Workshop

Geometry in May

May 2-3. 2017
Department of Mathematics and Statistics
University of Helsinki

Venue: Exactum, seminar rooms B121 and C323.

Schedule

	Tuesday
	(C323)
12.15	Jeff Lindquist
13.15	Janne Junnila
14.15	Martina Aaltonen
15.00	[coffee]
16.00	Otte Heinävaara
17.00	Eden Prywes

	Wednesday
	(C323)
10.15	Federica Fanoni
11.15	Angela Wu
12.00	[lunch]
13.15	Ilmari Kangasniemi
	(B121)
14.15	Lauri Hitruhin
15.00	[coffee]
15.30	Dimitrios Ntalampekos

Organizers: Mario Bonk, Pekka Pankka, and Eero Saksman.

Titles and abstracts

Tuesday

Jeff Lindquist (UCLA)

Weak capacity, modulus comparability, and quasisymmetric uniformization.

Abstract: We construct and use a hyperbolic filling of a Q-regular compact doubling metric space Z to define the notion of the weak p-capacity between appropriate subsets of Z. This notion extends modulus and is preserved up to constants by quasisymmetric maps. As an application, using weak 2-capacity bounds we will discuss a version of a result by M. Bonk and B. Kleiner on the quasisymmetric uniformization of topological 2-spheres.

Janne Junnila (Helsinki)

On non-Gaussian multiplicative chaos

Abstract: Random distributions (generalized functions) known as Gaussian multiplicative chaos are an active area of research with connections to e.g. random matrices and number theory. In this talk we introduce non-Gaussian generalizations of these distributions and discuss their existence and other basic properties.

Martina Aaltonen (Helsinki)

Non-manifold monodromy spaces of branched covers between manifolds.

Abstract: Berstein and Edmonds showed that every proper branched cover F between compact manifolds is a factor of a branched covering orbit map from a locally connected and locally compact Hausdorff space called the monodromy space of F. For proper branched covers between 2-manifolds the monodromy space is known to be a manifold. In this talk I introduce the construction of the monodromy space of a branched cover between compact manifolds. Then I show that the 2-dimensional result does not generalize to dimension 3 by constructing a self-map of the 3-sphere for which the monodromy space is not a locally contractible space.

Otte Heinävaara (Helsinki)

Matrix monotone functions

Abstract: 'Matrix monotonicity' is the notion one gets by combining functional calculus and Löwner order on Hermitian matrices. We discuss classic and recent characterizations for the class of matrix monotone functions.

Eden Prywes (UCLA)

The Rickman-Picard Theorem

Abstract: The Rickman-Picard Theorem is a generalization of the classical Picard Theorem from Complex Analysis. It states that a Quasiregular Mapping $f : \mathbb{R}^n \to \mathbb{R}^n$ can omit at most q points, where q depends only on n and the distortion of f. I will briefly discuss previous proofs of this fact and then present an original proof for the theorem. The method used comes from potential theory for p-harmonic differential forms.

Wednesday

Federica Fanoni (Heidelberg)

Basmajian-type inequalities for maximal representations

Abstract: Basmajian's celebrated identity gives a way to compute the length of the boundary of a hyperbolic surface in terms of the lengths of the so-called orthogeodesics (geodesics orthogonal to the boundary at both endpoints). This identity can be generalized to the context of maximal representations. This is a class of representations of the fundamental group of a surface that can be seen as a generalization of Teichmüller space. I will describe the classical identity, introduce maximal representations and discuss Basmajian's identity in this setup. Joint work with Beatrice Pozzetti.

Angela Wu (UCLA)

Solenoid

Abstract: A solenoid is the inverse limit of a system of compact spaces given by a dynamics on the sphere. In this talk, we will look at some interesting topological and geometric properties of the solenoid, and see how a solenoid encodes informations of the dynamics.

Ilmari Kangasniemi (Helsinki)

Uniform cohomological expansion of uniformly quasiregular mappings

Abstract: Let f be a uniformly quasiregular map on a closed oriented n-manifold M. In an upcoming paper with Pekka Pankka, we prove that the induced map $f^*\colon H^k(M;\mathbb{R}) \to H^k(M;\mathbb{R})$ of f in the k:th singular cohomology with real coefficients is complex diagonalizable, and furthermore, all complex eigenvalues of f^* have an absolute value of $(\deg f)^{k/n}$. As a consequence, this yields a limitation on the possible values of $\deg f$ if the manifold M has nontrivial cohomology.

Lauri Hitruhin (Helsinki)

On multifractal spectra of mappings with integrable distortion

Abstract: We sketch sharp bound for the stretching multifractal spectra of planar mappings with integrable distortions, that is, we find the maximum size of the set in which a mapping with integrable distortion can satisfy some stretching conditions. We will also mention how finding sharp multifractal spectra gives optimal area contraction results.

Dimitrios Ntalampekos (UCLA)

Uniformization of Sierpinski carpets by square carpets.

Abstract: Uniformization of metric spaces is the problem of finding conditions on a metric space, under which it can be transformed to a canonical space, by a map that preserves the geometry. In this talk, our metric space will be planar Sierpinski carpets, and the canonical spaces are square Sierpinksi carpets. We prove that every Sierpinski carpet, under certain geometric assumptions, can be mapped by a quasisymmetric map to a square carpet. This is achieved with the aid of carpet-harmonic functions, which is a discrete notion of harmonic functions on Sierpinski carpets.