Program

Saturday (February 13)

13:30 – 14:20 Dounnu Sasaki (Waseda University)
The space of subset currents on a surface group

14:30 –15:20 Masanori Amano (Tokyo Institute of Technology)
On asymptotic Jenkins-Strebel rays and a global coordinate of the Teichmüller space

15:50 – 16:40 Eiko Kin (Osaka University)
Braids, free group automorphisms and orderings

Sunday (February 14)

10:00 –10:50 Tomoshige Yukita (Waseda University)
On the arithmetic property of the growth rate of 3-dimensional hyperbolic Coxeter groups

11:00 – 11:50 Ken'ichi Ohshika (Osaka University)
Asymptotic behaviour of hyperbolic surface bundles

Lunch

13:30 – 14:20 Masashi Kisaka (Kyouto University)
Julia sets in the Mandelbrot set and small Mandelbrot sets

14:30 –15:20 Takayuki Masuda (Osaka University)
Deforming affine Lorentzian transformation groups and deforming hyperbolic structures

15:50 – 16:40 Shinpei Baba (Universität Heidelberg)
Neck-pinching of CP^1-structures

Monday (February 15)

9:00 – 9:50 DaisukeYamaki (Tokyo Institute of Technology)
Relations between holomorphic 1-forms and holomorphic 1-cochains on Riemann surfaces

10:00 –10:50 Masahiro Yanagishita (Waseda University)
Weil-Petersson metric on the square integrable Teichmüller space

11:10 – 12:00 Makoto Sakuma (Hiroshima University)
Parabolic generating pairs of 2-bridge link groups and Heckoid groups

Lunch

13:30 – 14:20 Mikio Furokawa (Hiroshima University)
On commensurability between once-punctured torus groups and once-punctured Klein bottle groups

14:30 –15:20 Johannes Jaerisch (Shimane University)
Critical exponents of normal subgroups of a Kleinian group

Abstract

Saturday (February 13)

Dounnu Sasaki (Waseda University)

The space of subset currents on a surface group

Subset currents are defined on hyperbolic groups. For each subgroup of a hyperbolic group G we can define its limit set, which is a closed "subset" of the boundary ∂G of G. Using a metric of ∂G, we can measure the distance between each limit set, which implies that we can measure the distance between each subgroup. Subset currents is a generalization of the above method to measure the distance between each subgroup. Kapovich and Nagnibeda introduced the space of subset currents on a hyperbolic group as a generalization of geodesic currents on a hyperbolic group, and obtained interesting results in the case of free groups in 2013. In this talk, I will talk about some new results on the space of subset currents on a surface group.

Masanori Amano (Tokyo Institute of Technology)

On asymptotic Jenkins-Strebel rays and a global coordinate of the Teichmüller space

In this talk, we give a parametrization of asymptotic Jenkins-Strebel rays. It is a kind of global coordinates of the Teichmüller space. For any admissible curve family of a surface, the subset of the boundary of the Teichmüller space which is constructed by pinching of the given curve family can be determined. There exists a homeomorphism of the product of the boundary space and several parameter spaces onto the Teichmüller space such that asymptotic Jenkins-Strebel rays are represented by these parameters. We will explain the constitution method of the homeomorphism, and show some estimations of the Teichmüller distance when each parameters varies.

Eiko Kin (Osaka University)

Braids, free group automorphisms and orderings

Braids represent mapping classes of the punctured disk, and hence they induce automorphisms of the fundamental group of the punctured disk, i.e, free group automorphisms. It is well-known that the free groups are bi-orderable. We consider which braid preserves some bi-ordering of the free group. Once we know a given braid preserves some bi-ordering of the free group, the fundamental group of the mapping torus by the braid monodromy is bi-orderable. By using a criterion by Perron-Rolfsen together with a technique on the disk twists, we give new examples of links in the 3-sphere whose fundamental groups of the link exteriors are bi-orderable, for example, the Whitehead link, the minimally twisted 4- and 5-chain links. We also give an infinite sequence of pseudo-Anosov braids which do NOT preserve any bi-orderings of the free groups. Our sequence includes pseudo-Anosov n-braids with the smallest dilatation for $n = 3, 4, 5, 7, 8$. This is a joint work with Dale Rolfsen (University of British Columbia).

Sunday (February 14)

Tomoshige Yukita (Waseda University)
On the arithmetic property of the growth rate of 3-dimensional hyperbolic Coxeter groups

Let P be a hyperbolic Coxeter polyhedron in $\overline{\mathbb{H}}^3$. The set S of reflections with respect to facets of P generates the discrete group G, called the hyperbolic Coxeter group associated to P. Then $\tau = \limsup_{k\to\infty} \sqrt[k]{a_k}$ is called the growth rate of G, where a_k is the number of elements of G whose word lengths with respect to S are equal to k. It is known that τ is a real algebraic integer bigger than 1. In this talk, we consider 3-dimensional hyperbolic Coxeter groups and show that their growth rates are always Perron numbers, where a real algebraic integer $\tau > 1$ is called a Perron number if all its algebraic conjugates are less than τ in absolute value.

Ken'ichi Ohshika (Osaka University)
Asymptotic behaviour of hyperbolic surface bundles

Recently there is a big progress in the study of hyperbolic surface bundles, which makes it possible to relate volumes and translation lengths of monodromies to each other, as can been seen in the inequalities of Brock, Kin-Kojima-Takasawa, and Kojima-McShane. In this talk, we shall give a classification of geometric limits of hyperbolic surface bundles, and try to get some insights into the meaning of these inequalities.

Masashi Kisaka (Kyoto University)
Julia sets in the Mandelbrot set and small Mandelbrot sets

If we zoom in a certain part of the Mandelbrot set, we can see a figure J' which is very similar to a certain Julia set. Furthermore, as we zoom in the middle part of J', we can see a certain nested structure which is similar to the iterated preimages of J' by z^2 and finally a small Mandelbrot set M' appears. We explain how to formulate this phenomena which is observed by computer graphics and show that this actually occurs. Also we show that this kind of nested structure exists in J_c for c in M'.

Takayuki Masuda (Osaka University)
Deforming affine Lorentzian transformation groups and deforming hyperbolic structures

In this talk, we will describe affine Lorentzian transformation groups with the linear parts fixed, through two main theorems. Firstly, we show that the deformation space of affine Lorentzian transformation groups has a certain canonical correspondence to Fenchel-Nielsen coordinates of the hyperbolic structures. Secondly, we introduce the relation found by W.Goldman and G.Margulis at 2000, which connects a Lorentzian transformation with a deformation of hyperbolic structures. Using it, we show that there exists an affine Lorentzian transformation corresponding to the Fenchel-Nielsen twists in the hyperbolic geometry.

Shinpei Baba (Universität Heidelberg)
Neck-pinching of CP^1-structures

We consider a diverging one-parameter family of marked CP^1-structures such that their holonomy representations converge in the PSL(2,C)-character variety. Under the assumption that the conformal structures of the CP^1-structures are "pinched" along the union of disjoint loops, we show that the family of the CP^1-structures converges to a noded CP^1-structure.

Monday (February 15)

DaisukeYamaki (Tokyo Institute of Technology)
Relations between holomorphic 1-forms and holomorphic 1-cochains on Riemann surfaces

In this talk, we consider the relations between holomorphic 1-forms and holomorphic 1-forms on closed Riemann surfaces with triangulations. Holomorphic 1-cochains are defined by Scott O. Wilson by using the combinatorial Hodge theory and Wilson also showed that holomorphic 1-cochains satisfy Riemann's bi-linear relations. Using Riemann's bi-linear relations, we may define an isomorphism from holomorphic 1-forms to holomorphic 1-cochains and show that holomorphic 1-cochains provide an approximation of holomorphic 1-forms with respect to the isomorphism.

Masahiro Yanagishita (Waseda University)
Weil-Petersson metric on the square integrable Teichmüller space

The Weil-Petersson metric is a Hermitian metric defined originally on finite dimensional Teichmüller spaces. Recently, some mathematicians have been studying the Weil-Petersson metric defined on a certain metric subspace of infinite dimensional Teichüller spaces, which we call the square integrable Teichmüller space. In this talk, we will show that the Weil-Petersson metric on the square integrable Teichmüller space of Riemann surfaces with a certain geometric condition is a Kähler metric and that some curvatures induced by this metric are negative. These results were originally given by Ahlfors in the Teichmüller space of compact Riemann surfaces and correspond to an extension to the infinite dimensional case.

Makoto Sakuma (Hiroshima University)
Parabolic generating pairs of 2-bridge link groups and Heckoid groups

At a conference in Budapestin in 2002, Ian Agol announced (i) classification of non-free Kleinian groups generated by two parabolic transformations, and (ii) classification of parabolic generating pairs of each of such groups. In the first part of this talk, I will talk about an approach to an alternative proof of the result (ii) by using small cancellation theory, Alexander invariants and a geometric observation suggested by Michel Boileau (joint work with Shunsuke Aimi and Donghi Lee). In the second part of the talk, I will explain Agol's beautiful geometric argument by using checkerboard surfaces and Klein combination theorem.

Mikio Furokawa (Hiroshima University)
On commensurability between once-punctured torus groups and once-punctured Klein bottle groups

The once-punctured torus and the once-punctured Klein bottle are topologically commensurable, namely, both of them are doubly covered by the twice-punctured torus. Thus we can introduce a notion of "commensurability" between PSL(2,C)-representations of their fundamental groups. In this talk, we give a condition for a faithful type-preserving PSL(2,C)-representation of the fundamental group of the once-punctured Klein bottle to be commensurable with that of the once-punctured torus. We also show that such a pair of PSL(2,C)-representations extend to a representation of the fundamental group of a common quotient orbifold.

Johannes Jaerisch (Shimane University)
Critical exponents of normal subgroups of a Kleinian group

For a Kleinian group G we denote by $\delta(G)$ the critical exponent of the Poincaré series of G. For a given Kleinian group G we discuss results on the critical exponent $\delta(N)$ for a normal subgroup N of G. We give a proof of a result of Falk/Stratmann and Roblin which states that $\delta(N)$ is bounded below by half of $\delta(G)$ and that this inequality is strict whenever G is of divergence type. If G uniformizes a compact surface, then a result of Bonfert-Taylor/Matsuzaki/Taylor states that there exists a sequence of normal subgroups N_k of G such that $\delta(N_k)$ tends to $1/2$, as k tends to infinity. We state a corresponding result for normal subgroups of a free group acting on the Cayley graph. This is a joint work with K. Matsuzaki.