MINI-WORKSHOP "GROWTH 5"

1. Program and schedule

The workshop will start at 10:20 on Saturday 10 January 2026 and end on Sunday 11 January 2026 in the afternoon. The talks of the workshop will take place in Room 401 on the 4th floor of Building 14 of Waseda Campus.

January 10 (Sat.)
10:20: Opening
10:30–11:20： Eiko Kin
11:40–12:30： Eriko Hironaka
Lunch
14:00–14:50： Livio Liechti
Coffee break
15:20–16:10： Jun Murakami
16:30–17:20： Ruth Kellerhals
Group photo
18:30–： Workshop dinner at Quatre Fontaines

January 11 (Sun.)
10:30–11:20： Masato Mimura
11:40–12:30： Jun Nonaka
Lunch
14:00–14:50： Makoto Sakuma
15:10–16:00： Tomoshige Yukita
Closing with coffee and cakes

2. Talks - titles and abstracts

Eiko Kin (Osaka University): Braids, stretch factors and periodic solutions of the planar N-body problem

We consider collision-free periodic motions of N points in the plane. When time is taken as a third axis, the trajectories of these N points form an N-braid. In particular, periodic solutions of the planar N-body problem give rise to such N-braids. A primitive braid arising from the figure-eight solution in the 3-body problem, proved by Chenciner and Montgomery is the simplest pseudo-Anosov 3-braid. Which braid types can be realized as periodic solutions of the N-body problem? If the braid type is pseudo-Anosov, which stretch factors can occur? I will report recent progress about these questions. This talk is based on joint work with Yuika Kajihara and Mitsuru Shibayama.

Eriko Hironaka (Florida State University): Coxeter links, and birational automorphisms of the complex projective plane

The study of Lehmer's number has revealed unexpected connections between objects coming from group actions on inner product spaces, associated hyperbolic links and pseudo-Anosov mapping classes, and birational automorphisms of the complex plane. In this talk we survey some of these connections focussing on examples associated to the E_n Coxeter systems.

Jun Murakami (Waseda University): Complexified tetrahedrons and double twist knots

Complexified tetrahedrons are introduced as deformations of the regular ideal octahedron in the hyperbolic space. We see that the complement of a double twist knot is divided into two congruent complexified tetrahedrons. As an application, the volume conjecture for the double twist knots is proved.

Livio Liechti (University of Fribourg): Minimal stretch factors of orientation-reversing pseudo-Anosov maps

It is a notoriously difficult problem to find the minimal stretch factor among all pseudo-Anosov maps of a given surface. In the classical case of closed orientable surfaces and orientation-preserving pseudo-Anosov maps, this problem is only solved in genus one and two. In this talk, we determine the orientation-reversing minimisers in genus two, three and potentially four. This is based on joint work in progress with P. Dehornoy, E. Lanneau and Q. Perroud.

Ruth Kellerhals (University of Fribourg): On the growth of hyperbolic Coxeter groups

Abstract: I shall present some results and speculations about growth of hyperbolic Coxeter groups, its arithmetic nature and connection to hyperbolic volume.

Masato Mimura (Tohoku University): Invariant quasimorphisms

Joint work with Morimichi Kawasaki (Hokkaido), Mitsuaki Kimura (Osaka Dental), Shuhei Maruyama (Kanazawa) and Takahiro Matsushita (Shinshu). For a pair (G, N) of a group and a normal subgroup, we can define a notion of G-invariant quasimorphisms on N. This concept may be regarded as a "quasification" of that of invariant homomorphisms. We will give an invitation to this notion, with describing why this "quasification" is interesting.

Jun Nonaka (Waseda University Junior and Senior High School): Volumes and arithmeticity of $\pi/3$-equiangular hyperbolic polyhedra

A hyperbolic polyhedron is called $\pi/3$-equiangular if all its diherdral angles are equal to $\pi/3$. Atkinson showed that ideal regular tetrahedron had the smallest volume among all $\pi/3$-equiangular hyperbolic polyhedra in 2009. In this talk, we show that ideal regular cube has the second smallest volume and pentagonal prism has the third smallest volume among $\pi/3$-equiangular polyhedra. This is joint work with Han Yoshida.

Makoto Sakuma (Osaka Central Advanced Mathematical Institute and Hiroshima University): Topological Models for Spherical CR Uniformizations

A spherical CR uniformization of a 3-manifold M realizes M as O/G, where G is a discrete subgroup of PU(2,1), the holomorphic isometry group of the complex hyperbolic plane, and O is the domain of discontinuity of G in the ideal boundary. The first example of a closed (real) hyperbolic 3-manifold admitting such a structure was given by Richard Evan Schwartz, by using a complex hyperbolic triangle group. In this talk, I will explain the purely combinatorial aspect of my joint work in progress with Yohei Komori and John Parker. This work constitute the first step of Parker's project, which aims to extend Schwartz's construction to a much broader class of complex hyperbolic triangle groups. I will emphasize the analogy with the combinatorial structure of the Ford domains of punctured torus Kleininan groups acting on real hyperbolic 3-space.

Tomoshige Yukita (Ashikaga University): On the arithmetic properties of growth rates of 2- and 3-dimensional Coxeter systems

In 1980, Cannon studied the growth series of closed surface groups and triangle groups and showed that their growth rates are Salem numbers, a special class of real algebraic integers. Following Cannon's work, the growth rates of discrete reflection groups in hyperbolic spaces have been studied from an arithmetic viewpoint. In this talk, we focus on 2- and 3-dimensional Coxeter systems and discuss the relationship between the arithmetic properties of their growth rates and the Euler characteristics of their nerves.