossroad between Algebraic Geometry, Differential Geometry, Algebraic Topology, Complex Geometry, Symplectic Geometry, has developed rapidly during the lasting 40 years.

In this talk(two parts), I will briefly describe the sketch of this huge systematic theory, by drawing the origins——two deeply relevant structures, with highly nontrivial deformations under the quotient of some infinitely Lie group action, contacted to several elegant branches——moment map, sheaf cohomology, charactic classes, Morse function, and index theorem. If time permits, I want to show my partly progress, focus on the parabolic Higgs bundles over the projective line minus n points, and the Non-Abelian Hodge correspondence.

第二组：教二楼913

(1) 晋雪婷

题目：Stability for the 2D Micropolar equations near Couette flow

简介：Recently, the stability of shear flows for Navier-Stokes equations have been studied in a number of literatures. In this talk, we consider the stability for the 2D Micropolar equations with different dissipation cases. The key is to overcome the difficulty caused by the higher order derivatives in right side of velocity equations. We adopt the Fourier multiplier method to prove. A new horizontal $\frac{1}{3}$ -order dissipation is created by special structure $y\partial_x - \partial_{yy}$ and a time-dependent elliptic operator $\Lambda_b^t = (1 - \partial_x^2 - (\partial_y + t\partial_x)^2)^{\frac{b}{2}}$ will be used to get more concise estimates. The relationship among viscosities and transition thresholds will be shown.

(2) 樊洁

题目：Blow up criteria for the 2D compressible Navier-Stokes equations

简介：This report is to derive three new blow-up criterion for the 2D barotropic Navier-Stokes equations、full compressible Navier-Stokes equations、full compressible N-S equations without heat conduction. The initial vacuum is permitted in this report. We show that if the strong solution to 2D viscous compressible flows blows up in finite time, then either the concentration of the density or the temperature. These results extend previous results and give an answer to Nash conjecture.

(3) 谢耀玮

题目：Global well-posedness and optimal decay for incompressible MHD equations with fractional dissipations

简介：We investigate the n-dimensional incompressible magnetohydrodynamic (MHD) equations with fractional dissipation and magnetic diffusion. Firstly, We have established existence and uniqueness in different sobolev spaces for the same dissipative case. Secondly, we use frequency truncation techniques to obtain an important lemma to obtain the decay result. In the case $\alpha = 0$, the system corresponds to a damped MHD equations. Our results improve previous results by extending the solution space from

$$H^s (s > \frac{n}{2} + 1) \text{ to } B_{2,1}^s (s \geq \frac{n}{2} + 1).$$

(4) 金美琳

题目：Well-posedness for the incompressible Hall-MHD equations

简介：We will talk about well-posedness for the incompressible Hall-MHD equations in 3-D or 2.5-D. For 3-D case, we study the Cauchy problem for the axisymmetric Hall-MHD system with horizontal velocity dissipation and vertical magnetic diffusion. And the 2.5-D case, we prove the global regularity of a certain system of equations with horizontal or vertical dissipation and magnetic hyper-diffusion for large initial data. The two-and-a-half-dimensional (2.5-D for brief) is three components of vector fields with spatial variations in two directions.

(5) 吴会茹

题目：Stability and large-time behavior of 2D Tropical climate model with zero thermal diffusion

简介: In this talk, we investigate the stability and large-time behavior of 2D Tropical climate model with zero thermal diffusion under small initial data. Due to the absence of thermal dissipation in the system, this has brought some difficulties and also aroused our great interest. First, by exploiting the structure of the system to overcome the difficulties and then utilizing the generated linear equation, we obtain the global well-posedness and precise large-time decay rates. Then, we also consider the stability of Couette flow for the system with zero thermal dissipation in $\mathbb{T} \times \mathbb{R}$. By the enhanced dissipation created by the operator $y\partial_x - \nu\Delta$, we establish the expected stability results.

(6) 王璐

题目: Global Well-Posedness of 3D Navier-Stokes Equations with Variable Viscous Coefficient

简介: In this manuscript, we are concerned with the global well-posedness of 3D inhomogeneous incompressible Navier-Stokes equations with density-dependent viscosity when the initial velocity is sufficiently small in the critical Besov space $\dot{B}_{2,1}^{\frac{1}{2}}$. Compared with the previous result of Abidi and Zhang (Science China Mathematics 58 (6) (2015) 1129-1150), we remove the smallness assumption of the viscosity $\mu(\rho_0) - 1$ in L^∞ -norm.

(7) 杨子亮

题目: Existence of Nontrivial Solutions for the Nonlinear Equation on Locally Finite Graphs

简介: Suppose that $G = (V, E)$ be a locally finite and connected graph with symmetric weight and uniformly positive measure, where V denotes the vertex set and E denotes the edge set. We are concerned with the following problem

$$\begin{cases} -\Delta u + hu = f(x, u), & \text{in } \Omega, \\ u = 0, & \text{on } \partial\Omega, \end{cases}$$

on the graph, where $h: \Omega \rightarrow \mathbb{R}$, $f: \Omega \times \mathbb{R} \rightarrow \mathbb{R}$ and $u: \Omega \rightarrow \mathbb{R}$. When f and h satisfies certain assumption conditions, we can ascertain the existence of one or two nontrivial solutions on the graph.

(8) 张越

题目: Global existence and large-time behavior of compressible two-phase flow

简介: In this talk, I will introduce our recent work on the global existence and large-time behavior of strong solutions to the Cauchy problem for two-phase flow models, including the compressible Euler-Navier-Stokes system and the pressureless Euler-Navier-Stokes system. These results show the effect of the interaction through the drag force on the motion of two fluids.

(9) 梁少琪

题目: 两类趋化模型行波解的谱稳定性研究

简介: 报告主要介绍两类趋化模型行波解的稳定性方面的研究工作。通过应用细致的谱分析、渐近估计、特殊变换和Evans函数, 结合数值模拟, 我们得到在一些指数加权空间中行波解的谱稳定性/不稳定性。

第三组：教二楼927

(1) 张晨

题目：The constant term algebra of type A : the structure

简介：In this paper, we discover a new noncommutative algebra. We refer this algebra as the constant term algebra of type A , which is generated by certain constant term operators. We characterize a structural result of this algebra by establishing an explicit basis in terms of certain forests. This algebra arises when we apply the method of the iterated Laurent series to investigate Beck and Pixton's residue computation for the Ehrhart series of the Birkhoff polytope. This algebra seems to be the first structural result in the area of the constant term world since the discovery of the Dyson constant term identity in 1962.

(2) 张子豪

题目：Fast Evaluation of Generalized Todd Polynomials

简介：The Todd polynomials $td_k = td_k(b_1, b_2, \dots, b_m)$ are defined by their generating

functions $\sum_{k \geq 0} td_k s^k = \prod_{i=1}^m \frac{b_i s}{e^{b_i s} - 1}$. It appears as a basic block in Todd class of a toric variety, which is important in the theory of lattice polytopes and in number theory. We find generalized Todd polynomials arise naturally in MacMahon's partition analysis, especially in Ehrhart series computation. We give fast evaluation of generalized Todd polynomials for numerical b_i 's. In order to do so, we develop fast operations in the quotient ring $\mathbb{Z}_p[[s]]$ modulo s^{d+1} for large prime P . As applications, i) we recompute the Ehrhart series of magic squares of order 6, which was first solved by the first named author. The running time is reduced from 70 days to about 1 day; ii) we give a polynomial time algorithm for Integer Linear Programming when the dimension is fixed, with a good performance.

(3) 徐欣雨

题目：Algebraic Volume for Polytope Arise from Ehrhart Theory

简介：Volume computation for d -polytopes P is fundamental in mathematics. There are known volume computation algorithms, mostly based on triangulation or signed-decomposition of the polytope. We consider the cone $\text{cone}(P)$ over P in view of Ehrhart theory. By using technique from algebraic combinatorics, we obtain an algorithm using only signed simplicial cone decompositions of $\text{cone}(P)$. Each cone is associated with a simple algebraic volume formula. Summing them gives the volume of the polytope. Our volume formula applies to various kind of cases. In particular, we use it to explain the traditional triangulation method and Lawrence's signed decomposition method.

(4) 刘飞虎

题目：A Combinatorial Approach to Frobenius Numbers of Some Special Sequences

简介：The Frobenius problem includes the determination of Frobenius number $g(A)$ and the related Sylvester number $n(A)$ and Sylvester sum $s(A)$. We present a new approach to the Frobenius problem. We illustrate the idea by giving concise proofs of some existing formulas and finding some interesting new formulas of $g(A)$, $n(A)$, $s(A)$. Moreover, we find that MacMahon's partition analysis applies to give a new way of calculating $n(A)$, $s(A)$ by using a rational function representation of a polynomial determined by A . This talk is based on joint work with Guoce Xin.

(5) 陆艺

题目：DNA存储的一种实现方案

简介：本次报告摘要：本次内容来源于2023年猛犸杯国际生命科学数据创新大赛参赛获奖作品。因为相对于传统的存储介质，DNA存储优势为信息密度大、单位能耗低，但纠错成本高、信息读写速度慢。为此，在本次比赛中将通过存储图像来对选手们存储数据的信息密度、兼容性和还原度进行考量。该方案给出一种通过码表对应的方式来实现对图像的存储，并可以达到很好的效果。此外，还会给出一种码表的生成方法，其生成的码表可以纠正事先给定个数的替换、插入和删除错误。

(6) 孙钰博

题目：Codes for correcting deletions

简介：A k -deletion correcting code is a set of binary sequences of length n in which any two distinct sequences do not share one subsequence of length $n-k$. The history of studying the constructions of k -deletion correcting codes dates back to 1966, when Levenshtein proved that the optimal redundancy of any k -deletion correcting code is lower bounded by $(k+o(1)) \log n$ and the celebrated Varshamov-Tenengolts (VT) code is a single-deletion correcting code with at most $\log(n+1)$ bits of redundancy that achieves the lower bound above. Although there is a rich literature on k -deletion correcting codes, the problem of giving an explicit construction with $(k+o(1)) \log n$ bits of redundancy remains unsolved even for $k=2$. In this talk, we will introduce results on deletion correcting codes in the literature as well as our recent improvements.

(7) 顾浩杰

题目：On twisted generalized Reed-Solomon codes with L twists

简介：In this report, we study a class of twisted generalized Reed-Solomon (TGRS) codes with general L twists. A sufficient and necessary condition for the TGRS codes to be MDS or L -MDS ($L < \min\{k, n-k\}$) is determined. A sufficient and necessary condition that such a TGRS code is self-dual for $L \leq \left\lfloor \frac{k-1}{3} \right\rfloor$ is also presented. Finally, we give an explicit construction of self-dual TGRS codes.

(8) 樊淑琼

题目：金属伪影去除相关算法研究

简介：当患者被扫描部位含有金属植入物时，由于金属植入物的高衰减特性，成像过程会受到部分容积效应，散射，噪声，硬化伪影以及光子饥饿等物理效应的影响，导致重建图像出现金属伪影。金属伪影严重破坏了图像内部的结构信息，增加了医生临床诊断的难度。因此，研究如何去除金属伪影，并提高重建图像的质量，具有重要的理论意义和实用价值。现有金属伪影的去除算法大致可以分为四类：投影域修补方法，基于物理模型校正方法，迭代方法以及深度学习方法。投影域修补方法将金属轨迹投影视为被破坏的数据，采用非金属投影插值出金属轨迹处的投影。基于物理模型的校正方法通过对金属伪影的成因建立校正模型来达到去伪影的目的。迭代重建校正方法通过建立合适的优化模型校正金属伪影。深度学习方法通过对神经网络喂入大量数据，通过挖掘数据的先验信息来得到无伪影的图像。现有金属伪影校正方法往往存在伪影校正不彻底或金属植入物附近细节丢失等问题。因此，如何在去除伪影的同时并恢复金属植入物附近细节结构，是提升校正效果的关键。本研究提出了一些校正方法，通过与其他方法进行对比，来验证所提方法的有效性。

(9) 于欣冉

题目：GPU BASED ITERATIVE RECONSTRUCTION ALGORITHM FORMULTI-SCALE 3D HIGH-RESOLUTION CONE BEAM COMPUTED TOMOGRAPHY

简介：Cone beam CT is widely used in defect detection, reverse engineering and tissue analysis due to its high ray utilization and fast scanning speed[1]. However, due to the large amount of cone beam CT scan data, image reconstruction is often time-consuming, especially the iterative class of reconstruction algorithms that require multiple forward and backward projections. With the rapid development of computing hardware, the use of graphics hardware (GPU) has been proposed to improve the reconstruction speed of iterative algorithms. However, the existing acceleration methods still have some deficiencies: (1) Due to the limitation of GPU graphics memory, single GPU devices cannot reconstruct high-resolution 3D CT images; (2) Multi-GPU based acceleration methods need to exchange data among multiple GPUs during forward projection, which affects the reconstruction speed. To address the above deficiencies, this paper proposes a GPU based multi-scale parallel iterative reconstruction method. Theoretically, the method is able to reconstruct arbitrarily high-resolution 3D CT images on a single GPU. For multi-GPU devices, the method does not require data exchange between GPUs, realizing true parallelism and further accelerating the reconstruction speed.

(10) 鲁昕

题目：A ring artifact removal model with dual domain regularization for x-ray computed tomography

简介：**Purpose** Ring artifacts are a common class of artifacts in CT images, which are mainly caused by inconsistent response between detector units. These artifacts can seriously affect measurement and visualized inspection, sometimes even resulting in inaccurate diagnosis of the reconstructed CT image. Therefore, it is crucial to remove ring artifacts without compromising image quality.

Method In order to remove ring artifacts from CT images, we proposed a regularized ring artifact removal model:

$$\arg \min_{x, S^T} \left\{ \frac{1}{2} \| \mathcal{R}(Ax - p) + \mathbf{1} \cdot S^T \|_F^2 + \lambda_1 \| Dx \|_{2,1} + \lambda_2 \sum_i R_i | s_i | \right\}$$

where $p \in R^m$ is real projection data, $m = m_v \times m_b$, m_v is the number of projection view, m_b is the number of detector bins; $x \in R^n$ is the clean reconstructed image, $n = n_x \times n_y$, n_x and n_y are the number of rows and columns of the reconstructed image, respectively; $A \in R^{m \times n}$ is a measurement matrix; $\mathcal{R}(\cdot)$ denotes the operator that resets the vector to matrix; $\mathcal{R}(Ax - p) \in R^{m_v \times m_b}$; $\mathbf{1} \in R^{m_v}$ is the unit column vector; $S \in R^{m_b}$; T represents the transpose operator, and $\mathbf{1} \cdot S^T \in R^{m_v \times m_b}$ is the stripe artifact image; $D = (D_H, D_V)^T \in R^{2n \times n}$ is the finite difference matrix, where $D_H \in R^{n \times n}$ and $D_V \in R^{n \times n}$ are the difference matrices in horizontal and vertical directions, respectively; $Dx \in R^{2n}$; $\| Dx \|_{2,1} = \sum_{i=1}^n ((D_H x)_i^2 + (D_V x)_i^2)^{1/2}$; λ_1 and λ_2 are regularization parameters; R_i is the distance from the i -th detector pixel to the center of the detector, which is used to apply different weights to the pixels at different distances from the center of the detector. s_i is the i -th element of S . An alternating direction method was designed to solve model (1). The advantage of the proposed method is that it considers both the prior information of the reconstructed image and the structural information of the stripe artifacts in the projection domain. On the one hand, it can avoid the incomplete removal of artifacts by focusing only on the structural information of stripe artifacts; on the other hand, it can avoid the destruction of image details by focusing only on the reconstructed image itself.

Result Numerical experiments were performed on the real projection data obtained by the photon counting detector, and some of the reconstruction results are shown in Figure 1. Figure 1(a) shows the result of the FBP method, Figure 1(b) shows the result of the WF method ^[1], Figure 1(c) shows the result of the Wu method ^[2], and Figure 1(d) shows the result of the proposed method. The reconstruction results show that there are slight low-frequency artifacts remain in the result of both the WF method and the Wu method, while the proposed method can remove the ring artifacts in the reconstructed images more effectively and preserve the details of the images.

第四组：教二楼727

(1) 闫安慧

题目：两个经典可积系统的负流及其与正交多项式的关系

简介：首先，我们建立了非等谱Lotka-Volterra格和Toda格的负流，并用Hankel行列式给出了其相应的解。其次，利用正交多项式和对称正交多项式与他们的关系找到了这两个负流的Lax对。此外，我们还发现了非等谱Toda格的负流到非等谱Lotka-Volterra格的负流的变换。

Firstly, we establish the negative flow of the nonisospectral Lotka-Volterra and Toda lattices and present its corresponding solutions in terms of Hankel determinants. Secondly, the Lax pair of these lattices is given in the form of the orthogonal polynomials and symmetric orthogonal polynomials. Besides, we find a transformation from the negative flow of the nonisospectral Toda lattice to the nonisospectral Lotka-Volterra lattice proposed in this paper.

(2) MUHAMMAD KASHIF

题目：The commutative and non-commutative versions of extended KP equation, extended mKP equation and their Miura transformation

简介：We employ the Hirota direct method to derive Pfaffian solutions for both the extended Kadomtsev-Petviashvili (eKP) equation and the extended modified KP (emKP) equation. Additionally, the investigation extends to the establishment of Miura transformations related to these solutions. Furthermore, the non-commutative (NC) counterparts of the extended and emKP equations are considered, yielding quasi-determinant solutions. This study achieves the clarification of Miura transformations linking solutions within the framework of the NC eKP and NC emKP equation.

(3) 刘凡

题目：数学物理中的对称函数

简介：我们简要地回顾了2d杨图对称函数（多项式）（Schur, Jack, Macdonald函数）的定义以及一些重要性质。对称函数理论是研究许多物理模型的重要工具，如一些几何计数模型，矩阵模型（属于KP\Toda孤子方程 τ 函数族）；多粒子长程相互作用的Calogero-Moser-Sutherland及其相对论型模型。对称函数可作为后者（规范变换）守恒量族的共同本征函数。从代数角度，守恒量族的形变（Weyl根系统，超李代数 $U(m|n)$,超变量)可以相应地给出相应对称函数的推广定义；另一方面，对称函数可以作为仿射Yangian或DIM代数的Cartan生成元Fock表示（顶点算子）的基向量。若以双loop代数的MacMahon表示的基视为对称函数在3d杨图上的推广，此类函数的基本性质仍尚未明确。

(4) 娄楷

题目：Higher form symmetry and 't hooft anomaly

简介：A p -form global symmetry is a global symmetry for which the charged operators are of space-time dimension p ; e.g. Wilson lines, surface defects, etc. Many of the properties of ordinary global symmetries ($p = 0$) apply here. Such global symmetries can be coupled to classical background fields and they can be gauged by summing over these fields. They can also have 't Hooft anomalies, which prevent us from gauging them, but lead to 't Hooft anomaly matching conditions. After gauging these symmetries, we can see higher form global symmetries fit into a more general symmetry structure called higher group symmetry.

(5) 张富豪

题目: $W_{1+\infty}$ n -algebra and hierarchies related to Deformed Calogero-Sutherland model

简介: We constructed with $W_{1+\infty}$ n -algebra and hierarchies related to Deformed Calogero-Sutherland model. We obtained Super Hermite polynomials and Super Laguerre polynomials from the known eigenfunctions of the Deformed Calogero Sutherland model. We used operators related to the Deformed Calogero Sutherland model of Hamilton to construct asymmetric super Jack, Hermite, and Laguerre polynomials. We also constructed a higher-order Hamiltonian for the Deformed Calogero Sutherland model.

(6) 王路瑶

题目: W -representation of tensor model

简介: 张量模型最初提出是为了研究它与3维量子引力动力学三角化模型之间的关系。彩色张量模型也作为计算工具出现在3维及更高维随机几何问题的研究中,而且它作为矩阵模型的推广与矩阵模型共享许多特性,所以是一个值得研究的课题。本报告集中讨论张量模型的 W 表示及其应用,具体是亚里士多德张量模型和阶为3的二张量模型。

(7) 吕俏俏

题目: Sharing EPR steering between sequential pairs of observers

简介: The recycling of quantum correlations has attracted widespread attention both theoretically and experimentally. Previous works show that bilateral sharing of nonlocality is impossible under mild measurement strategy and 2-qubit entangled state can be used to witness entanglement arbitrary many times by sequential and independent pairs of observers. However, less is known about the bilateral sharing of EPR steering yet. Here, we aim at investigating the EPR steering sharing between sequential pairs of observers. We show that an unbounded number of sequential Alice-Bob pairs can share the EPR steering as long as the initially shared state is an entangled two-qubit pure state. The claim is also true for particular class of mixed entangled states.

(8) 杨康康

题目: Super-additivity Relations for Quantum Coherence Measures

简介: Super-additivity relation is an elementary issue to characterize the shareability of coherence in multipartite quantum systems within the frame of resource theory of coherence. In this talk, we investigate the super-additivity related to the l_1 -norm of coherence, robustness of coherence and max-relative entropy of coherence in multipartite quantum systems. A category of tighter super-additivity inequalities related to the α -th ($\alpha \geq 2$) power of l_1 -norm coherence is presented for N-qubit states.

(9) 王珂珂

题目: Operational entanglement detection based on lamata -moments

简介: We introduce lamata-moments with respect to any positive map. We show that these lamata-moments can effectively characterize the entanglement of unknown quantum states without their prior reconstructions. Based on lamata-moments necessary and sufficient separability criteria, as well as necessary optimized criteria are presented, which include the ones in Yu et al. (Phys Rev Lett127:060504, 2021) as special cases. Detailed example is given to show that our criteria can detect bound entanglement that cannot be identified by positive partial transpose criterion, with the explicit measurement operators

to experimentally measure the corresponding lamata-moments.

(10) 沈中喜

题目：General monogamy and polygamy relations of arbitrary quantum correlations for multipartite systems

简介：Monogamy and polygamy of quantum correlations are the fundamental properties of quantum systems. We study the monogamy and polygamy relations satisfied by any quantum correlations in multipartite quantum systems. General monogamy relations are presented for the α -th ($0 \leq \alpha \leq 1, \gamma \geq 2$) power of quantum correlation, and general polygamy relations are given for the β -th ($\beta \geq \delta, 0 \leq \delta \leq 1$) power of quantum correlation. We show that these newly derived monogamy and polygamy inequalities are tighter than the existing ones. By applying these results to specific quantum correlations such as concurrence and the square of convex-roof extended negativity of assistance (SCRENoA), the corresponding new classes of monogamy and polygamy relations are obtained, which include the existing ones as special cases. Detailed examples are given to illustrate the advantages of our results.

(11) 徐聪

题目：Uncertainty of quantum channels via modified generalized variance and modified generalized Wigner–Yanase–Dyson skew information

简介：Uncertainty relation is a fundamental issue in quantum mechanics and quantum information theory. By using modified generalized variance (MGV), and modified generalized Wigner–Yanase–Dyson skew information (MGWYD), we identify the total and quantum uncertainty of quantum channels. The elegant properties of the total uncertainty of quantum channels are explored in detail. In addition, we present a trade-off relation between the total uncertainty of quantum channels and the entanglement fidelity and establish the relationships between the total uncertainty and entropy exchange/coherent information. Detailed examples are given to the explicit formulas of the total uncertainty and the quantum uncertainty of quantum channels.