CARL VON OSSIETZKY universität OLDENBURG
FAKULTÄT V
MATHEMATIK UND NATURWISSENSCHAFTEN

IfM INSTITUT FÜR MATHEMATIK

Geometric Singular Analysis and Mathematical Physics

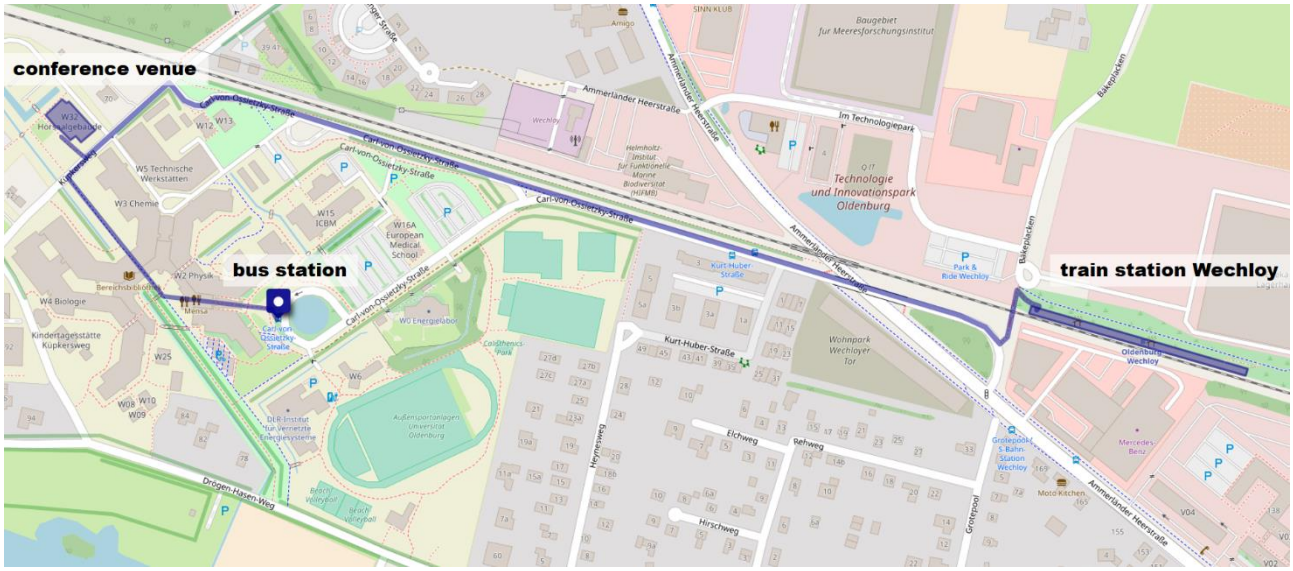
Conference 17th to 21st of September 2018

Schedule

All talks will take place in room W32 0-005

	Monday		Tuesday		Wednesday		Thursday		Friday
09^{00}-09^{30}	**Registration**								
09^{30}-10^{10} 10^{15}-10^{55}	Mazzeo Dai	9^{00}-9^{40} 9^{45}-10^{25}	Rochon Müller	9^{00}-9^{30} 9^{35}-10^{05}	Bahuaud Baskin	9^{00} - 9^{40} 9^{45}-10^{25}	Tosatti Degeratu	9^{00}-9^{30} 9^{35}-10^{05}	McDonald Rowlett
	Coffee		**Coffee**	10^{10}-10^{40}	Datchev **Coffee**		**Coffee**	10^{10}-10^{40}	Kröncke **Coffee**
11^{30}-12^{10} 12^{15}-12^{55}	Melrose Kottke	11^{00}-11^{40} 11^{45}-12^{25}	Zelditch Piazza	11^{10}-11^{40} 11^{45}-12^{15} 12^{20}-12^{50}	Fedosova Sher Swoboda	11^{00}-11^{40} 11^{45}-12^{25}	Strohmeier Schrohe	11^{10}-11^{50} 11^{55}-12^{35}	Pluda Savin
	Lunch		**Lunch**		**Lunch**		**Lunch**		**Lunch**
14^{30}-15^{10} 15^{15}-15^{55}	Mendoza Lesch	14^{30}-15^{10} 15^{15}-15^{55}	Vasy Hintz		**Tourism**	14^{30}-15^{10} 15^{15}-15^{55}	Böhm Tuschmann	14^{00}-14^{40} 14^{45}-15^{25}	Singer Andersen
	Coffee		**Coffee**				**Coffee**		
16^{30}-17^{10} 17^{15}-17^{55}	Albin Brüning	16^{30}-17^{10} 17^{15}-17^{55}	Ma Wendl			16^{30}-17^{10} 17^{15}-17^{55}	Bismut Ludwig		
	Reception						Conf. **Dinner**		

Direction to the institute



How to get to the conference venue:

From the center of Oldenburg or the central train station (Oldenburg Hauptbahnhof) take bus 306 in direction ‚Universität' and get off at the last stop, which is called Carl-von-Ossietzky Straße. Do NOT get off at the stop ‚Universität A'! The bus takes about 13 minutes and it runs every 15 minutes. There will be signs directing you from the bus stop to the conference venue. The walk takes about 5-8 minutes.

If you arrive by train (e.g. from Bremen or Bad Zwischenahn) then you may consider using the S-Bahn (NWB RS3) to Oldenburg-Wechloy. From there it is a 15 minute walk to the conference venue, see the map. This train runs once an hour.

List of abstracts

Pierre Albin (University of Illinois at Urbana-Champaign)

The families index formula on stratified spaces

Abstract: Stratified spaces arise naturally even when studying smooth objects, e.g., as algebraic varieties, orbit spaces of smooth group actions, and many moduli spaces. There has recently been a lot of activity developing analysis on these spaces and studying topological invariants such as the signature. I will report on joint work with Jesse Gell-Redman in which we study families of Dirac-type operators on stratified spaces and establish a formula for the Chern character of their index bundle.

Jørgen Ellegaard Andersen (Aarhus University)

Geometric Recursion

Abstract: Geometric Recursion is a very general machinery for constructing mapping class group invariants objects associated to two dimensional surfaces. After presenting the general abstract setup we shall see how a number of constructions in low dimensional geometry and topology fits into this setting. These will include the Mirzakhani-McShane identies and Zeta-like functions based on the simpel closed geodesic length spectrum. We shall see how Geometric Recursion provides us with a kind of categorification of Topological Recursion, namely any application of Topological Recursion can be lifted to a Geometric Recursion setting involving continuous functions on Teichmüller space, where the connection back to Topological Recursion is obtained by integration over the moduli space of curve. We will end the talk by applying the machinery to obtain interesting results on expectation values of various statistics of length of simple closed geodesic over moduli spaces of hyperbolic surfaces. The work presented is joint with G. Borot and N. Orantin.

Eric Bahuaud (Seattle University)

Low regularity Poincare-Einstein metrics

Abstract: A C^2 conformally compact Einstein metric has sectional curvature decay to -1 up to corrections that are quadratic in the boundary defining function. In this talk I'll discuss the relationship between curvature decay rate of a generic asymptotically hyperbolic metric and the regularity of the conformal compactification. I then discuss ongoing work with John M Lee that proves the existence of a low regularity conformally compact Einstein metrics with quadratic hyperbolic curvature decay.

Dean Baskin (Texas A&M University)

Diffraction for the Dirac equation with Coulomb-like potentials

Abstract: The Dirac equation describes the relativistic evolution of electrons and positrons. We consider the (time-dependent!) Dirac equation in three dimensions coupled to a potential with Coulomb-type singularities. We describe the structure of the propagator for this equation and show that singularities are typically diffracted by the singularities of the potential. We finally compute the symbol of the diffracted wave. This talk is based on joint work with Oran Gannot and Jared Wunsch.

Jean-Michel Bismut (Université Paris-Sud, Ortsay)

Analytic torsion and characteristic classes

Abstract: As its name indicates, analytic torsion is an analytic invariant. A form of the Cheeger-Müller theorem asserts that if properly understood, it localizes on the critical points of Morse functions.
Following earlier work with Lott and Goette, we will explain on one hand how it is compatible with the theory of direct images, where the Todd class is replaced by the Euler class. Also we will describe the construction of differential geometric invariants on compact manifolds equipped with a group action, which have formally the same properties as the analytic torsion, i. e., they tend to localize on critical points of invariant Morse-Bott functions. We will also explain how such differential geometric invariants appear in formulas involving analytic torsion itself, in exact or in asymptotic form.

Christoph Böhm (Universität Münster)

Immortal homogeneous Ricci flows

Abstract: We show that for an immortal homogeneous Ricci flow solution any sequence of parabolic blow-downs subconverges to a homogeneous expanding Ricci soliton. This is established by constructing a new Lyapunov function based on curvature estimates which come from real geometric invariant theory.

Jochen Brüning (Humboldt-Universität zu Berlin)

Titel & Abstract: t. b. a.

Xianzhe Dai (University of California, Santa Barbara)

Perelman's Functional for Manifolds with Conical Singularity

Abstract: We study Perelman's functionals for manifolds with conical singularity and establish the existence and some basic properties and their possible applications to Ricci flow.

Kiril Datchev (Universität Purdue)

Lower resolvent bounds and wave non-decay far away from trapped sets

Abstract: We study the wave equation on Euclidean space with smooth wavespeed which is constant outside of a compact set. Local energy (i.e. energy over a bounded spatial region) decays in time, in a way dependent on the dynamics of the rays of geometric optics. For example, if there is no trapping (i.e. if all rays escape to spatial infinity), then the local energy is square-integrable in time, regardless of the bounded region. Otherwise the square-integrability may hold only for bounded regions away from the trapping.
We give examples showing that the distance may be arbitrarily large between the set where trapping occurs and the set where local energy is square-integrable in time. In our radial examples this distance has a natural interpretation in terms of convexity and concavity of spheres. This talk is based on joint work with Long Jin.

Anda Degeratu (Universität Stuttgart)

Special Kähler metrics on elliptic surfaces

Abstract: Gluing techniques have been establishing themselves as a standard, albeit difficult, approach for obtaining geometrical objects with special properties. In this talk, I will focus on this technique in the context of Kähler metrics with constant scalar curvature on elliptic surfaces. The first requirements for this program are to have enough models for such metrics and to figure out the obstructions for gluing them together into metrics with desired properties. This is joint work with Michale Singer and Joel Fine.

Ksenia Fedosova (Albert-Ludwigs-Universität Freiburg)

Eisenstein series twisted by representations with non-expanding cusp monodromy

Abstract: In this talk, we investigate the behavior of the Eisenstein series, or generalized eigenfunctions of the Laplace operator on hyperbolic surfaces. We twist them by a (possibly) non-unitary representation of the fundamental group of the manifold, show their convergence on some half-plane and study their Fourier expansion.

Peter Hintz (University of California, Berkeley)

Stability of Minkowski space and asymptotics of the metric

Abstract: I will explain a new proof of the non-linear stability of the Minkowski spacetime as a solution of the Einstein vacuum equation. The proof relies on an iteration scheme at each step of which one solves a linear wave-type equation globally. The analysis takes place on a suitable compactification of $\mathbb{R}^4$ to a manifold with corners whose boundary hypersurfaces correspond to spacelike, null, and timelike infinity; I will describe how the asymptotic behavior of the metric can be deduced from the structure of simple model operators at these boundaries. This talk is based on joint work with András Vasy.

Chris Kottke (New College of Florida)

Compactification of monopole moduli spaces

Abstract: I will discuss joint work with Michael Singer and Karsten Fritzsch on compactifications of the moduli spaces M_k of $SU(2)$ magnetic monopoles on R^3. Via a geometric gluing procedure, we construct manifolds with corners compactifying the M_k, the boundaries of which represent monopoles of charge k decomposing into widely separated 'monopole clusters' of lower charge. The hyperkahler metric on M_k has a complete asymptotic expansion, the leading terms of which generalize the asymptotic metric discovered by Bielawski, Gibbons and Manton in the case that the monopoles are all widely separated. The manifolds with corners can alternatively be seen as resolving a smaller family of compactifications of the M_k as stratified spaces, with 'quasi-fibered boundary' type metrics.

Klaus Kröncke (Universität Hamburg)

Stability of Ricci de Turck flow on Singular Spaces

Abstract: We establish stability of the Ricci de Turck flow near Ricci-flat metrics with isolated conical singularities. More precisely, we construct a Ricci de Turck flow which starts sufficiently close to a Ricci-flat metric with isolated conical singularities and converges to a singular Ricci-flat metric under an assumption of integrability, linear and tangential stability. We provide a characterization of conical singularities satisfying tangential stability and discuss examples where the integrability condition is satisfied. This is joint work with Boris Vertman.

Matthias Lesch (Universität Bonn)

The resolvent expansion of geometric operators on singular spaces

Abstract: In this overview talk I will review the "direct" approach to the resolvent expansion of Laplace type operators on certain singular spaces. The paradigm is that on the model singularity one has a second order Sturm-Liouville operator with operator valued coefficients. This point of view has the advantage of being very elementary, microlocal analysis is only needed in the smooth interior. In an outlook I will sketch a programme for proving the resolvent expansion on a general stratified space with iterated cone-edge singularities. This is an ongoing project with Boris Vertman and Luiz Hartmann.

Ursula Ludwig (Universität Duisburg-Essen)

An Extension of a Theorem by Cheeger and Müller to Spaces with Isolated Conical Singularities

Abstract: An important comparison theorem in global analysis is the comparison of analytic and topological torsion for smooth compact manifolds equipped with a unitary at vector bundle. It has been conjectured by Ray and Singer and has been independently proved by Cheeger and Müller in the 70ies. Bismut and Zhang combined the Witten deformation and local index techniques to generalize the result of Cheeger and Müller to arbitrary at vector bundles with arbitrary Hermitian metrics. The aim of this talk is to present an extension of the Cheeger-Müller theorem to spaces with isolated conical singularities by generalising the proof of Bismut and Zhang to the singular setting.

Xiaonan Ma (Université Paris VII, Paris-Diderot)

Comparison of two equivariant eta forms

Abstract: In 2000, Goette compared two equivariant eta invariants in the sense of formal power series when the group action is locally free. Thus he got the the singular behavior of the equivariant eta invariantnear the identity element. In this talk, we explain the general comparison formula for two equivariant eta invariants. This is a joint work with Bo Liu, and this result is used in our recentwork on the localization formula of the equivariant eta invariants

Rafe Mazzeo (Stanford University)

Spherical cone metrics

Abstract: A long-standing problem has been to classify the constant curvature metrics on surfaces with conic singularities. This turns out to be particularly subtle for metrics with constant positive curvature (the spherical case) with cone angles larger than 2π. This problem has roots in many problems in complex analysis, but is also tied to new developments in geometric analysis and elsewhere. I will report on new progress, joint with X. Zhu, on some surprising features of the moduli space of solutions, and a set of techniques which should be relevant for other related problems.

Patrick McDonald (New College of Florida)

Geometric Properties of Heat Content

Abstract: The heat content of a compact Riemannian manifold with boundary is the integral of the fundamental solution of the Dirichlet Laplacian. It is a Riemannian invariant that is non-spectral, but closely related to the heat trace. Like the heat trace, heat content can be studied when the boundary of the ambient space is not smooth. In this talk we will discuss results where the heat content and heat trace behave in a similar fashion, and examples where their behavior is different. As an example where the invariants behave in a similar fashion, we will discuss recent results establishing that both determine planar triangles and both detect corners. As an example where they differ we provide examples of isospectral planar domains and quantum graphs that are distinguished by heat content.

Richard B. Melrose (Massachusetts Institute of Technology)

Stratification and Compactification

Abstract: I will describe several cases of the compactification of a non-compact space by the addition of a resolved stratification -- corresponding to an iterated boundary fibration -- and corresponding geometric structures. In particular for reductive Lie groups this leads to interesting convolution algebras.

Gerardo Mendoza (Temple University, Philadelphia)

Elliptic operators on compact manifolds with simple strata

Abstract: I'll present joint work with T.~Krainer on the nature of the closed extensions of the operators of an elliptic first order complex of cone operators. The main difficulty lies in that the individual operators are not elliptic (if the complex has more that one term) so distinguishing between the minimal and maximal domains by the boundary behavior is not immediate. It is easy to see that, for a given degree, elements of the maximal domain modulo the minimal domain are represented by so called singular elements. The key to which of the latter actually represent non-zero elements of the quotient is the non-degeneracy of a certain pairing in cohomology. The characterization of the minimal domain is a combination of a regularity argument and a representaiton argument. If time permits, I'll also give some applications.

Werner Müller (Universität Bonn)

Analytic torsion and cohomology of arithmetic groups

Abstract: I am reporting on joint work with Frederic Rochon. For hyperbolic manifolds of finite volume we obtained a formula relating the regularized analytic torsion of the hyperbolic manifold and the Reidemeister torsion of its Borel-Serre compactification. Following ideas of Bergeron and Venkatesh, we apply this formula to obtain lower bounds forthe growth of the torsion subgroup in the cohomology of the hyperbolic manifold with coefficients in certain integral local systems. I also will discuss possible generalizations to higher rank and some open problems.

Paolo Piazza (Sapienza Università di Roma)

Singular structures and K-theory invariants of Dirac operators

Abstract: Let M be a compact manifold without boundary. If M is spin and g is a positive scalar curvature metric, then we can define the rho class associated to g: $\rho(g)$. It is an element in the K-theory of the Higson-Roe algebra. Similarly, if $f : V -> M$ is a smooth homotopy equivalence, we can define the rho class associated to f, $\rho(f)$, and this is an element in the same K-theory group. These classes play a fundamental role in distinguishing metrics of positive scalar curvature up to concordance or in distinguishing homotopy equivalences up to h-cobordism. In this talk I will explain how a suitable elliptic theory allows for the generalisation of these results to smoothly stratified spaces. This is joint work with Pierre Albin. At the end I will also briefly explain how a different treatment of these results can be given, using groupoids and how this approach allows for the treatmentof more singular structures, such as manifolds with foliated boundaryThis is joint work with Vito Felice Zenobi.

Alessandra Pluda (Universität Regensburg)

Evolution of network with multiple junctions

Abstract: A regular network is a finite union of sufficiently smooth curves whose end points meet in triple junctions. We will present the state-of-the-art of the problem of the motion by curvature of a regular network of curves in the plane mainly focusing on singularity formation. Then we will discuss the need of a "restarting" theorem for networks with multiple junctions of order bigger than three and we will give an idea of a possible strategy to prove it.

Frédéric Rochon (Université du Québec à Montréal)

Analytic torsion and Reidemeister torsion on hyperbolic manifolds with cusps

Abstract: On an odd-dimensional oriented hyperbolic manifold of finite volume with strongly acyclic coefficient systems, we will indicate how to derive a formula relating analytic torsion with the Reidemeister torsion of the Borel-Serre compactification using analytic surgery methods. This is a joint work with Werner Müller.

Julie Rowlett (Chalmers University of Technology, Gothenburg)

Variational formulas for the Selberg zeta function and applications to curvature asymptotics (based on joint work with K. Fedosova and G. Zhang)

Abstract: We will begin by introducing the Selberg zeta function and its relatives. We will then recall the geometric setting of our work, the Teichmüller space of Riemann surfaces of genus, g. As shown by Zograf and Takhtajan, the Selberg trace formula connects the Ricci curvature of the Hodge bundle $H^0(K^m)$ over Teichmüller space together with the second variation of the Selberg zeta function at integer points. We will investigate the behavior of the Selberg zeta function, $Z(s)$, as a function on Teichmüller space. We will deduce an explicit formula for the second variation of $\log(Z(s))$ via a certain infinite sum involving lengths of closed geodesics of the underlying surface and their variations. We will then utilize this formula to study the asymptotics of the second variation of $\log(Z(s))$ as $s \to \infty$. We shall see that the most prominent role is played by the systole geodesics. Moreover, the dimension of the kernel of the first variation of the latter appears in the signature of the Hessian of $\log(Z(s))$ for large s. In conclusion, we will show how our variational formula and its asymptotics have interesting implications for the curvature of the Hodge bundle and its relationship to the Quillen curvature.

Anton Savin (RUDN University, Moscow, Russia)

On the homotopy classification of a class of nonlocal elliptic boundary value problems

Abstract: An important role in the solution of the index problem for elliptic operators is played by the homotopy classification, i. e., by the computation of the group of stable homotopy classes of elliptic operators. Such classification was first obtained on a closed smooth manifold by Atiyah and Singer in terms of topological K-groups of the cotangent bundle of the manifold. Homotopy classifications were later obtained in a number of other interesting situations (on manifolds with boundary, stratified manifolds, manifolds with polycylindrical ends, etc.) by many authors (e. g., see works by Atiyah and Bott; Boutet de Monvel; Melrose; Nazaikinskii, Savin and Sternin).

We consider a class of elliptic problems associated with actions of groups on manifolds (see for example works by Connes, Antonevich, Lebedev). In the talk, we explain, how to obtain homotopy classification for a class of nonlocal elliptic boundary value problems associated with an action of a discrete group on a manifold with boundary.

The results presented in this talk were obtained in a joint work with Boris Sternin. The work was partially supported by RFBR grants~Nos. 16-01-00373, 15-01-08392.

Elmar Schrohe (Universität Hannover)

Index theory for quantized canonical transformations

Abstract: Let M be a smooth compact manifold and G a finite-dimensional Lie group acting on $L^2(M)$ by quantized canonical transformations. We associate to it an algebra of so-called G-opera-tors in $\mathcal{B}(L^2(M))$. We assign to each operator a symbol in a crossed product algebras with G. Its invertibility implies the Fredholm property of the associated G-operator.

I will also report on recent work towards an index formula for these operators.

(joint work with Anton Savin and Boris Sternin)

David Sher (DePaul University, Chicago)

The heat kernel on surfaces with corners

Abstract: We construct the heat kernel on compact surfaces with piecewise smooth boundary and finitely many corners, including curvilinear polygons, and derive heat trace asymptotics as well as some inverse spectral results. We give results for Dirichlet, Neumann, and Robin boundary conditions, as well as any mixture of the three. Our geometric microlocal construction builds on prior work of Melrose, of Grieser, and of Mazzeo and Vertman. This is joint work with M. Nursultanov and J. Rowlett (Gothenburg).

Michael Singer (University College London)

Gravitational instantons and a proposal of Sen

Abstract: In 1997, Ashoke Sen suggested that D_n gravitational instantons with cubic volume growth could be constructed by gluing the Atiyah—Hitchin manifold (aka the moduli space of strongly centred monopoles of charge 2) into an orbifold quotient of an A_n gravitational instanton, 'explicitly' constructed from the Gibbons—Hawking Ansatz. I shall explain this construction in detail. This is joint work with Bernd Schroers.

Alexander Strohmaier (University of Leeds)

A relativistic trace formula for stationary spacetimes

Abstract: The space of lightlike geodesics on a globally hyperbolic spacetime is naturally a symplectic manifold. Its quantisation leads to the space of solutions of the wave equation. I will explain how this point of view leads naturally to a Duistermaat-Guillemin type trace formula for stationary spacetimes. I will show some examples and discuss the relation to Hadamard states.
(joint work with Steve Zelditch)

Jan Swoboda (Ludwig-Maximilians-Universität, München)

The large scale geometry of the Higgs bundle moduli space

Abstract: In this talk I will explain recent joint work with Rafe Mazzeo, Hartmut Weiß and Frederik Witt on the asymptotics of the natural L^2-metric G_{L^2} on the moduli space $\mathcal{M}$ of rank-2 Higgs bundles over a Riemann surface Σ as given by the set of solutions to the so-called self-duality equations

$$\begin{cases} 0 = \bar{\partial}_A \Phi \\ 0 = F_A + [\Phi \wedge \Phi^*] \end{cases}$$

for a unitary connection A and a Higgs field Φ on Σ. I will show that on the regular part of the Hitchin fibration $(A, \Phi) \mapsto \det \Phi$ this metric is well-approximated by the semiflat metric G_{sf} coming from the completely integrable system on $\mathcal{M}$. This also reveals the asymptotically conic structure of G_{L^2}, with (generic) fibres of the above fibration being asymptotically flat tori. This result confirms some aspects of a more general conjectural picture made by Gaiotto, Moore and Neitzke. Its proof is based on a detailed understanding of the ends structure of $\mathcal{M}$. The analytic methods used there in addition yield a complete asymptotic expansion of the difference $G_{L^2} - G_{\mathrm{sf}}$ between the two metrics.

Valentino Tosatti (Northwestern University)

Hyperkähler metric collapsing to special Kähler metrics

Abstract: Special Kähler geometry was first discovered in the context of $N = 2$ supersymmetric 4D gauge theories, and it also plays a prominent role in mirror symmetry. A key observation of Donagi-Witten is that the base of every algebraic integrable system admits a special Kähler metric, while the total space admits a hyperkähler metric. I will explain how special Kähler geometry arises in the collapsing of hyperkähler metrics on the total space of a compact algebraic integrable system with singularities (i. e. a projective irreducible holomorphic symplectic manifold with a holomorphic Lagrangian torus fibration), when the volume of the torus fibers shrinks to zero. Furthermore, the global collapsed Gromov-Hausdorff limit is equal to the metric completion of the special Kähler metric, it has singularities in real codimension 2, and is homeomorphic to half-dimensional projective space, as predicted by the SYZ conjecture. This solves a conjecture of Kontsevich-Soibelman and Gross-Wilson in this setting. Joint work with Y. Zhang.

Wilderich Tuschmann (KIT Karlsruhe)

On Spaces and Moduli Spaves of Nonnegatively Curved Riemannian Metrics

Abstract: I will report on general results and open questions about spaces and moduli spaces of Riemannian metrics with non-negative Ricci or non-negative sectional curvature on closed and open manifolds.

András Vasy (Stanford University)

The stability of Kerr-de Sitter black holes

Abstract: In this lecture, based on joint work with Peter Hintz, I will discuss Kerr-de Sitter black holes, which are rotating black holes in a universe with a positive cosmological constant, i.e. they are explicit solutions (in 3+1 dimensions) of Einstein's equations of general relativity. They are parameterized by their mass and angular momentum. I will first discuss the geometry of these black holes as well as that of the underlying de Sitter space, and then talk about the stability question for these black holes in the initial value formulation. Namely, appropriately interpreted, Einstein's equations can be thought of as quasilinear wave equations, and then the question is if perturbations of the initial data produce solutions which are close to, and indeed asymptotic to, a Kerr-de Sitter black hole, typically with a different mass and angular momentum. In the second part of the talk I will discuss analytic aspects of the stability problem, in particular showing that Kerr-de Sitter black holes with small angular momentum are stable in this sense.

Chris Wendl (Humboldt Universität zu Berlin)

Some remarks on transversality and symmetry

Abstract: Everyone knows that you can't have transversality and symmetry at the same time. One example important in the study of symplectic manifolds arises from holomorphic curve invariants such as Gromov-Witten theory and Floer homology, where the transversality needed for constructing nice moduli spaces typically cannot be achieved unless multiply covered curves are excluded. In this talk, I will explain why, in a fairly wide variety of settings, the degree of transversality that is achievable without breaking symmetry is in fact much nicer and more useful than commonly known. I will then sketch some specifically symplectic applications, including a proof that the Gromov-Witten invariants of Calabi-Yau 3-folds can be completely localized to a finite disjoint union of embedded holomorphic curves (i. e. the embedded curves are "super-rigid"), plus surprising regularity results for certain moduli spaces of multiply covered curves.

Steven M. Zelditch (Northwestern University)

Nodal intersections and geometric control

Abstract: Let (M, g) be a compact Riemannian manifold and let H be a hypersurfac of M . A well-known problem is to restrict the eigenfunctions ϕ_j of the Laplacian to H and to estimate the L^2 norms of the restrictions. My talk is about lower bounds. In general, there do not exist non-trivial lower bounds since odd eigenfunctions w.r.t. an isometric involution restrict to zero on the fixed point set. But I will show that if H is “asymmetric” w.r.t. geodesics and if almost every geodesic hits H , then the exist lower bounds for almost the entire sequence of eigenfunctions. The lower bound implies upper bounds on intersections of nodal sets with H .