Last name	First name	Institution	Title	Abstract	Status
Alpan	Gokalp	rice university	Orthogonal polynomials on generalized Julia sets	Generalized polynomial Julia sets are constructed via composition of infinitely many polynomials. We review asymptotics of orthogonal polynomials associated with equilibrium measures of these sets.	Postdoctoral researcher
Bucaj	Valmir	Rice University	Spectral localization for Bernoulli-Anderson model via positivity and large deviations for the Lyapunov exponent	In this talk we provide a complete and self-contained proof of spectral localization for the one-dimensional Anderson model, starting from the positivity of the Lyapunov exponent provided by F\"urstenberg's theorem, and a large deviation theorem. Joint work with: David Damanik, Jake Fillman, Vitaly Gerbuz, Tom VandenBoom, Fengpeng Wang, Zhenghe Zhang	PhD student
Chong	Jacky	University of Maryland	Dynamics of Large Boson Systems with Attractive Interaction and a Derivation of the Cubic Focusing NLS in R^3	We consider a many-body Boson system with short range two-body interaction given by $v_N(x)=N^{3\beta} v(N\beta x)$ where v is sufficiently smooth, without a definite sign, for some range of the scaling parameter β. Our main goal is to extend the results of Grillakis, Machedon and Kuz regarding the second-order correction to mean field evolution of coherent states in the Fock space to the case of attractive interaction for $0<\beta<1/2$. The two key ingredients in our extension to this case of indefinite sign potentials are the proofs of the uniform existence of global solutions to a family of Hartree-type equations and the corresponding L^∞-decay estimates on the solutions. Inspired by the recent works of X. Chen & J. Holmer, we also provide both a derivation of the focusing nonlinear Schrodinger equation (NLS) in 3D from the many-body Boson system and a rate of convergence toward mean field. In particular, we provide two derivations of the focusing NLS using both the pair excitation method and a method introduced by Pickl. For the latter method, we prove a regularity condition for the solution to the NLS which subsequently feeds into the works of Pickl. As a consequence, we are able to give a rigorous derivation of the focusing cubic NLS in R^3 for $0<\beta<1/6$. .	PhD student

Debray	Arun	UT Austin	The Low-energy Limit of the Generalized Double Semion Model	The generalized double semion model, introduced by Freedman and Hastings, is a lattice field theory similar to the toric code, with a gapped Hamiltonian whose space of ground states depends on the topology of the ambient manifold. In this talk, I'll explain how to geometrically reformulate it as a lattice gauge theory and calculate its low-energy limit, which is a topological field theory, in terms of characteristic classes of the ambient manifold. If time permits, I'll discuss a connection to a class of symmetry-protected topological phases. Collaborators: Thomas Chen and Nataša Pavlović	PhD student
Denlinger	Ryan	University of Texas at Austin	The Wigner transform approach to kinetic theory: a partial review and new results	Talk Abstract: The Wigner transform is a mathematical device, largely similar to the Fourier transform, which relates classical descriptions (positions, velocities, ...) to quantum descriptions (wavefunctions, density matrices, ...) of the physical world. For example, a Schrődinger equation will typically be converted into a kinetic (transport) equation under the Wigner transform. The Wigner transform has found many applications in the physics and mathematics literature, and we will touch on one or two interesting examples. We will conclude with some new approaches to standard problems in kinetic theory, including questions surrounding local well-posedness for the Boltzmann equation. We hope to convince the audience that the Wigner transform provides a useful conduit for transferring tools from dispersive PDE to the context of kinetic theory.	Postdoctoral researcher
Fischbacher	Christoph	University of Alabama at Birmingham	Droplet states in the XXZ model on general graphs	We consider the XXZ model on general graphs and show its equivalence to a direct sum of discrete many-particle Schroedinger operators of hard-core bosons with an attractive interaction that can be expressed using so called symmetric graph products. In particular, we will consider the XXZ model on strips and in higher dimension for which the Bethe ansatz does not provide an exact solution. We will also discuss the existence of a lowest separated energy band (the droplet band) and its separation from higher spectral contributions. This is joint work with G. Stolz, UAB.	Postdoctoral researcher

Girotti	Manuela	Colorado State University	Smallest singular value distribution and large gap asymptotics for products of random matrices	We study the distribution of the smallest singular eigenvalue for the finite product of certain random matrix ensemble, in the limit where the size of the matrices becomes large. The limiting distributions can be expressed as Fredholm determinants of certain integral operators, and generalize in a natural way the extensively studied hard edge Bessel kernel determinant. We will express such quantities in terms of a 2x2 Riemann-Hilbert problem, and use this representation to obtain so-called large gap asymptotics. This is a joint work with Tom Claeys (UC Louvain) and Dries Stivigny (KU Leuven).	Postdoctoral researcher
Harrison	Jon	Baylor University	Relating zeta functions of discrete and quantum graphs	Spectral graph theory relates graph properties to the spectrum of the discrete Laplace operator of a graph. While in mathematical physics, the spectrum of a Laplace operator on a network of intervals (a quantum graph) provides a model of quantum mechanics in systems with complex geometry. It is then natural to ask to what extent the two are related. We tackle this question for spectral zeta functions of the discrete and quantum graphs. As an application we investigate the class of complete bipartite graphs where the zeta function can be used to evaluate the spectral determinant and vacuum energy of the quantum graph. This is joint work with Tracy Weyand.	Associate Professor
He	Siming	University of Maryland, College Park	Suppression of Chemotactic blow up through fluid flow	We study the parabolic-elliptic Patlak-Keller-Segel models in T^d, with d=2,3 with the additional effect of advection by a large shear flow. Without the shear flow, the model is L^1 critical in two dimensions with critical mass 8π solutions with mass less than 8π are global and solutions with mass larger than 8π with finite second moment, all blow up in finite time. In three dimensions, the model is L^1 supercritical; there exists solutions with arbitrarily small mass which blow up in finite time arbitrarily fast. We show that the additional shear flow, if it is chosen sufficiently large, suppresses one dimension of the dynamics and hence can suppress blow-up. Joint work with Jacob Bedrossian.	PhD student

				Joint work with Ioannis Anapolitanos and Dirk Hundertmark (KIT, Germany). In 1925, Bose and Einstein postulated the condensation of Bosons at low temperatures. It took 70 years, to experimentally verify this condensation. However, mathematicians have been trying to rigorously establish this condensation in the formulation of quantum statistics. The derivation of the Hartree equation from many-body systems of Bosons in the mean field limit has been very intensively studied in the last 3 decades. However, very few results exist showing convergence of the k-th marginal of the N-body density matrix to the projection to the k-fold tensor product of the solution of the Hartree equation in stronger trace norms like the energy trace norm. This issue is from a physical view point very important: One can then approximate expectation values of certain observables of the N-body system by means of the Hartree equation, with relaxation of the very restrictive assumption that the observables are bounded operators. I will give a brief introduction into the concept of BEC, discuss some recent results and then show how one can upgrade previous results by using simple interpolation.	
Hott	Michael	UT Austin	An interpolation result for the convergence to the Hartree dynamics in Sobolev trace norms		PhD student
Hulko	Artem	UNC Charlotte	On the number of eigenvalues of the discrete one-dimensional Schr\"odinger operator with a complex potential	We study the eigenvalues of the discrete Schr\"odinger operator with a complex potential. We use the trace formula approach to obtain bounds on the total number of eigenvalues in the case where V decays exponentially at infinity. Coauthor: Robert M. Strain, Professor at the University of Pennsylvania Department of Mathematics.	PhD student
Jang	Jin Woo	IBS - Center for Geometry and Physics	On the relativistic Boltzmann equation without angular cutoff	Abstract: We establish here global-in-time well-posedness and stability results for solutions nearby the relativistic Maxwellian to the special relativistic Boltzmann equation without angular cutoff. We work in the case of a spatially periodic box. We assume the generic soft-potential conditions on the collision kernel in that were derived by Dudynski and Ekiel-Jezewska (Commun Math Phys 115(4):607-629, 1985). In this physical situation, the angular function in the collision kernel is not locally integrable, and the collision operator behaves like a non-isotropic fractional diffusion operator.	Postdoctoral researcher

Kha	Minh	University of Arizona	Liouville-Riemann-Roch theorem on abelian coverings	The classical Riemann-Roch theorem has been extended by M. Gromov and M. Shubin to computing indices of elliptic operators on compact (as well as non-compact) manifolds, when a divisor mandates a finite number of zeros and allows a finite number of poles of solutions. On the other hand, Liouville type theorems count the number of solutions that allow to have a ``pole at infinity.'' Usually these theorems do not provide the exact dimensions of the spaces of such solutions (only finite-dimensionality, possibly with estimates of the dimension). An important case has been discovered by M. Avellaneda - F. H. Lin and J. Moser - M. Struwe. It pertains periodic elliptic operators of divergent type, where exact dimensions can be computed. This study has been extended for the case of periodic elliptic operators on co-compact abelian coverings by P. Kuchment - Y. Pinchover. Comparison of the results and techniques of Gromov and Shubin and of Kuchment and Pinchover shows significant similarities in the techniques, as well as appearance of the same combinatorial expressions in the answers. Thus a natural idea was considered that possibly the results could be combined somehow in the case of co-compact abelian coverings, if the infinity is added to the divisor. In this talk, I will present some of such results in this direction. This talk is based on the joint work with P. Kuchment.	Postdoctoral researcher
Krupa	Sam	UT Austin	Single Entropy Condition for Burgers Equation via the Relative Entropy Method	Existence and uniqueness for solutions to scalar conservation laws with convex flux is well known when the solutions are entropic for the large family of Kruzhkov entropies. It is a more recent result that only one entropy condition is enough to ensure uniqueness. The first proof was by Panov in 1994, followed by a second proof by De Lellis, Otto and Westdickenberg in 2004. We give a new proof of this result. Unlike the previous results, we do not use the Hamilton-Jacobi equation. We work directly on the conservation law. Our method is the relative entropy method. This is joint work with A. Vasseur.	PhD student

Lopez	Juan	University of Houston	Finite energy solutions of axisymmetric div-curl systems on bounded domains	Some results on the finite energy solutions of axisymmetric div-curl problems are presented. Representation of the solution in terms of special eigenfunctions yield sharp energy estimates whose best constants are determined using the corresponding eigenvalues. In particular, the best constants for the energy estimates dependent on the boundary data come from harmonic Steklov-type eigenproblems.	PhD student
Meshkova	Yulia	St. Petersburg State University (Russia)	Operator estimates for homogenization of periodic hyperbolic systems	The talk is devoted to homogenization of periodic differential operators (DO's). In $L_2(\mathbb{R}^d;\mathbb{C}^n)$, we consider a matrix elliptic second order differential operator A_ε given in a factorized form. The coefficients of the operator A_ε are periodic and depend on $\mathbf{x}/\varepsilon$. So, they oscillate rapidly as $\varepsilon\rightarrow 0$. Our main result is approximation of the operator $A_\varepsilon ^{-1/2}\sin(t A_\varepsilon^{1/2})$ in the $(H^2\rightarrow H^1)$-operator norm. The results are applied to homogenization of periodic hyperbolic systems. We use the spectral approach to homogenization problems deloped by M. Sh. Birman and T. A. Suslina. The method is based on the scaling transformation, the Floquet-Bloch theory and analytic perturbation theory. It turns out that homogenization is a spectral threshold effect at the bottom of the spectrum. (See arXiv:1705.02531)	PhD student
Morales	Pedro	UT Austin	Spectral zeta function and vacuum energy of perturbed warped manifolds	We study the spectral zeta function associated with the Laplace operator on a warped manifold whose warping function contains a localized perturbation. In particular, we outline a simple method for analyzing how the spectral zeta function changes due to the presence of the perturbation.The results obtained for the spectral zeta function are then used to examine the effect that a localized perturbation of the warping function has on the vacuum energy of a scalar field propagating on a perturbed warped manifold.	Lecturer
Simanek	Brian	Baylor University	Geronimus Polynomials and Chebyshev Polynomials	The Geronimus polynomials are orthogonal on the unit circle and correspond to a constant sequence of Verblunsky coefficients. We provide a convenient formula for these polynomials in terms of Chebyshev polynomials and discuss some applications of this formula. The most substantial application is a universality result at the endpoint of an arc for measures that are perturbations of Geronimus weights.	Assistant Professor (TT)

Sukhtaiev	Selim	Rice University	The Maslov index and the spectra of second order elliptic operators	In this talk I will discuss a formula relating the spectral flow of the one-parameter families of second order elliptic operators to the Maslov index, the topological invariant counting the signed number of conjugate points of certain paths of Lagrangian planes. In addition, I will present formulas expressing the Morse index, the number of negative eigenvalues, in terms of the Maslov index for several classes of second order differential operators. The talk is based on joint work with Yuri Latushkin.	Postdoctoral researcher
Swindle	Erica	Baylor University	Quantum Circulant Graphs	A quantum graph is a metric graph paired with a differential operator acting on functions on the graph. Quantum graphs can serve as a useful model for a variety of applications in mathematical physics because they are relatively simple but can effectively model many complex systems. We study quantum circulant graphs, which is a class of graphs having a circulant adjacency matrix. Circulant graphs can be described as a collection of interwoven cycles and are a natural extension of star graphs. We are interested in studying the operator spectra of these graphs. Specifically, we seek to find a secular equation, an equation whose roots are the eigenvalues of the graph. One useful application of the secular equation is to calculate the spectral zeta function, which can be used to compute vacuum energy and the spectral determinant. This is joint work with my advisor, Dr. Jon Harrison.	PhD student
Tian	Jing	Towson University	On the Solutions of the 2D Navier-Stokes Equations with Constant Energy and Enstrophy	It is not yet known if the global attractor of the space periodic 2D Navier-Stokes equations contains nonstationary solutions u(x; t) such that their energy and enstrophy per unit mass are constant for every t. In this work, we introduce and study geometric structures shared by all ghost solutions.This study led us to consider a subclass of ghost solutions for which those geometric structures have a supplementary stability property. This is a joint work with Bingsheng Zhang	Assistant Professor (TT)
VandenBoom	Tom	Rice University	Reflectionless discrete Schroedinger operators are spectrally atypical	Abstract: We prove that, if an isospectral torus contains a discrete Schroedinger operator with nonconstant potential, the shift dynamics on that torus cannot be minimal. Consequently, we specify a generic sense in which finite unions of nondegenerate closed intervals having capacity one are not the spectrum of any reflectionless discrete Schroedinger operator. We also show that the only reflectionless discrete Schroedinger operators having zero, one, or two spectral gaps are periodic.	PhD student

Wang	Wei	University of Science and Technology Beijing	Repulsion effect on superinfecting virions by infected cells for virus infection dynamic model with absorption effect and chemotaxis	A mathematical model for virus infection dynamics with absorption effect and chemotaxis is proposed to study the repulsion effect on superinfecting virions by infected cells. The basic reproduction number R_0 is established. The threshold dynamics can be expressed by the basic reproduction number R_0 in a bounded domain. It is shown that the infection-free steady state E_0 is asymptotically stable if $R_0<1$, and the virus is uniformly persistent if $R_0>1$ in the case of spatially heterogeneous infections. The stability properties and Turing instability have been extensively discussed for the case of spatially homogeneous infections. In addition, the existence of the travelling wave solutions is discussed in unbounded domains and numerical simulations are carried out to illustrate our main results.	PhD student
Zhao	Zhihong	University of Science and Technology Beijing	Symmetry analysis of reaction diffusion equation with distributed delay	We study the reaction–diffusion equation with distributed delay from the Lie group theoretic point of view. At first, we give the evolutionary infinitesimal vector field v, then we can find a number of group invariant solutions corresponding to v by applying the symmetry group theory.	Postdoctoral researcher
Zhao	Donghong	University of Science & Technology Beijing	A model combining a total variation and a fractional-order filter	In this talk, we propose an adaptive combination model of the total variation and the fractional-order variation model for image restoration. The primal-dual hybrid gradient algorithm is employed to solve this combined energy functional minimization problem. In our study, we reorder the image matrices into the vectorby discretization, and the Laplacian will be represented as a multiplication of vector and matrix. Numerical results show that our proposed model and algorithm have good performance both in improving peak signal to noise ratio of images and protecting image details such as edges and textures.	Postdoctoral researcher